California High-Speed Rail Authority

San Jose to Merced Project Section

Draft Environmental Impact Report/ Environmental Impact Statement

Section 3.7
Biological and Aquatic Resources

April 2020

CALIFORNIA High-Speed Rail Authority

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being or have been carried out by the State of California pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated July 23, 2019, and executed by the Federal Railroad Administration and the State of California.

TABLE OF CONTENTS

Tables

Figures

ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
APLIC	Avian Power Line Interaction Committee
ATC	automatic train control
Authority	California High-Speed Rail Authority
BA	biological assessment
BGEPA	Bald and Golden Eagle Protection Act
BMP	best management practice
BRMP	biological resources management plan
C.F.R.	Code of Federal Regulations
Caltrans	California Department of Transportation
CCC	central California coast
CCED	California Conservation Easement Database
CDFW	California Department of Fish and Wildlife
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CMP	compensatory mitigation plan
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CNPS Online Inventory	*CNPS Online Inventory of Rare and Endangered Plants of California*
CPAD	California Protected Areas Database
CRPR	California Rare Plant Rank
CVJV	Central Valley Joint Venture
CWA	Clean Water Act
dBA	A-weighted decibel
ECOS	*Environmental Conservation Online System*
EFH	essential fish habitat
EIR	environmental impact report
EIS	environmental impact statement
EMMA	Environmental Mitigation Management and Assessment system
ESA	environmentally sensitive area
FAST Act	Fixing America’s Surface Transportation Act
Fed. Reg.	*Federal Register*
FESA	federal Endangered Species Act
FRA	Federal Railroad Administration

GAMMP	groundwater adaptive management and monitoring plan
GEA	Grasslands Ecological Area
GIS	geographic information system
GPS	global positioning system
Greenprint	*Santa Clara Valley Greenprint*
HCP	habitat conservation plan
HUC	hydrologic unit code
I-	Interstate
IAMF	impact avoidance and minimization feature
IBA	National Audubon Society's Important Bird Area
Magnuson-Stevens Act	Magnuson-Stevens Fisheries Conservation and Management Act
MBTA	Migratory Bird Treaty Act
MOWF	maintenance of way facility
Mph	miles per hour
NCCP	natural community conservation plan
NCCPA	Natural Community Conservation Planning Act
NHD	National Hydrography Dataset
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NPPA	Native Plant Protection Act
O&M	operations and maintenance
OCS	overhead contact system
PBF	physical or biological feature
PCE	primary constituent element
PG&E	Pacific Gas and Electric Company
PL	Public Law
project, project extent	San Jose to Central Valley Wye Project Extent
RRP	restoration and revegetation plan
RSA	resource study area
RWQCB	Regional Water Quality Control Board
SCCC	south-central California coast
SCVHA	Santa Clara Valley Habitat Agency
SCVHP	*Santa Clara Valley Habitat Plan*
SCVOSA	Santa Clara Valley Open Space Authority
SR	State Route
SWRCB	State Water Resources Control Board

TCE	temporary construction easement
U.S.C.	United States Code
UPR	Upper Pajaro River
UPRR	Union Pacific Railroad
USACE	U.S. Army Corps of Engineers
USACE Arid West Supplement	*Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region*
USACE Delineation Manual	*Corps of Engineers Wetlands Delineation Manual*
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VCP	vegetation control plan
VMT	vehicle miles traveled
WCA	Wildlife Corridor Assessment
WCP	weed control plan
WEAP	worker environmental awareness program
WEF	wildlife exclusion fencing

3.7 Biological and Aquatic Resources

3.7.1 Introduction

This section describes biological and aquatic resources in the resource study areas (RSA), describes the sources and methods used to characterize these resources, evaluates the potential for construction and operation of the San Jose to Central Valley Wye Project Extent (project or project extent) to affect these resources, and proposes mitigation measures to reduce those impacts.

The *San Jose to Merced Project Section: Biological and Aquatic Resources Technical Report* (Biological and Aquatic Resources Technical Report) (Authority 2020a) and the *San Jose to Merced Project Section: Aquatic Resources Delineation Report* (Authority 2019a) provide additional technical details on biological and aquatic resources and serve as sources for this analysis. Supporting information pertaining to biological and aquatic resources is provided in the following technical appendices in Volume 2 of this Draft environmental impact report (EIR)/environmental impact statement (EIS):

- Appendix 2-D, Applicable Design Standards, provides the list of design standards for the project alternatives that have bearing on biological and aquatic resources.
- Appendix 2-J, Regional and Local Plans and Policies, provides a list by resource of all applicable regional or local plans and policies.
- Appendix 3.7-A, Special-Status Species Potentially Affected by the Project, provides a list of special-status species with the potential to be affected and the rationale for their inclusion or dismissal.
- Appendix 3.7-B, Scientific Nomenclature, provides a list of the common and scientific names of all species mentioned in the text.

In addition to the analysis presented in this section and the relevant appendices, five other Draft EIR/EIS sections provide analyses of topics that can also be relevant to biological and aquatic resources:

- Section 3.4, Noise and Vibration, discusses noise and vibration that would result from construction and operations of the project. Potential impacts of noise and vibration on wildlife are based on information provided in the *High-Speed Ground Transportation Noise and Vibration Impact Assessment Manual* (FRA 2012).
- Section 3.8, Hydrology and Water Resources, discusses existing surface water hydrology, water quality, groundwater, and floodplains, and identifies potential impacts on these resources for each project alternative.
- Section 3.14, Agricultural Farmland, discusses the range of impacts on agricultural lands that may overlap with the biological resources discussed and evaluated in this section.
- Section 3.18, Regional Growth, includes a discussion of growth-inducing impacts.
- Section 3.19, Cumulative Impacts, describes the cumulative impacts of this and other past, present, and reasonably foreseeable future projects.

3.7.1.1 Definition of Terminology

Land Cover Types

For the purposes of this section, a *land cover type* is the dominant character of the land surface discernible from aerial photographs, as determined by vegetation, water, or human uses. Land cover types are the most widely used units in analyzing ecosystem function, habitat diversity, natural communities, aquatic resources, and species habitat, and provide the foundation for analyzing impacts on biological resources (e.g., special-status plant communities, aquatic resources). More information on land cover mapping and interpretation is provided in Section 3.7.5, Methods for Evaluating Impacts.

Several terms related to land cover types and vegetation are used in this analysis. The primary reference for describing vegetation in California is the *Manual of California Vegetation* (Sawyer et al. 2009; CNPS 2017), a prominent scientific publication distributed by the California Native Plant Society (CNPS) in collaboration with the California Department of Fish and Wildlife (CDFW) that has been adopted as the standard for vegetation classification and description by state and federal agencies. Definitions of *Manual of California Vegetation* terms used or referenced in this report are:

- **Alliance**—A classification unit of vegetation, containing one or more associations and defined by one or more diagnostic species, often of high cover, in the uppermost layer or the layer with the highest canopy cover.
- **Association**—A vegetation classification unit defined by a diagnostic species, a characteristic range of species composition, physiognomy, and distinctive habitat conditions.
- **Community**—A group of organisms living together and linked together by their effects on one another and their responses to the environment they share.
- **Habitat**—The biological and environmental conditions associated with a vegetation type, including "the resources and conditions present in an area that enable occupancy—including survival and reproduction—by a given organism" (Hall et al. 1997).
- **Natural community**—See *plant community*.
- **Plant community**—A group of plant species living together and linked together by their effects on one another and their responses to the environment they share (CNPS 2017). Synonymous with *natural community* for the purposes of this analysis.
- **Vegetation type**—A classification unit of vegetation at any level in the National Vegetation Classification hierarchy (e.g., alliance, association), or a unit used when vegetation has not been classified formally to a specific level. A vegetation type is typically defined on the basis of shared floristic or physiognomic characteristics. It is comparable to a taxon in plant classification.

Special-Status Species

For the purposes of this analysis, *special-status species* are defined as follows:

- Plants or wildlife listed or proposed for listing as threatened or endangered under the federal Endangered Species Act (FESA) (16 United States Code [U.S.C.] § 1531 et seq.).
- Plants or wildlife listed or candidates for listing as threatened or endangered under the California Endangered Species Act (CESA) (California [Cal.] Fish and Game Code §§ 2050–2085).
- Plants listed as rare under the California Native Plant Protection Act (NPPA) (Cal. Fish and Game Code §§ 1900–1913).
- Plants assigned to California Rare Plant Ranks (CRPR) 1A, 1B, 2A, 2B, and 3 (CNPS 2018):
  - 1A—Plants presumed extirpated in California and either rare or extinct elsewhere.
  - 1B—Plants rare, threatened, or endangered in California and elsewhere.
  - 2A—Plants presumed extirpated in California but common elsewhere.
  - 2B—Plants rare, threatened, or endangered in California but more common elsewhere.
  - 3—Plants about which more information is needed.
- Wildlife species, subspecies, or distinct populations designated as California species of special concern by the CDFW.
- Wildlife designated as Fully Protected (Cal. Fish and Game Code §§ 3511 [birds], 4700 [mammals], 5515 [fish], and 5050 [reptiles and amphibians]).
- Plants or wildlife determined to meet the definitions of rare or endangered under Sections 15380 and 15125 of the California Environmental Quality Act (CEQA) Guidelines.

Although not defined as special-status species per se, *critical habitat* and *essential fish habitat* are also addressed in this section since they refer to geographic areas or features that the U.S. Fish and Wildlife Service (USFWS) or National Marine Fisheries Service (NMFS) have designated as important for the conservation of federally listed species or federally managed fisheries, respectively. These designations are further described in the following subsections.

Critical Habitat

Critical habitat is a specific, formally designated geographic area(s) that contains *physical or biological features* (see definition below) essential for the conservation of a threatened or endangered species and that may require special management and protection.

Physical or biological features (PBF) refer to those physical and biological features that are essential to a listed species' conservation within an area formally designated as critical habitat for that species (50 Code of Federal Regulations [C.F.R.] § 424.12).

Primary constituent elements (PCE) was a term introduced in the critical habitat designation regulations (50 C.F.R. § 424.12) to describe aspects of PBFs that are referenced in the statutory definition of critical habitat. In 2016, USFWS removed the PCE term and returned to the statutory term PBFs (81 Fed. Reg. 7214). The shift in terminology, however, does not change the approach used in conducting an analysis of impacts on critical habitat, which is the same regardless of whether the original designation identified PCEs, PBFs, or both. Although the critical habitat designations as published for the species assessed herein identified PCEs, this report uses the term PBF in place of the term PCE, consistent with the 2016 revised regulation.

Essential Fish Habitat

Essential fish habitat (EFH) is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." For the purposes of interpreting the definition of EFH, *waters* include aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may include areas historically used by fish where appropriate; *substrate* includes sediment, hard bottom, structures underlying the waters, and associated biological communities; *necessary* means habitat required to support a sustainable fishery and a healthy ecosystem; and *spawning, breeding, feeding, or growth to maturity* covers a species' full life cycle. The following characteristics of EFH must be adequate for spawning, rearing, and migration:

- Substrate composition
- Water quality
- Water quantity, depth, and velocity
- Channel gradient and stability
- Food
- Cover and habitat complexity
- Space
- Access and passage
- Habitat connectivity

The Magnuson-Stevens Fisheries Conservation and Management Act (Magnuson-Stevens Act) requires all federal agencies to consult with the NMFS on all actions or proposed actions permitted, funded, or undertaken by the federal agency that may adversely affect EFH. *Adversely affect* means any effect that reduces the quality or quantity of EFH. Adverse effects may include direct (e.g., contamination, physical disruption), indirect (e.g., loss of prey), site-specific, or habitat-wide effects, including individual, cumulative, or synergistic consequences of actions (PFMC 2014).

Non-Special-Status Wildlife

For the purposes of this analysis, *non-special-status wildlife* is an umbrella term for wildlife species or species groups that do not meet the definition of a special-status species as defined earlier in this section, but that may still be affected by construction and operations of the project,

including native birds protected under the Migratory Bird Treaty Act (MBTA) and Cal. Fish and Game Code Section 3503, as well as species groups of regional or international conservation concern (e.g., waterfowl and shorebirds, roosting bats).

Special-Status Plant Communities

Special-status plant communities are plant communities that are of limited distribution statewide or within a county or region, and that are often vulnerable to the environmental effects of projects (CDFG 2009). The CDFW maintains a *California Sensitive Natural Community List* (CDFW Sensitive Community List) (CDFW 2018a). This list is based on the *Manual of California Vegetation* (Sawyer et al. 2009) and assigns global and state rarity rankings based on NatureServe's Heritage Program methodology (Master et al. 2012). Communities with state ranks of S1–S3 are considered "highly imperiled," and effects on these communities are typically considered significant by the CDFW. State ranks S1–S3 are defined as follows:

- S1: Fewer than 6 viable occurrences or up to 1,280 acres statewide
- S2: 6–20 viable occurrences or 1,280–6,400 acres statewide
- S3: 21–100 viable occurrences or 6,400–32,000 acres statewide

The rarity ranking is sometimes modified by an additional threat ranking:

- 0.1: Very threatened
- 0.2: Threatened
- 0.3: No current threat known

Aquatic Resources

Aquatic resources within the aquatic resources study area are wetlands and nonwetland waters that are considered jurisdictional under Section 404 of the federal Clean Water Act (CWA), collectively called waters of the U.S., waters of the state regulated under the Porter-Cologne Water Quality Control Act, and aquatic and other related resources regulated under Cal. Fish and Game Code Section 1600 et seq. The U.S. Army Corps of Engineers (USACE) regulates federal waters, the State Water Resources Control Board (SWRCB) regulates waters of the state, and CDFW regulates lakes, streambeds and banks (often including adjacent riparian vegetation). The definitions of the regulatory categories for aquatic resources are presented in this section. Confirmation of these resources as jurisdictional by USACE, or regulated by SWRCB or CDFW, would be obtained through the regulatory permitting process. The project extent crosses areas under the jurisdiction of two USACE districts: the Sacramento District and the San Francisco District.

Waters of the U.S., including Wetlands (Clean Water Act § 404)

The federal CWA (33 U.S.C. § 1251 et seq.) defines *waters of the U.S.* as follows:

> *(1) all waters that are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters that are subject to the ebb and flow of the tide; (2) all interstate waters including interstate wetlands; (3) all other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation, or destruction of which could affect interstate or foreign commerce; (4) all impoundments of waters otherwise defined as waters of the U.S.; (5) tributaries to the foregoing types of waters; and (6) wetlands adjacent to the foregoing waters (33 C.F.R. § 328.3(a)).*

Wetlands are a sub-classification of waters of the U.S. The term *nonwetland waters* is used to describe waters of the U.S. exclusive of wetlands.

According to the *Corps of Engineers Wetlands Delineation Manual* (USACE Delineation Manual) (Environmental Laboratory 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (Version 2.0) (USACE Arid West Supplement) (USACE 2008a), three criteria must be satisfied to classify an area as a wetland. These criteria are: (1) a predominance of plant life that is adapted to life in wet conditions (hydrophytic

vegetation); (2) soils that saturate, flood, or pond long enough during the growing season to develop anaerobic conditions in the upper part (hydric soils); and (3) permanent or periodic inundation or soil saturation, at least seasonally (wetland hydrology).

Waters of the State (Porter-Cologne Water Quality Control Act)

Waters of the state are broadly defined by the Porter-Cologne Water Quality Control Act (Cal. Water Code § 13050(e)) to mean any surface water or groundwater, including saline waters, within the boundaries of the state. Under this definition, isolated wetlands that may not be subject to regulation under federal law are considered waters of the state and regulated accordingly.

On April 2, 2019, the SWRCB adopted its proposed State Wetland Definition and Procedures for Discharges of Dredge or Fill Material to Waters of the State (Procedures). Among other provisions, the Procedures define certain *wetlands* as *waters of the state* under the Porter-Cologne Water Quality Control Act. The Procedures also provide a jurisdictional framework for the determination of aquatic features as wetlands. Such wetland features under the Procedures are identified and analyzed as *aquatic resources* throughout this document. Compliance with the SWRCB Procedures for the project would be achieved through adherence to the provisions set forth in a Memorandum of Understanding between the SWRCB and the California High-Speed Rail Authority (Authority) dated January 19, 2017, and amended March 11, 2019.

California Fish and Game Code Section 1600 et seq.

Pursuant to Cal. Fish and Game Code Section 1600 et seq., CDFW regulates activities of an applicant's project that would substantially alter the flow, bed, channel, or bank of streams or lakes, unless certain conditions outlined by CDFW are met by the applicant. Under Cal. Fish and Game Code Section 1602, the CDFW takes jurisdiction over rivers, streams, and lakes. The state's jurisdiction generally includes the streambed/lakebed to tops of bank. Although not specifically defined in Cal. Fish and Game Code Section 1602, jurisdiction in some instances may include adjacent riparian vegetation. A riparian area consists of the transitional habitat between terrestrial and aquatic ecosystems, specifically the vegetated areas between a riverine feature and the outer drip line of the adjacent vegetation. In practice, CDFW has extended its authority to the top of a bank of a stream, the bank of a lake, or outer edge of the riparian vegetation, whichever is wider. The term *stream* is commonly understood as a watercourse having a source and terminus, banks and channel, through which waters flow, at least periodically. A *streambed* under Section 1602 includes the channel of a watercourse, which is generally defined to include the depression between the banks worn by the regular and usual flow of the water.

Protected Trees

Protected trees are trees that have special significance and are afforded protection by, and specifically identified in, county and city ordinances, codes, or general plans. Cities and counties traversed by the project that may have tree protection regulations include the Counties of Santa Clara, San Benito, and Merced as well as the Cities of Santa Clara, San Jose, Morgan Hill, and Gilroy. The types of trees and specific physical characteristics required to meet the local tree definitions are further addressed in Volume 2, Appendix 2-J.

Wildlife Movement

The movement of wildlife between patches of suitable habitat is an important ecological process. Species make daily movements to forage, avoid predators, and find refugia. Longer distance movement is often associated with breeding or juvenile dispersal. Movement distances and patterns are affected by factors such as sex (males tend to move greater distances, on average, than females), habitat distribution, prey density, and topography.

Wildlife movement facilitates genetic and demographic exchange, allows recolonization, contributes to maintenance of metapopulations, and minimizes the risk of inbreeding. Without functional movement between habitat areas, populations would be subject to increased risk of collapse and, in severe cases, extirpation.

The Authority prepared a Wildlife Corridor Assessment (WCA) (Appendix C of the Biological and Aquatic Resources Technical Report [Authority 2020a]) to address impacts on wildlife movement. The impact analysis in this section is based on that document. Some important terms and concepts associated with the study of wildlife movement are presented in the following paragraphs.

- **Permeability**—The degree to which landscapes facilitate animal movement and other ecological flows, also known as *connectivity* (FHWA 2011). High levels of landscape permeability occur when the area between habitat patches contains few barriers to movement. Reduced permeability occurs when the area between habitat patches contains barriers to movement such as roads and urban development.
- **Wildlife corridors**—Landscape features that provide for the movement of wildlife between two or more habitat patches (Soulé and Gilpin 1991; Beier and Loe 1992). Wildlife corridors may be natural or artificial, but they often provide the shortest, most direct linkage between two patches of suitable habitat for a stated target species.

  A natural wildlife movement corridor may be a riparian area or narrow valley that wildlife uses to travel between two larger patches of suitable habitat such as forest or grassland. Artificial wildlife corridors are routes through developed regions that animals use to navigate between suitable habitat patches. Such corridors may include a combination of roads, riparian areas, culverts, bridges, underpasses, and overpasses.

  Regional wildlife corridors identified in statewide or regional reports (Spencer et al. 2010; Penrod et al. 2013) or identified by the wildlife agencies (USFWS or CDFW) as important for the preservation of connectivity for federally or state-listed species have been mapped in the vicinity of the project, and some intersect the HSR alignment. Local movement corridors are less well understood; however, occurrence data, roadkill locations, and camera trap data provide an indication of wildlife movement patterns in the vicinity of the rail alignment. This analysis combines the modeling results for post-project permeability with evidence of local and regional wildlife movement to characterize the severity of the effect and to inform mitigation location and design.

Conservation Areas

Conservation areas are land parcels that are protected or managed specifically or that have been designated for the conservation of biological or aquatic resources. This report discusses three types of conservation areas: conservation easements, public lands (refuges and ecological reserves), and conservation and mitigation banks.

Conservation Easements

A *conservation easement* is a binding, legal agreement between a landowner and a land trust or government agency that limits uses of the land to protect its conservation values and achieve specific conservation objectives. A conservation easement allows landowners to continue to own and use their land. However, certain actions are prohibited, and the landowner agrees to conserve or restore habitat, open space, scenic, or other ecological resource values on the land covered by the easement.

Publicly Owned Lands

Public lands are owned and typically maintained by the government, including cities, counties, states, and the federal government. Public lands considered in this analysis comprise wildlife refuges and ecological reserves.

Conservation and Mitigation Banks

Conservation and *mitigation banks* are permanently protected lands that contain natural resource values. These lands are conserved and permanently managed for special-status species, wetlands or waters, or other natural resources. Conservation and mitigation banks function to offset impacts on natural resources that occurred elsewhere; for this reason, these banks are sometimes referred to as off-site mitigation. In exchange for permanently protecting the land and

managing it for natural resources, the natural resource regulatory agencies (USFWS, USACE, NMFS, or CDFW) approve a specified number of natural resource (habitat, species, or resource) credits that bank owners may sell.

Habitat Conservation Plans

Habitat conservation plans (HCP) are planning documents required as part of an application for an incidental take permit under Section 10 of the FESA; for the purposes of this analysis, an HCP is also defined in Appendix G to the CEQA Guidelines, as other approved local, regional, or state conservation plans. As defined in this document, HCPs also include natural community conservation plans (NCCP) prepared under California's Natural Community Conservation Planning Act (NCCPA), which identify measures necessary to conserve and manage natural biological diversity within the planning area while allowing compatible and appropriate economic development, growth, and other human uses. One adopted federal HCP and state NCCP overlaps with the project alternatives, the *Santa Clara Valley Habitat Plan* (SCVHP) (County of Santa Clara et al. 2012). In addition, two locally approved conservation plans overlap with the project alternatives, the *Santa Clara Valley Greenprint* (Greenprint) (SCVOSA 2014), and the *Coyote Valley Landscape Linkage* report (SCVOSA 2017).

3.7.2 Laws, Regulations, and Orders

This section presents federal and state laws, regulations, and orders applicable to biological and aquatic resources that could be affected by the project. The Authority would implement the overall HSR project, including the project, in compliance with all federal and state regulations. Regional and local laws, regulations, and orders considered in preparing this analysis are provided in Volume 2, Appendix 2-J.

3.7.2.1 Federal

Federal Railroad Administration, Procedures for Considering Environmental Impacts (64 *Fed. Reg.* 28545)

On May 26, 1999, the Federal Railroad Administration (FRA) released *Procedures for Considering Environmental Impacts*. These FRA procedures supplement the Council on Environmental Quality (CEQ) Regulations (40 C.F.R. Part 1500 et seq.) and describe FRA's process for assessing the environmental impacts of actions and legislation proposed by the agency as well as for preparation of associated documents (42 U.S.C. § 4321 et seq.). The FRA *Procedures for Considering Environmental Impacts* state that "the EIS should identify any significant changes likely to occur in the natural environment and in the developed environment. The EIS should also discuss the consideration given to design quality, art, and architecture in project planning and development as required by U.S. Department of Transportation Order 5610.4." These FRA procedures state that an EIS should consider possible impacts on ecological systems, wetlands, and endangered wildlife species.

Federal Endangered Species Act of 1973 (16 U.S.C. § 1531 et seq.)

The FESA and subsequent amendments provide guidance for conserving federally listed species and their habitat. Sections of the FESA applicable to the project are discussed in this section.

- Section 7 requires federal agencies to consult with the USFWS or NMFS, as appropriate, so that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of threatened or endangered fish, wildlife, or plant species, or result in the destruction or adverse modification of designated critical habitat for any such species. As part of the consultation, USFWS and NMFS would issue a biological opinion and an incidental take statement for wildlife species to exempt the Section 9 take prohibition.
- Section 9 and its implementing regulations prohibit the take of any fish or wildlife species listed under the FESA as endangered or threatened, unless otherwise authorized by federal regulations. The term *take* means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Take also includes the

modification of a listed species' habitat. Section 9 and the implementing regulations prohibit a number of specified activities with respect to endangered and threatened plants.

- Section 10 provides a process by which nonfederal entities may obtain an incidental take permit from USFWS or NMFS for otherwise lawful activities that might incidentally result in take of endangered or threatened animal species, subject to specific conditions. The project is a federal agency project and therefore would not utilize Section 10; however, the project would affect areas covered by Section 10 HCPs (e.g., SCVHP).

Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. § 1801 et seq.)

The amended Magnuson-Stevens Act, also known as the Sustainable Fisheries Act (Public Law [PL] 104-297), requires that all federal agencies consult with NMFS on activities or proposed activities authorized, funded, or undertaken by that agency that may adversely affect EFH of commercially managed marine and anadromous fish species.

Clean Water Act (33 U.S.C. § 1251 et seq.)

The CWA serves as the primary federal law protecting the quality of the nation's surface waters, including wetlands. Sections of the CWA applicable to the project are further discussed in this section.

- Under Section 401, a federal agency may not issue a permit or license to conduct any activity that may result in any discharge into waters of the United States unless a state where the discharge would originate issues a Section 401 water quality certification verifying compliance with existing water quality requirements or waives the certification requirement.
- Under Section 402, all point-source discharges, including construction-related stormwater discharges to surface waters, are regulated through the National Pollutant Discharge Elimination System (NPDES) program. Project sponsors must obtain an NPDES permit from the SWRCB.
- Under Section 404, the USACE and U.S. Environmental Protection Agency regulate the discharge of dredged and fill materials into the waters of the U.S. Project sponsors must obtain a CWA Section 404 permit from the USACE for discharges of dredged or fill materials into waters of the U.S. (wetlands and other waters) under USACE jurisdiction.

U.S. Fish and Wildlife Coordination Act (16 U.S.C. §§ 661–666c)

The U.S. Fish and Wildlife Coordination Act applies to any federal project where any body of water is impounded, diverted, deepened, or otherwise modified. Project proponents are required to consult with the USFWS and appropriate state wildlife agency.

Migratory Bird Treaty Act (16 U.S.C. §§ 703–712; PL 108–447)

The MBTA of 1918 prohibits the take of the nest, eggs, birds, or any parts thereof (listed at 50 C.F.R. § 10.13, as modified by 75 Fed. Reg. 9281). The MBTA defines migratory birds broadly; all birds native to North America are considered migratory birds under the MBTA. The Migratory Bird Treaty Reform Act (16 U.S.C. § 703 et seq.; PL 108–447) amends the MBTA of 1918 to exclude nonnative birds or birds that have been introduced by humans to the U.S. or its territories from protection under the MBTA. The statute defines a native migratory bird as a species present in the U.S. and its territories as a result of natural biological or ecological processes.

Bald and Golden Eagle Protection Act (16 U.S.C. §§ 668–668(d), 50 C.F.R. § 22)

The Bald and Golden Eagle Protection Act (BGEPA) prohibits anyone from taking, possessing, or transporting bald eagle or golden eagle, or the parts, nests, or eggs of such birds without prior authorization. *Take* is defined to include pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest, and disturb. *Disturb* is further defined in 50 C.F.R. Section 22.3 as "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior." The BGEPA regulations authorize issuance of incidental take permits of bald and golden eagles

under the following conditions: (1) the take is compatible with the preservation of the bald eagle and golden eagle, (2) it is necessary to protect an interest in a particular locality, (3) it is associated with but not the purpose of an otherwise lawful activity, and (4) it cannot be practicably avoided (50 C.F.R. § 22.26).

3.7.2.2 State

California Endangered Species Act (Cal. Fish and Game Code, §§ 2050–2085)

The CESA prohibits the take of any fish, wildlife, or plant species listed as endangered or threatened, or designated as candidates for listing, under CESA. *Take* under CESA means hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill. It does not include "the taking of habitat alone or the impacts of the taking.[1]" Compared to the FESA process, CESA contains a procedure for the CDFW to issue a Section 2081 incidental take permit authorizing the take of listed and candidate species incidental to an otherwise lawful activity, subject to specified conditions, including that the effects of the take are fully mitigated.

California Fish and Game Code

Fully Protected Species (Cal. Fish and Game Code, §§ 3511, 4700, 5050, and 5515)

The California Fish and Game Code designates 37 fully protected species and prohibits the take or possession at any time of such species with certain limited exceptions. Fully protected species are described in Cal. Fish and Game Code Sections 3511 (birds), 4700 (mammals), 5050 (reptiles and amphibians), and 5515 (fish). These protections state that "…no provision of this code or any other law shall be construed to authorize the issuance of permits or licenses to take any fully protected [bird], [mammal], [reptile or amphibian], [fish]."

Bird Protections (Cal. Fish and Game Code, §§ 3503, 3503.5, and 3513)

Cal. Fish and Game Code Section 3503 states that it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by code or any regulation made pursuant thereto. Section 3503.5 prohibits the take, possession, or needless destruction of any nests, eggs, or birds in the orders Falconiformes (New World vultures, hawks, eagles, ospreys, and falcons, among others) or Strigiformes (owls). Section 3513 prohibits the take or possession of any migratory nongame bird or part thereof, as designated in the MBTA. To avoid violation of the take provisions, project-related disturbance at active nesting territories generally are required to be reduced or eliminated during the nesting cycle.

Lake and Streambed Alteration (Cal. Fish and Game Code, § 1600 et seq.)

Section 1600 et seq. of the Cal. Fish and Game Code requires notifying the CDFW prior to any project activity that might (1) substantially divert or obstruct the natural flow of any river, stream, or lake; (2) substantially change or use any material from the bed, channel, or bank of any river, stream, or lake; or (3) deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake. If after this notification CDFW determines that the activity may substantially adversely affect fish and wildlife resources, a Lake or Streambed Alteration Agreement would need to be obtained.

Under Cal. Fish and Game Code Section 1602, the CDFW takes jurisdiction over rivers, streams, and lakes. The state's jurisdiction generally includes the streambed/lakebed to tops of bank. The term *stream* is commonly understood as a watercourse having a source and terminus, banks and channel, through which waters flow, at least periodically. A *streambed* under Section 1602 includes the channel of a watercourse, which is generally defined to include the depression between the banks worn by the regular and usual flow of the water.

[1] Environmental Council of Sacramento v. City of Sacramento, 142 Cal. App. 4th 2018 (2006).

Natural Community Conservation Planning Act (Cal. Fish and Game Code, §§ 2800–2835)

In 1991, the NCCPA was enacted to encourage broad-based planning to provide for effective protection and conservation of the state's wildlife resources while continuing to allow appropriate development and growth. Pursuant to the NCCPA, local, state, and federal agencies are encouraged to prepare NCCPs to provide comprehensive management and conservation of multiple species and their habitats under a single plan, rather than through preparation of numerous individual plans on a project-by-project basis. The NCCPA is broader in its orientation and objectives than are FESA and CESA. To be approved by CDFW, an NCCP must provide for the conservation of species and protection and management of natural communities in perpetuity within the plan area. Conservation is defined by the NCCPA and the Cal. Fish and Game Code as actions that result in the delisting of state-listed species. .

The 1991 NCCPA was replaced with a substantially revised and expanded NCCPA in 2002. The revised NCCPA established new standards and guidance on many facets of the program, including scientific information, public participation, biological goals, interim project review, and approval criteria. The new NCCPA took effect on January 1, 2003. To approve an NCCP under the new NCCPA, CDFW must make a series of findings.

- The plan must be consistent with the Planning Agreement.
- The plan must provide for the conservation and management of the covered species (conservation is defined to mean that the Plan must contribute to species recovery).
- The plan must protect habitat, natural communities, and species diversity on the landscape level.
- The plan must conserve the ecological integrity of large habitat blocks, ecosystem function, and biodiversity.
- The plan must support sustainable populations of covered species.
- The plan must provide a range of environmental gradients and habitat diversity to support shifting species distributions.
- The plan must sustain movement of species among reserves.
- Mitigation and conservation must be roughly proportional to impacts in timing and extent.
- Funding for conservation, monitoring, and adaptive management must be adequately assured.

The project alternatives overlap with one NCCP, the SCVHP, and the analysis within this document must evaluate whether there any conflicts between the SCVHP and the project alternatives.

California Native Plant Protection Act (Cal. Fish and Game Code, §§ 1900–1913)

The NPPA requires all state agencies to use their authority to carry out programs to conserve endangered and rare native plants. The NPPA gives the CDFW the power to designate native plants as "endangered" or "rare" and prohibits the take of such plants, with certain exceptions.

Porter-Cologne Water Quality Control Act (Cal. Water Code, § 13000 et seq.)

The Porter-Cologne Water Quality Control Act provides for implementation of the federal CWA by the SWRCB, including issuance of CWA Section 401 Certifications and Section 402 NPDES permits. Issuance of a Section 401 Certification requires documenting compliance with state water quality standards, including watershed plans, designated beneficial uses, and the total maximum daily load program.

The Porter-Cologne Water Quality Control Act also regulates discharges that could affect the quality of waters of the state and requires a waste discharge requirements form be obtained for discharges, including fill of wetlands that are not otherwise authorized by Section 404 or Section

402 of the federal CWA. Application for waste discharge requirements requires filing a report of waste discharge.

3.7.2.3 Regional and Local

Regional and local plans relevant to biological and aquatic resources include city and county general plans, county ordinances, local tree removal ordinances, the Greenprint (SCVOSA 2014), and the *Coyote Valley Linkage Report* (SCVOSA 2017). Policies and regulations include guidelines that minimize disturbance of vegetation, encourage habitat protection, and support conservation. All regional and local policies that are applicable to the project are listed in Volume 2, Appendix 2-J.

3.7.3 Consistency with Plans and Laws

As indicated in Section 3.1.5.3, Consistency with Plans and Laws, CEQA and CEQ regulations require a discussion of inconsistencies or conflicts between a proposed undertaking and federal, state, regional, or local plans and laws. As such, this Draft EIR/EIS describes the inconsistency of the project alternatives with federal, state, regional, and local plans and laws to provide planning context.

There are a number of federal and state laws and implementing regulations, listed in Section 3.7.2.1, Federal, and Section 3.7.2.2, State, that protect biological and aquatic resources. A summary of the federal and state requirements considered in this analysis follows:

- Federal and state acts and laws that protect jurisdictional wetlands and other waters. Applicable acts and laws include the federal CWAand the state Porter-Cologne Water Quality Control Act.
- Federal and state acts and laws that provide comprehensive requirements for protection and management of special-status species and their habitats and communities. Applicable acts and laws include FESA, the Magnuson-Stevens Act, the U.S. Fish and Wildlife Coordination Act, the MBTA, the BGEPA, Cal. Fish and Game Code (including CESA, Fully Protected Species, Bird Protections, Lake and Streambed Alteration, the NCCPA, and the NPPA), and the Porter-Cologne Water Quality Control Act under the California Water Code.

The Authority, as the lead agency proposing to build and operate the HSR system, is required to comply with all federal and state laws and regulations and to secure all applicable federal and state authorizations prior to initiating construction on the selected alternative. Therefore, there would be no inconsistencies between the project alternatives and these federal and state laws and regulations.

The Authority is not required to comply with local biological and aquatic resource regulations; however, it has endeavored to design and construct the HSR project so that it is compatible with biological and aquatic resource regulations. t Avoidance, minimization, and mitigation will be implemented to reduce and compensate for impacts on biological and aquatic resources including implementing biological resource management plans, specific construction protocols, and protection of habitat and species. Analysts reviewed a total of 11 plans with 68 goals, strategies, or polices, and determined that the project alternatives were consistent with all regional and local plans and policies.

3.7.4 Consultation with Regulatory Agencies for Federal Endangered Species Act Compliance

The goal of the FESA is to conserve threatened and endangered species (federally listed species) and the ecosystems on which they depend (16 U.S.C. § 1531 et seq.). Section 7 of the FESA, Interagency Cooperation, establishes the process by which federal action agencies, their designees (e.g., state transportation agencies), and the USFWS and NMFS consult to make certain that proposed actions are not likely to jeopardize the continued existence of species that are listed or proposed for listing as threatened or endangered or result in the destruction or adverse modification of critical habitat. Both agencies share responsibility for implementing the FESA, with the USFWS managing most terrestrial and freshwater species and the NMFS managing marine and anadromous species (e.g., Pacific salmonids).

The implementing procedures of the FESA are outlined in 50 C.F.R. Part 402. Section 7 consultation is required for discretionary federal agency actions taken directly, through one of its own proposed projects or indirectly, through partial or complete funding for a nonfederal project or through issuing a permit for a nonfederal project. Section 7(a)(2) states:

> *Each federal action agency shall, in consultation with and with the assistance of the Secretary [of the Interior], insure that any action authorized, funded, or carried out by such agency (hereinafter in this section referred to as an 'agency action') is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined by the Secretary, after consultation as appropriate with affected States, to be critical, unless such agency has been granted an exemption for such action by the Committee pursuant to subsection (h) of this section. In fulfilling the requirements of this paragraph, each agency shall use the best scientific and commercial data available.*

In addition, Magnuson-Stevens Act Section 305(b)(2) requires federal agencies to consult with the NMFS regarding actions authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken, and which may affect and are likely to adversely affect EFH (50 C.F.R. § 600.920). The Magnuson-Stevens Act requires cooperation among the NMFS, fishery management councils, fishing participants, federal and state agencies, and others in achieving EFH protection, conservation, and enhancement.

3.7.4.1 Consultation History with the U.S. Fish and Wildlife Service: Wildlife

The Authority has begun coordination with the USFWS, but has not yet submitted a biological assessment (BA) and initiated formal Section 7 consultation. Submittal of the BA and a request to initiate Section 7 consultation is expected to occur in early 2020.[2] The BA will evaluate the potential adverse effects of the project (i.e., proposed action) on species listed as endangered or threatenedg under FESA, as well as effects on designated or proposed critical habitat. Potential effects on federally listed species will be evaluated in accordance with the legal requirements set forth in Section 7 of FESA (16 U.S.C. § 1531 et seq.). A preliminary effects evaluation is provided in Section 3.7.11, Preliminary FESA Findings.

3.7.4.2 Consultation History with the National Marine Fisheries Service: Fish

The Authority has begun coordination with the NMFS, but has not yet submitted a BA to the NMFS and has not yet initiated formal Section 7 consultation. Submittal of the BA and a request to initiate Section 7 consultation is expected to occur in early 2020. The BA will evaluate the potential adverse effects of the project (i.e., proposed action) on fish species identified as endangered or threatened under FESA, as well as effects on designated or proposed critical habitat and EFH. A preliminary effects evaluation is provided in Section 3.7.11.

3.7.5 Methods for Evaluating Impacts

The evaluation of impacts on biological and aquatic resources is a requirement of NEPA and CEQA. The following sections define the RSAs and summarize the methods used to analyze impacts on biological and aquatic resources.

3.7.5.1 Definition of Resource Study Area

As defined in Section 3.1, Introduction, RSAs are the geographic boundaries in which the environmental investigations specific to each resource topic were conducted. The RSA for impacts on biological and aquatic resources encompasses the areas directly or indirectly affected by construction and operations of the project. These areas include the project footprint for each of

[2] Pursuant to 23 U.S.C. Section 327, under the NEPA Assignment Memorandum of Understanding between the FRA and the State of California, effective July 23, 2019, the Authority has been assigned FRA's FESA Section 7 (16 U.S.C. § 1536) responsibilities for consultations (formal and informal) with respect to the project extent and other projects described in subpart 3.3 of the Memorandum of Understanding.

the project alternatives plus an additional distance from the project footprint where construction and operations could result in indirect impacts on biological and aquatic resources. Specific RSA boundaries vary by biological and aquatic resource, as shown in Table 3.7-1 and illustrated on Figure 3.7-1 and Figure 3.7-2. The wildlife movement RSAs are illustrated on Figure 4-1 of the WCA (Appendix C of the Biological and Aquatic Resources Technical Report [Authority 2020a]). The project footprint is the area that would be physically affected by construction and operations of the project (including temporary disturbance) and the location of permanent HSR facilities and activities. The project footprint includes the limits of cut and fill plus all access roads and areas required for operating, storing, and refueling construction equipment.

Table 3.7-1 Definition of Biological and Aquatic Resource Study Areas[1]

Type	Area of Impact	Boundary Description
Habitat Study Area		
Core Habitat Study Area		
Direct Impacts[2]	Project footprint (includes permanent and temporary impacts)	Area in which potential direct and indirect impacts on special-status wildlife species and their habitat were evaluated. Ground-based site assessments or surveys were conducted in this area, if accessible.
Indirect Impacts[2]	Project footprint plus 250-foot buffer	
Indirect Bisected Impacts (vernal pool species)[3]	Project footprint plus the entirety of vernal pool coverage	
Auxiliary Habitat Study Area		
Indirect Impacts	250- to 1,000-foot buffer outside core habitat study area	Area in which indirect impacts on special-status wildlife species and their habitat were evaluated. Habitat assessed through extrapolation of field observations made in the core habitat study area, aerial photograph interpretation, or windshield surveys.
Aquatic Resource Study Area		
Direct Impacts[2]	Project footprint	Evaluate direct and indirect impacts on aquatic resources.
Indirect Impacts[2]	Project footprint plus 250-foot buffer	
Indirect Bisected Impacts[3]	Project footprint plus the entirety of vernal pool coverage	If a portion of the vernal pool or swale is within the project footprint and therefore directly affected, then the whole vernal pool or swale is considered directly affected for purposes of impact methodology analysis.
Special-Status Plant Study Area[4]		
Direct Impacts[2]	Project footprint	Evaluate direct and indirect impacts on upland sensitive plant resources (including special-status plants, special-status plant communities, and protected trees). For vernal pool plant species, the aquatic RSA and auxiliary study area (if applicable) are used to evaluate impacts.
Indirect Impacts[2]	Project footprint plus 100-foot buffer	
Regional Resource Study Area		
Direct and Indirect Impacts	Habitat study area plus larger area defined by ecoregion and/or county boundaries as follows:	Area used for developing species habitat models and identifying potential mitigation options. Biologists designed the regional RSA to encompass the habitat

Type	Area of Impact	Boundary Description
	▪ North—mostly Santa Clara, Stanislaus, and Merced County boundaries ▪ East—San Joaquin Basin ecoregion boundary, Merced County boundary, and Southern Hardpan Terraces ecoregion boundary ▪ South—Merced County boundary and the following ecoregion boundaries from east to west: Upper Santa Clara Valley, East Bay Hills/Western Diablo Range, Westside Alluvial Fans and Terraces, and San Joaquin Basin ▪ West—Santa Clara County boundary	study area and to meet the following additional criteria: ▪ The regional RSA should capture a sufficient portion of each species' range, suitable habitat, and known occurrences to enable evaluation of an array of viable mitigation opportunities. ▪ Mitigation should be provided in geographic proximity to project impacts. ▪ Mitigation of project impacts on aquatic resources should primarily occur in or near the watersheds in which they occur. ▪ The regional RSA should be broad enough to allow for a landscape-level analysis of impacts and mitigation options that consider wildlife linkages, priority acquisition areas, proximity to existing conservation lands, and other key attributes. ▪ The regional RSA should be sufficiently focused to limit unnecessary data collection and processing for species modeling and mitigation analysis.
Wildlife Movement Resource Study Areas		
Wildlife Movement Study Area[5]		
Direct and Indirect Impacts	Project footprint plus 5- to 15-mile buffer	Area in which wildlife movement permeability was analyzed on a local scale using a (1) GIS-based resistance-surface model for terrestrial species and (2) a qualitative assessment for aquatic and aerial species.
Local Permeability Analysis Study Area		
Direct and Indirect Impacts	Project footprint plus 1.9-mile buffer	Area in which wildlife movement permeability was quantitatively modeled using GIS. Based on Beier et al. (2008) recommendation of 6-kilometer minimum distance between source and destination locations in GIS models.

Type	Area of Impact	Boundary Description
Groundwater Inflow Aquatic Resources Study Area[6]		
Indirect Impacts	Project footprint (including underground tunnel right-of-way) plus 1-mile buffer	Area in which groundwater (deep aquifer) may be affected during tunnel construction. The one-mile wide RSA is based on the area evaluated for groundwater effects from construction of the SFPUC's New Irvington Tunnel (SFPUC 2009), which was constructed through the Diablo Range approximately 50 miles north-northwest of Pacheco Pass and the construction of the Arrowhead Tunnels in the San Bernardino Mountains in southern California in which monitoring indicated impacts occurred out to 1.1-mile of the tunnel alignments (Berg 2012). Surface water features of biological value include wetlands, streams, and ponds fed by groundwater as well as any riparian vegetation growing adjacent to such features. Upland wildlife species not dependent on surface water features would not be affected by potential groundwater depletion. Non-riparian upland plants would only be affected by potential groundwater depletion if they had sufficiently deep roots to reach relatively shallow areas of groundwater, which is usually limited to oak trees.

Source: Authority and FRA 2017

[1] Study areas were selected considering the resources (species and other biological resources) potentially affected, impact mechanisms, agency guidelines, and professional judgement.

[2] Vernal pools located within the project footprint, and those partially located within the footprint, were considered to be directly and permanently affected in their entirety (i.e., the entire vernal pool was considered to be permanently affected if any part of the vernal pool was affected). Vernal pools located within 250 feet of the project footprint, but not within the project footprint, were considered to be potentially indirectly affected out to 250 feet from the project footprint. This method was used because it is the most inclusive of the potential project impacts and considering limitations on field surveys and direct observations.

[3] Indirect bisected impacts apply in circumstances where a vernal pool falls partially within the project footprint and extends into adjacent areas, including areas beyond 250 feet, and includes impacts on regulated aquatic resources as well as vernal pool wildlife and plant species.

[4] Impacts on special-status plant species occurring in vernal pools are also considered in the context of the aquatic RSA and the auxiliary habitat study area (as applicable).

[5] A detailed description of the wildlife movement study area and the methods used to determine its parameters is presented in Appendix C, Wildlife Corridor Analysis, of the Biological and Aquatic Resources Technical Report (Authority 2020a).

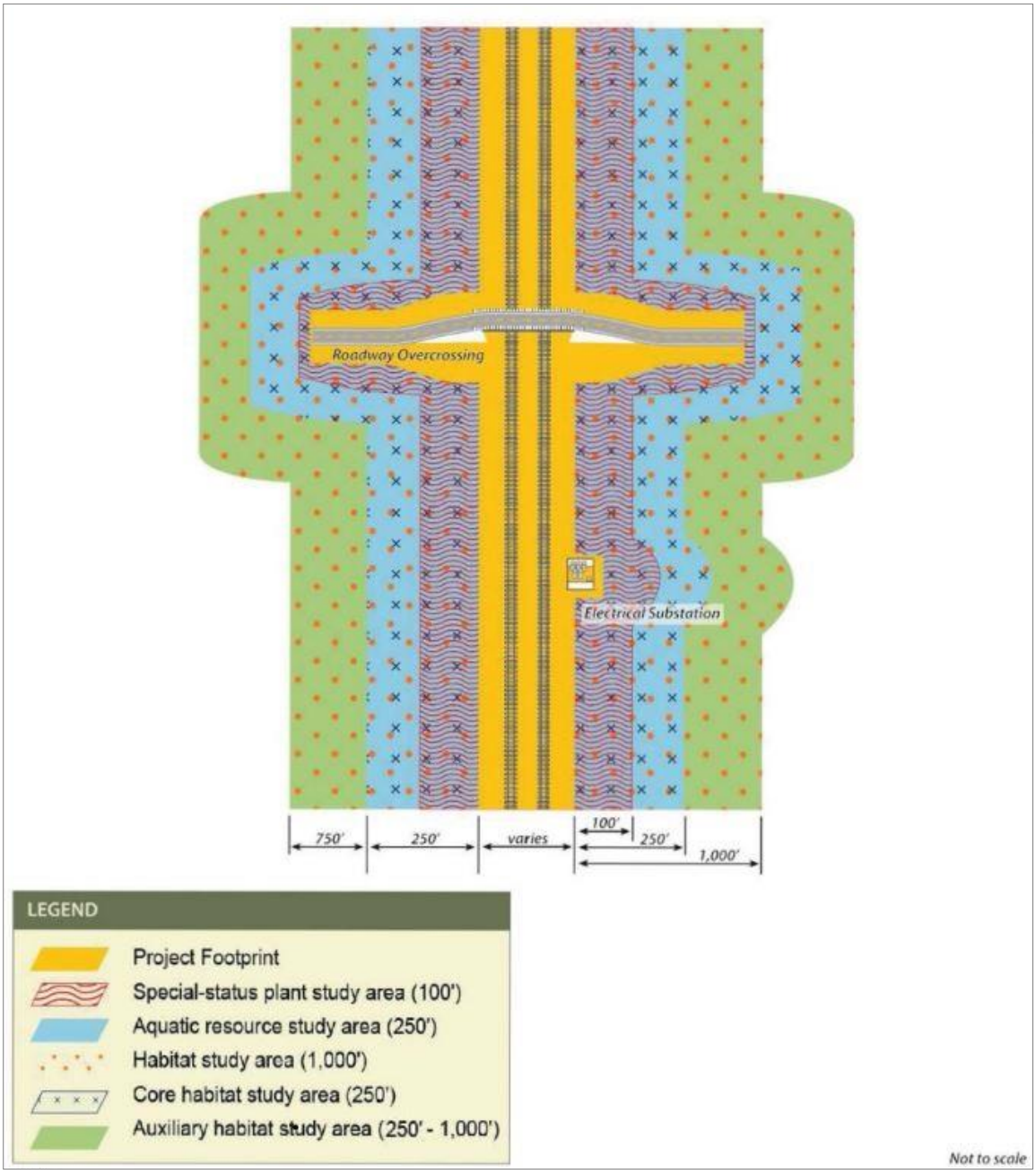
[6] Groundwater inflow aquatic resources RSA not depicted on Figure 3.7-15 due to scale limitations.

A "supplemental habitat study area," which Version 5 Environmental Methods states "*can* be identified for specific species, as required by regulatory agencies or standard protocols," and "extends up to 10 miles from the project footprint, depending on the target species," is not used in this Draft EIR/EIS because the regional RSA includes all known species occurrences and habitat in the region.

GIS = geographic information system

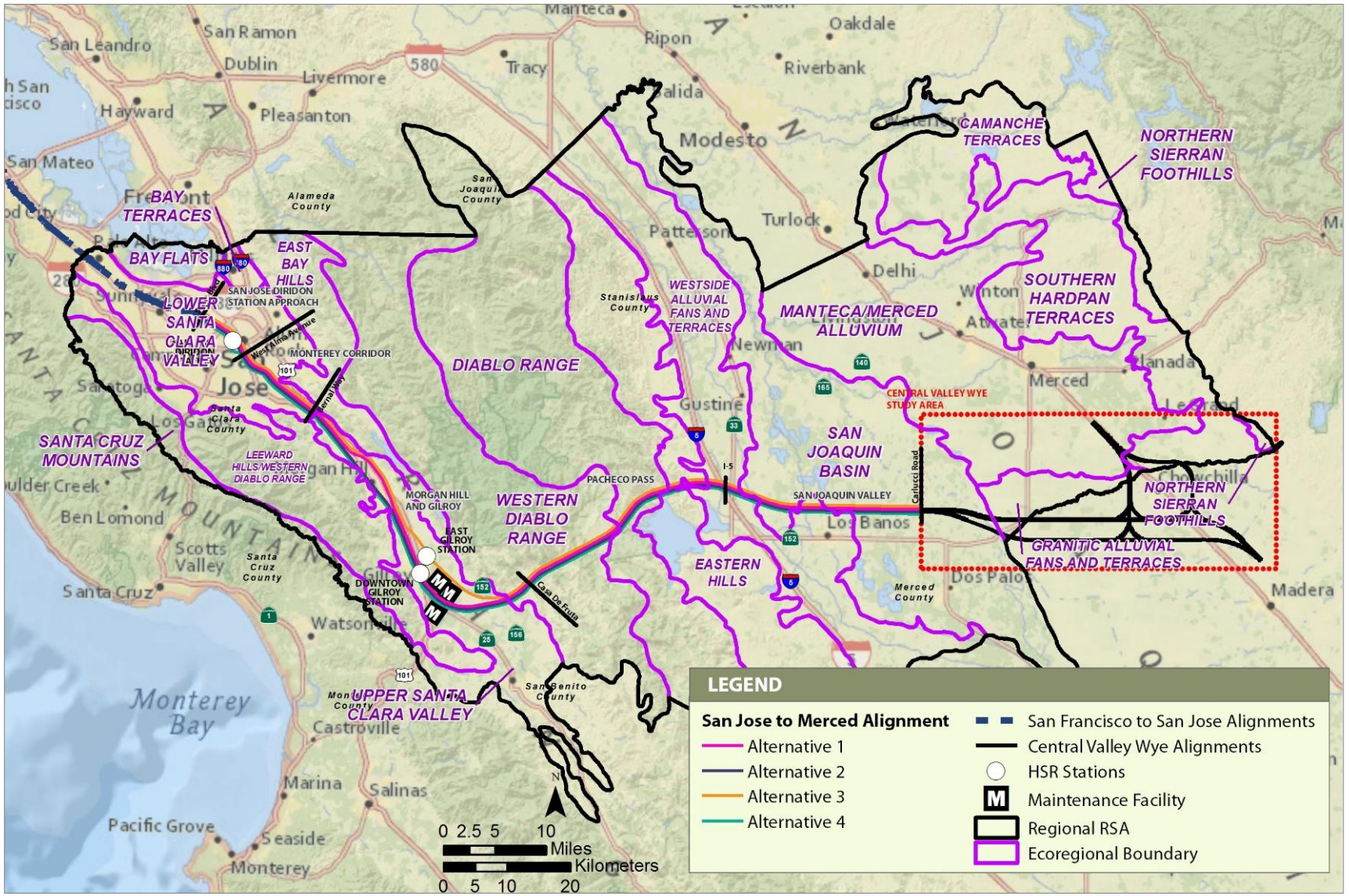
RSA = resource study area

SFPUC = San Francisco Public Utility Commission



OCTOBER 2016

Figure 3.7-1 Schematic of Biological Resource Study Areas



Sources: USEPA 2011; USFS 1994

FEBRUARY 2019

Figure 3.7-2 Regional RSA, Ecoregion, and County Boundaries

3.7.5.2 Impact Avoidance and Minimization Features

IAMFs are project features that are considered to be part of the project and are included as applicable in each of the alternatives for purposes of the environmental impact analysis. The full text of the IAMFs that are applicable to the project is provided in Volume 2, Appendix 2-E. The following IAMFs are applicable to the biological and aquatic resources analysis:

- BIO-IAMF#1: Designate Project Biologist, Designated Biologists, Species-Specific Biological Monitors and General Biological Monitors
- BIO-IAMF#2: Facilitate Agency Access
- BIO-IAMF#3: Prepare WEAP Training Materials and Conduct Construction Period WEAP Training
- BIO-IAMF#4: Conduct Operation and Maintenance Period WEAP Training
- BIO-IAMF#5: Prepare and Implement a Biological Resources Management Plan
- BIO-IAMF#6: Establish Monofilament Restrictions
- BIO-IAMF#7: Prevent Entrapment in Construction Materials and Excavations
- BIO-IAMF#8: Delineate Equipment Staging Areas and Traffic Routes
- BIO-IAMF#9: Dispose of Construction Spoils and Waste
- BIO-IAMF#10: Clean Construction Equipment
- BIO-IAMF#11: Maintain Construction Sites
- BIO-IAMF#12: Design the Project to be Bird Safe
- HMW-IAMF#3: Work Barriers
- HMW-IAMF#6: Spill Prevention
- HYD-IAMF#5: Tunnel Design Features and Construction Methods
- NV-IAMF#1: Noise and Vibration

This environmental impact analysis considers these IAMFs as part of the project design. In Section 3.7.7, Environmental Consequences, each impact narrative describes how these project features are applicable and, where appropriate, effective at avoiding or minimizing potential impacts to less than significant under CEQA.

3.7.5.3 Methods for Impact Analysis

Overview of Impact Analysis

This section describes the sources and methods the Authority used to analyze potential project impacts on biological and aquatic resources. Sections 3.7.5.4, Method for Evaluating Impacts under NEPA, and 3.7.5.5, Method for Determining Significance under CEQA, describe the methodologies used to evaluate project impacts pursuant to NEPA and CEQA. Laws, regulations, and orders (see Section 3.7.2, Laws, Regulations, and Orders) that regulate biological and aquatic resources were also considered in the evaluation of impacts. Data collected from local municipalities such as local and regional land use plans, transportation plans, subarea plans, and other relevant planning documents established the projected planned development along the project extent.

Pre-Field Investigation and Consultation

This section describes the methodology for obtaining information on biological and aquatic resources in the project vicinity (i.e., regional RSA). All information was obtained through reviews of public datasets (e.g., the California Natural Diversity Database [CNDDB]) and previous environmental documentation of the project (Authority and FRA 2011).

Land Cover Mapping

Biologists created preliminary maps of vegetation and land cover types in the auxiliary habitat study area using National Agriculture Imagery Program 2016 imagery as a base map and ArcGIS 10.3 software. A mapping scale of 1 inch = 200 feet (1:2,400) was used. A minimum mapping unit of 1.0 acre was used for wetland complexes, and a minimum mapping unit of 0.25 acre was used for stand-alone wetlands. A minimum mapping unit of 10 acres was used for all other land cover types, but a smaller unit was used where discrete boundaries and types could be discerned. Natural and constructed watercourses were mapped as line features then attributed with their average width. Features wider than 40 feet were mapped as polygons. Terrestrial land cover types were classified in accordance with the unpublished 2011 *Administrative Draft San Jose to Merced Section Biological Resources and Wetlands Technical Report* (2011 San Jose to Merced Section Technical Report), or identified using the *Manual of California Vegetation* (Sawyer et al. 2009; CNPS 2017) or the *California Wildlife Habitat Relationships Habitat Classification Scheme* (CWHR System) (CDFG 1988). Aquatic land cover types were further classified in accordance with the USFWS *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979).

Special-Status Species

Biologists consulted the following sources to identify special-status plant and wildlife species that could potentially be affected by the project:

- **USFWS Species Lists**—Biologists obtained official lists of federal candidate, proposed, threatened, and endangered plant and wildlife species potentially affected by activities in the regional RSA from the San Francisco Bay-Delta, Sacramento, and Ventura Fish and Wildlife Offices using the USFWS Environmental Conservation Online System's (ECOS) Information for Planning and Conservation website (Authority 2020a: Appendix A).
- **NMFS Species List**—Biologists obtained an official list of federal candidate, proposed, threatened, and endangered fish species potentially affected by activities in the regional RSA from NMFS (Authority 2020a: Appendix A).
- **CNDDB**—Biologists queried the CNDDB geographic information system (GIS) dataset (CDFW 2018b) for occurrences of special-status plant and wildlife species within 10 miles of the HSR centerlines for the project alternatives.
- **CNPS Online Inventory of Rare and Endangered Plants of California (CNPS Online Inventory)**—To identify additional special-status plants not captured by the official USFWS species list or CNDDB, botanists obtained "nine-quad" species lists (i.e., query of U.S. Geological Survey [USGS] 7.5-minute quadrangle map and surrounding eight quads) for each of the USGS quads intersected by the project alternatives from the CNPS Online Inventory (CNPS 2017). From these lists, botanists identified species with very localized distributions (i.e., limited to only a few known localities) outside the special-status plant study area and eliminated them from further consideration. The CNPS Online Inventory is a credible and widely recognized resource used by conservationists, consultants, planners, researchers, and resource managers to obtain information about California's rare plants.
- 2011 San Jose to Merced Section Biological and Aquatic Resources Technical Report (Authority and FRA 2011).
- Species accounts in Appendix D of the SCVHP (County of Santa Clara et al. 2012).
- *Historical Distribution and Current Status of Steelhead/Rainbow Trout (*Oncorhynchus mykiss*) in Streams of the San Francisco Estuary, California* (Leidy et al. 2005).

The official USFWS and NMFS species lists, CNDDB list, and CNPS lists used to inform this effort are provided in Appendix A, Official Species Lists, of the Biological and Aquatic Resources Technical Report (Authority 2020a). Complete lists of special-status plants (Table B-1) and wildlife (Table B-2) considered for the impacts analysis are provided in Appendix B, Special-Status Species Considered, of the technical report.

Critical Habitat

Biologists identified federally designated critical habitat in the habitat study area by importing USFWS and NMFS geospatial data (i.e., ArcGIS shapefiles from ECOS [USFWS 2016a] and NMFS [2018], respectively) into GIS and overlaying with the regional RSA boundary. Biologists also reviewed the PCE descriptions for applicable species in their respective critical habitat publications in the Fed. Reg. to inform subsequent comparisons with species habitat models.

Essential Fish Habitat

Biologists identified federally designated EFH in the habitat study area by consulting the EFH Mapper online mapping tool maintained by the NMFS (2017). Since the data displayed by the EFH Mapper is somewhat coarse, biologists also reviewed the *Identification and Description of Essential Fish Habitat, Adverse Impacts, and Recommended Conservation Measures for Salmon* report attached to the Pacific Coast Salmon Fishery Management Plan (PFMC 2014) to identify specific USGS hydrologic units designated as EFH.

Non-Special-Status Wildlife

Project biologists collected background information on non-special-status wildlife resources potentially occurring in the habitat study area from several sources. Most information on native wildlife species likely to occur in the habitat study area is based on the collective knowledge of project biologists and conservation planners that have been working in central California for 15–30 years and on standard wildlife references (Stebbins 2003; Reid 2006; CDFW 2018b). Additional information on breeding birds was compiled from the *Breeding Bird Atlas of Santa Clara County, California* (Bousman 2007), eBird (Sullivan et al. 2009), and communications with local birders. Information on waterfowl and shorebird use of large wetlands (i.e., Soap Lake, Grasslands Ecological Area [GEA]) was compiled from public comments received during stakeholder meetings and outreach efforts, eBird reports, the National Audubon Society's Important Bird Areas (IBA) program (National Audubon Society 2017a, 2017b), the Western Hemisphere Shorebird Reserve Network website (WHSRN 2017), and the scientific literature. Biologists identified native bat species potentially roosting in the habitat study area by reviewing range maps and habitat information in the online species accounts maintained by the Western Bat Working Group (Western Bat Working Group 2017).

Special-Status Plant Communities

Biologists identified special-status plant communities potentially occurring in the special-status plant study area by reviewing the same CNDDB query conducted for special-status plants and wildlife (CDFW 2018b). Biologists also reviewed plant communities with state rankings of S1–S3 in the CDFW's Sensitive Communities List (CDFW 2018a) to identify additional special-status plant communities that could occur, based on the preliminary vegetation and land cover mapping effort described in Land Cover Mapping earlier in this section.

Aquatic Resources

Biologists reviewed the following resources to obtain information on aquatic resources that may occur in the aquatic RSA:

- USGS 7.5-minute topographic quadrangles that overlap with the aquatic RSA
- National Wetland Inventory maps (USFWS 2016b)
- National Hydrography dataset; BIOS dataset (USGS 2017a)
- Soil survey map units (NRCS 2016, 2017a)
- Google Earth Pro aerial photographs from 2003 to 2017 (Google 2018)
- Climate and precipitation data (NRCS 2017b)

Protected Trees

To identify the requirements for protected trees, biologists reviewed county and city ordinances and codes, as well as available general plans and HCPs. Protected trees in the special-status plant study area were identified based on the regulations summarized in Volume 2, Appendix 2-J.

Wildlife Movement

The Authority prepared a WCA (Appendix C of the Biological and Aquatic Resources Technical Report [Authority 2020a]) to address impacts on wildlife movement and to support the EIR/EIS. Section 5.2 of the WCA summarizes the references used to identify regional and local wildlife movement corridors. Major references include the following:

- *Bay Area and Beyond Critical Linkages* report (Penrod et al. 2013)
- *Safe Passage for Coyote Valley* report (Phillips et al. 2012)
- *Coyote Valley Linkage Assessment Study* (Diamond and Snyder 2016)
- *The Nature Conservancy's Pajaro Study 2012–2013* (Diamond and Snyder 2013)
- *The Effects of Spatial and Temporal Scale on Conservation Planning and Ecological Networks in the Central Valley, California*; Ph.D. dissertation by Patrick Huber (2008)

Conservation Areas

To identify conservation areas (i.e., conservation easements, public lands, conservation and mitigation banks), two primary sources were used:

- **California Protected Areas Database (CPAD)**—Database containing GIS data about lands that are owned in fee and protected for open-space purposes (i.e., national parks, national forests, wildlife refuges, land trust preserves, Bureau of Land Management land, state parks, county parks, neighborhood parks, and other open spaces) (GreenInfo 2016a).
- **California Conservation Easement Database (CCED)**—Database containing GIS data about lands protected under conservation easements (GreenInfo 2016b). It is a parallel dataset to CPAD.

Additionally, local conservation agencies and organizations (e.g., The Nature Conservancy) were contacted to obtain any additional parcels not yet recorded in CCED.

Habitat Conservation Plans

Federal HCPs overlapping with the project were identified by accessing the USFWS Conservation Plans and Agreements Database in ECOS (USFWS 2017a) and reviewing adopted HCPs within USFWS Region 8.

Field Surveys and Species Habitat Modeling

This section describes field surveys and desktop analyses conducted for the project. The primary limitation of the field surveys and assessments is the lack of access to a large portion of the habitat, aquatic resource, and special-status plant study areas. The Authority has identified all parcels that may be crossed by the project. The Authority sent letters to property owners in 2016, 2017, and 2019 requesting permission to access the identified parcels by survey teams conducting biological, cultural resource, visual, and geotechnical surveys. The Authority saves all returned permission to enter forms and records which parcels have granted permission for access to the survey teams. Property owners who have granted access to their property are given a 48-hour notice before survey teams enter the parcel. Some property owners have indicated that they may permit entry to their property at a later date. At the time of preparation of this document, permission to enter had been granted for some properties, but access to most properties had not been granted; accordingly, most biological resource information is based on desktop analyses, including habitat modeling for special-status species. No protocol-level presence-absence surveys for special-status plants or wildlife have been conducted and therefore they were assumed to be present in areas modeled as habitat. Field surveys conducted as of the time of writing are summarized in Table 3.7-2.

Table 3.7-2 Field Surveys and Personnel

Date(s)	Personnel	Subsection(s)	Purpose
May 4–5, 2016	Angela Alcala Kate Carpenter Matt Ricketts	All	Reconnaissance-level wildlife habitat assessment. Verify/update 2010 land cover mapping (Authority and FRA 2011).
December 16, 2016	Brad Schafer	Pacheco Pass (east of Casa de Fruta)	Reconnaissance-level habitat assessment of proposed geotechnical investigation/boring sites.
January 19, 2017	Shannon Crossen Matt Ricketts	Monterey Corridor Morgan Hill and Gilroy Pacheco Pass San Joaquin Valley	Tour of key wildlife crossings in Coyote Valley with Pathways for Wildlife and SCVOSA (Crossen). Windshield survey of Pacheco Pass and San Joaquin Valley Subsections to familiarize Ms. Crossen with project extent (Ricketts and Crossen).
January 24 and 31, 2017	Ross Wilming Matt Ricketts	Pacheco Pass (south of Lover's Leap)	Reconnaissance-level habitat assessment of proposed geotechnical investigation/boring sites.
January 25, 2017	Matt Ricketts	Pacheco Pass (north of Whiskey Flat)	Reconnaissance-level habitat assessment of proposed geotechnical investigation/boring sites.
April 19, 2017	Matt Ricketts	Pacheco Pass San Joaquin Valley	Reconnaissance-level habitat assessment during Authority-sponsored tour of locations where project footprint overlaps with USBR or local water district facilities for affected stakeholders.
April 30–May 1, 2018	Joel Butterworth Kate Carpenter	Morgan Hill and Gilroy San Joaquin Valley	Aquatic resource delineation surveys.
May 21–23, 2018	Joel Butterworth Kate Carpenter	Morgan Hill and Gilroy San Joaquin Valley	Aquatic resource delineation surveys.
April 22–25, 2019	Linnea Spears-Lebrun Lanika Cervantes R. J. Van Sant Kristen Klinefelter Marty Lewis Donna Maniscalco	Morgan Hill and Gilroy Pacheco Pass San Joaquin Valley	CRAM field surveys.

CRAM = California Rapid Assessment Method
SCVOSA = Santa Clara Valley Open Space Authority
USBR = U.S. Bureau of Reclamation

Reconnaissance Field Surveys

Biologists conduct reconnaissance field surveys of the project extent as access allows (Table 3.7-2). During these visits, biologists collect qualitative information on vegetation and wildlife habitat quality using geotagged digital photographs and field notes. Biologists also collect geospatial information on incidental observations of special-status wildlife using smartphones or tablets (Collector for ArcGIS). At the time of writing, approximately 75 percent of the project extent (i.e., the footprint of all four project alternatives) has been accessed or viewed from adjacent roadways during reconnaissance surveys.

Special-Status Species Habitat Modeling

The Authority prepared GIS species habitat models for the regional RSA. The use of species habitat models was selected because access to the project extent is limited, and modeling allows the Authority to complete impact analyses and permitting efforts despite limited access to properties to conduct field-level biological surveys.

Species habitat models were developed to achieve the following:

- Assess impacts
- Analyze project alternatives
- Place avoidance and minimization features
- Determine mitigation requirements
- Prioritize mitigation opportunities
- Track and report impacts and mitigation

In summary, the models—and the maps generated from them—provide important support for compliance with CEQA, NEPA, Section 7 of the FESA, and Section 2081(b) of the CESA. Moreover, they inform compensatory mitigation planning associated with permitting under Sections 404 and 401 of the CWA and Cal. Fish and Game Code Section 1600. Additional details on species habitat modeling methodology and approach are provided in the technical memorandum prepared for and submitted to the USFWS and CDFW on December 19, 2016 (Appendix D, Species Habitat Modeling Methods Memo, of the Biological and Aquatic Resources Technical Report [Authority 2020a]). Key elements of the methodology are summarized in the following subsections.

Habitat Terminology

Habitat—The environmental conditions that support occupancy of a given organism in a specified area (Hall et al. 1997).

In scientific and lay publications, habitat is defined in many different ways and for many different purposes. For the purposes of this Draft EIR/EIS, habitat is defined as the specific places where the physical and biological conditions are assumed present that are required to support occupancy by individuals or populations of a given species. Habitat may be occupied (i.e., species present or recently documented as present) or unoccupied.

The term *habitat* implies suitability because any areas with habitat for a given species are therefore *suitable* for that species. The use of this term in this Draft EIR/EIS does not imply presence or absence of a given species, only that the environmental conditions known to support that species are known (through direct observation or expert opinion) or presumed (through habitat modeling) to be present in a specified area. *Occupied habitat* is used only when species occurrence has been verified in a specified area.

Species Modeling Methods

Habitat models bring together information about environmental attributes, species life history, and environmental requirements to create a spatially explicit model of suitable habitat at a regional scale. The models are created and displayed using GIS software (ArcGIS 10.3). Once in GIS, the habitat models can be intersected with the project footprint and resource layers to determine impacts and assess mitigation opportunities.

Biologists developed two types of species habitat models to assess impacts from construction and operations of the project and to identify mitigation opportunities: statistically based and rule based. *Statistically based* models are created using a GIS-based software program that accepts habitat and occurrence data inputs and then selects potentially suitable habitat based on the most statistically significant correlations between model variables. San Joaquin kit fox is the only species for which a statistically based model was used. *Rule-based* models are created using an intersection of habitat parameters in GIS. Typically, this is done using Boolean “and/or” relationships to formulate the habitat distribution. For example, a species would be predicted to

occur in an area that has the vegetation community *and* the soil type *and* the correct elevation range where the species is known to occur. To recognize a difference in model complexity between listed and nonlisted species, biologists defined two secondary types of rule-based models: basic and specific. *Basic* rule-based habitat models were created through an intersection of land cover and geographic range (including elevation range in some cases) datasets in GIS, and were created primarily for nonlisted species. *Specific* rule-based habitat models used land cover and range data; additional parameters such as geology, soil, and hydrological data; and spatial measurements related to species movement and area use to identify potentially suitable habitat.

Biologists selected the rules for basic and specific habitat models based on the scientific literature, listing and recovery documents published by resource agencies, first-hand species knowledge, and prior experience. The rules incorporate analysts' best interpretation of species biology and life history requirements into model parameters. Where existing rule-based species habitat models were available and appropriate, they were applied or adapted to the regional RSA. Existing models were used when possible because most have been previously reviewed by the agencies and species experts. For example, the SCVHP is a permitted HCP that uses habitat models developed through close coordination with resource agency staff. Rule-based habitat models developed for Southern California HSR sections (e.g., Bakersfield to Palmdale) were also considered a source of best available information because the agency and expert review process is farther along than Northern California sections. Accordingly, the final models are considered a source of best available information and are used to guide rule development, model parameter selection, and output review for all overlapping species.

The Biological and Aquatic Resources Technical Report (Authority 2020a) provides detailed information regarding the species for which models were developed, the type of model developed, the iterative process through which models were developed, and the source of the model, if applicable. Habitat was modeled for species determined to have potential to be affected by the project. Species chosen for modeling have range, modeled habitat, and occurrences that overlap with or are near the project footprint.

Some of the impact discussions presented in this analysis group species based on a habitat type that they have in common (e.g., special-status plants; least Bell's vireo, yellow warbler, and yellow-breasted chat in riparian habitat), and where significant impacts occur, similarity of compensatory mitigation (i.e., habitat preservation). In these cases, the impact acreages presented in the discussion reflect the *aggregate* areal extent of all species taken together—in other words, the exterior perimeter of the overlapping boundaries of their mapped habitat, so that land where modeled habitat for more than one species is present is only counted once.

Delineation of Aquatic Resources

The mapping conducted for the delineation of aquatic resources was accomplished largely through the interpretation of high-resolution aerial imagery and review of existing maps. The aerial images reviewed covered a range of dates (approximately 1998–2017), but use of recent imagery was emphasized to support interpretation of typical site conditions. Soil survey maps and supporting information were used to identify the soils' geomorphic setting, hydric status, and drainage characteristics.

The emphasis on mapping using aerial imagery and other sources constrained the precision of the mapping of aquatic resources. Some areas identified as potential waters of the U.S. may not meet the technical criteria. Conversely, some areas identified as terrestrial land cover types may indeed be waters of the U.S., although such areas are expected to be of relatively limited extent because the mapping of aquatic features was approached in a conservatively inclusive manner.

The mapping of aquatic features considered to be waters of the U.S. is subject to verification by the USACE. The Authority submitted an aquatic resources delineation to the USACE, and verification (Preliminary Jurisdictional Determination) by the USACE was completed on December 5, 2019.

Clean Water Act Section 404

Wetland Delineation Methods

Field surveys were conducted in July 2010, May 4 and 5, 2016, January 19, 2017, April 30 and May 1, 2018, and May 21–23, 2018. During field surveys, qualified delineators verified the pre-field survey aerial imagery mapping where site access was granted or where the features could be viewed from public roads. In addition, where site access was granted, delineators walked meandering transects to visually assess the aquatic RSA for the presence of additional wetland features. Where terrain was accessible, the extent of all observed waters of the U.S. was identified and mapped using a handheld global positioning system (GPS) unit with sub-meter accuracy; in areas where terrain prevented walking transects, GPS points were taken at intervals. Representative photographs were taken of mapped features to document physical characteristics. The landforms, vegetation, hydrology, and soil characteristics were noted. Survey data and personnel were recorded on determination data forms. For properties where access was not granted, delineators conducted "windshield" surveys from public roads using binoculars to compare their field observations with signatures on the aerial imagery mapping and updated boundaries as necessary. All mapping was conducted by wetland specialists experienced in using the methods described in the USACE Delineation Manual (Environmental Laboratory 1987) and the USACE Arid West Supplement (USACE 2008a).

Nonwetland Waters Delineation Methods

Wetland specialists conducted field surveys for and desktop mapping of nonwetland waters in the aquatic RSA. These specialists applied the relevant methods described in *A Field Guide to the Identification of the Ordinary High Water Mark in the Arid West Region of the Western United States* (USACE 2008b) and USACE Regulatory Guidance Letter No. 05-05 (USACE 2005) to conditions observed in the field and to aerial photograph signatures of nonwetland waters. Indicators of the ordinary high water mark that were evaluated in the field were natural lines impressed on banks, stain lines, shelving, changes in soil character, changes in vegetation, destruction of terrestrial vegetation, and the presence of litter and debris.

Porter-Cologne Water Quality Control Act

Generally, waters under state regulation are presently delineated in the same manner as federal waters (including the USACE Delineation Manual [Environmental Laboratory 1987] and the USACE Arid West Supplement [USACE 2008a]) based on a Memorandum of Understanding (MOU) with the Authority and SWRCB dated January 2017. The MOU was amended in March 2019 to note that the SWRCB is engaged in a rulemaking to amend the requirements that apply to applications for discharges of dredged or fill materials to waters of the state and the methodology for delineating certain aquatic features. The MOU amendment notes that the provisions in the rulemaking will supersede the provisions of the original amendment upon the effective date of the rulemaking. The rulemaking is currently scheduled to take effect on May 28, 2020. Because the rulemaking has not yet taken effect, this document identifies waters of the state that fall under SWRCB regulation in the same manner as federal waters, consistent with the MOU. The Authority would be required to adhere to the rules in effect at the time an application for discharges of dredged or fill materials to waters of the state is made to the SWRCB.

California Fish and Game Code Section 1600 et seq.

The area regulated under Section 1600 et seq. of the Cal. Fish and Game Code often extends beyond that the limit of waters of the U.S. (i.e., above the ordinary high water mark). For example, waterbodies and stream channels up to the top of the streambank or to the riparian vegetation drip line are typically regulated under Section 1600 et seq., but may not qualify as waters of the U.S. or waters of the state. For the purposes of this analysis, all riparian areas have been mapped to the outer drip line of riparian vegetation and are included as areas potentially regulated by CDFW under Section 1600 et seq. of the Cal. Fish and Game Code.

Impact Types and Mechanisms

Project impacts may be direct (i.e., caused by the activity and occurring in the same time and place) or indirect (i.e., caused by the activity but removed in time or distance, but still reasonably

foreseeable). Direct impacts would occur within the project footprint during construction and could be temporary (e.g., habitat loss or disturbance resulting from construction staging and activities but restored to pre-project conditions following construction) or permanent (e.g., removal and conversion of existing habitat to HSR facilities). Direct impacts would also occur during operations and would be intermittent (i.e., not continuous but recurring during rail operations on an episodic or occasional basis throughout the life of the system). Indirect impacts could occur both within and adjacent to the project footprint.

Direct construction impacts on special-status species habitat, special-status plant communities, aquatic resources, and conservation areas were quantified using GIS. Specifically, GIS analysts calculated areas of impact by intersecting biological and aquatic resource feature layers (e.g., special-status species habitat models) with feature layers in the project design drawings (i.e., project activities). Land cover (including special-status plant communities) and aquatic resource feature layers were generated in the land cover mapping and aquatic resource delineation efforts described earlier in this section. Feature layers for special-status species habitat are equivalent to the species habitat models developed specifically for the project as previously described in Species Modeling Methods. Prior to analysis, GIS analysts converted MicroStation DGN files provided by project engineers to ArcGIS geodatabases to facilitate intersects between design drawing and biological resource feature layers.

Direct and indirect construction impacts on wildlife movement and certain groups of non-special-status wildlife (i.e., waterfowl, shorebirds, and wading birds) were evaluated using a variety of quantitative and qualitative methods, including selection and scoring of focal species (i.e., species whose movement needs are representative of a wider variety of species in a given landscape) and permeability modeling. These methods are described in the WCA (Appendix C of the Biological and Aquatic Resources Technical Report [Authority 2020a]).

Indirect construction impacts and direct intermittent and indirect operations impacts are described qualitatively because it is difficult to measure or predict species' or plant community response to future or far-removed environmental factors, especially at the scale of individual plants or animals. Indirect impacts were assessed based on biologists' understanding of the best available science for a given resource and proposed construction and operations activities.

A key component of describing impacts from construction and operations are the impact mechanisms (i.e., the physical activities associated with the project that could result in effects on biological and aquatic resources). The following categories of impact mechanisms were identified:

- Ground disturbance
  - Construction—Grading, clearing, and excavation needed to construct the project
  - Operations—Minor grading, clearing, and excavation necessary to maintain the project right-of-way
- Vegetation removal
  - Construction—Removal of trees and other vegetation as part of site preparation
  - Operations—Tree pruning or weed management along the right-of-way
- Structure modification/demolition
  - Construction—Modification or removal of existing buildings, bridges, roadways, or other structures
  - Operations—Not applicable: no existing structures would be removed during operations
- Hazardous material and pollutant release
  - Construction—Inadvertent release of hazardous materials (e.g., oils and fluids from construction equipment) into sensitive habitat or aquatic resources
  - Operations—Same as for construction

- Hydrologic modification of surface flows caused by surficial activities
  - Construction—Changes to the hydrology of an aquatic resource, either from a change in topography or temporarily to divert water from a work area
  - Operations—Not applicable: minor ground disturbance during operations would not alter topography to an extent that would result in hydrologic change
- Hydrologic modification of surface water features or flows caused by groundwater inflow during tunnel construction or operations
  - Construction—Changes to the hydrology of an aquatic resource caused by inflow of groundwater during tunneling, associated reduction in the aquifer, and reduction of flow to groundwater-dependent aquatic resources.
  - Operations—Not applicable: as described in Section, 3.8, the tunnels would be watertight, which would prevent groundwater inflow during operations.
- Noise
  - Construction—Noise generated by heavy equipment and workers
  - Operations—Noise generated by passing trains and maintenance activities
- Vibration
  - Construction—Vibration generated by heavy equipment and tunnel-boring activities
  - Operations—Vibration generated by passing trains and maintenance activities
- Visual disturbance
  - Construction—Visual perception of construction activities and human presence by wildlife (e.g., birds, nesting raptors)
  - Operations—Visual perception of passing trains and maintenance activities by wildlife
- Artificial light
  - Construction—Light generated by nighttime construction activities, including tunnel portals
  - Operations—Light generated by passing trains and security at HSR facilities
- Vehicle strike
  - Construction—Movement of construction vehicles (e.g., trucks on temporary access roads)
  - Operations—Movement of passing trains

3.7.5.4 Method for Evaluating Impacts under NEPA

The CEQ NEPA regulations (40 C.F.R. Parts 1500–1508) provide the basis for evaluating project impacts (as described in Section 3.1.5.4, Methods for Evaluating Impacts). As described in Section 1508.27 of these regulations, the criteria of context and intensity are considered together when determining the severity of the change introduced by the project.

- **Context—**For the analysis of impacts on biological and aquatic resources, the context would be the existing resources within the RSA: the status of sensitive communities and species that occur or that could occur along the project corridor; and the regulatory setting pertaining to biological and aquatic resources.
- **Intensity—**For the analysis of impacts on biological and aquatic resources, the intensity or severity of an impact would reflect the magnitude of the change between the existing and

projected conditions—specifically, the degree to which the construction and operations of the project could affect these resources.

3.7.5.5 Method for Determining Significance under CEQA

CEQA requires an EIR to identify the significant environmental impacts of a project (CEQA Guidelines § 15126). One of the primary differences between NEPA and CEQA is that CEQA requires a threshold-based impact analysis. Significant impacts are determined by evaluating whether project impacts would exceed the significance threshold established for the resource (Section 3.1.5.4). Based on the CEQA Guidelines, the project would have a significant impact on biological and aquatic resources if it would:

- 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 CDFW or USFWS
- 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 CDFW or USFWS
- Have a substantial adverse effect on state- or federally protected wetlands (including but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means
- Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance
- Conflict with the provisions of an adopted HCP, NCCP, or other approved local, regional, state, or federal HCP

As discussed above, biological resources are regulated by numerous agencies at all levels of government, and there are numerous statutes and regulations that are intended to avoid or minimize impacts on biological resources. Where local governments have developed policies or ordinances for the protection of biological resources within their jurisdictions, a conflict with the policy or ordinance would generally indicate the potential for a significant impact. Similarly, a conflict with an adopted HCP, NCCP, or other approved local, regional, state, or federal HCP, would generally indicate the potential for a significant impact because NCCPs and HCPs are adopted specifically for the protection of biological resources. Conversely, where there is no conflict with a local policy or ordinance or an NCCP or HCP, that would generally indicate that the project would not result in a significant impact related to the resources that are protected by the policy, ordinance, or plan.

Mandatory findings of significance in CEQA Guidelines Section 15065 require the lead agency to determine whether a project may have a significant effect on the environment where substantial evidence indicates that negative impacts may occur on biological resources. Under CEQA's mandatory findings of significance, the project would result in a significant impact if it would:

- Substantially reduce the habitat of a fish or wildlife species
- Cause a fish or wildlife population to drop below self-sustaining levels
- Threaten to eliminate a plant or animal community
- Substantially reduce the number or restrict the range of an endangered, rare, or threatened species

General indicators of significance, based on guidelines or criteria in NEPA or CEQA, and regulatory guidance from FRA include:

- Potential modification or destruction of habitat, movement corridors, or breeding, feeding, and sheltering areas for endangered, threatened, rare, or other special-status species
- Potential measurable degradation of protected habitats, sensitive vegetation communities, wetlands, or other habitat areas identified in plans, policies, or regulations
- Potential loss of a substantial number of any species that could affect the abundance or diversity of that species beyond the level of normal variability
- Potential indirect impacts, both temporary and permanent, from excessive noise that elicits a negative response and avoidance behavior

3.7.6 Affected Environment

3.7.6.1 Physical Conditions

This section describes the physical conditions of the project: its topography, climate, hydrology, and soils. These characteristics are the context for the biological conditions and the biological resource descriptions that follow. Additional details are provided in the Biological and Aquatic Resources Technical Report (Authority 2020a).

Topography

The project is located within three ecological sections: Central California Coast, Central California Coast Ranges, and Great Valley (Miles and Goudey 1998).

Within the Central California Coast section is the Santa Clara Valley subsection. It consists of an alluvial plain in the Santa Clara Valley that extends from Hollister to San Francisco Bay and an alluvial plain along the southwestern side of San Francisco Bay.

Within the Central California Coast Ranges section are three subsections: the Eastern Hills, the Diablo Range, and the Western Diablo Range. The Eastern Hills subsection consists of hills and low mountains in the eastern portion of the Diablo Range as well as some hills south of the Diablo Range. The Diablo Range subsection consists of the steep, mountainous central part of the Diablo Range and steep hills along the east-northeast side of the San Andreas fault between Hollister and Parkfield. The Western Diablo Range subsection consists of mountains with rounded ridges, steep and moderately steep sides, and narrow canyons.

Within the Great Valley section are two subsections: the San Joaquin Basin and the Westside Alluvial Fans and Terraces. The San Joaquin Basin subsection is on floodplains and the basin floor in the middle of the San Joaquin Valley. The Westside Alluvial Fans and Terraces subsection is along the western edge of the San Joaquin Valley, adjacent to the Coast Ranges.

Elevations specifically in the project extent range from approximately 55 feet at the western tip of the project extent in Santa Clara to 1,583 feet at Pacheco Pass. Slopes range from nearly level in the Santa Clara Valley and between Interstate (I-) 5 and the eastern tip of the project extent to approximately 75 percent in the Pacheco Pass area.

Climate

The Mediterranean climate typical of the region consists of cool, wet winters and hot, dry summers. Mean annual temperatures in the project extent range from a low of 36 degrees Fahrenheit (°F) in December to a high of 95°F in July. Approximately 79 to 85 percent of the annual rainfall occurs from November to March (NRCS 2017b). A detailed climate summary is provided in the *San Jose to Merced Project Section Hydrology and Water Resources Technical Report* (Hydrology and Water Resources Technical Report) (Authority 2020b).

Watershed and Hydrology

Watersheds and major hydrological features (based on the NRCS's hydrologic unit code [HUC]-8 watersheds) are illustrated on Figure 3.7-3. The western part of the project extends through a number of watersheds that drain to the San Francisco Bay, including Coyote Creek, Guadalupe River, and Los Gatos Creek, and the Pacific Ocean (Monterey Bay), including Llagas Creek,

Pacheco Creek, and Pajaro River. The divide between these watersheds and the San Joaquin River watershed to the east is at Pacheco Pass on the crest of the Coast Range.

The eastern part of the project lies in the southern portion of the San Joaquin River watershed. The San Joaquin River watershed extends from the Sacramento–San Joaquin Delta in the north to the northern boundary of the Tulare Lake Basin in the south, and from the crest of the Sierra Nevada in the east to the crest of the Coast Ranges in the west.

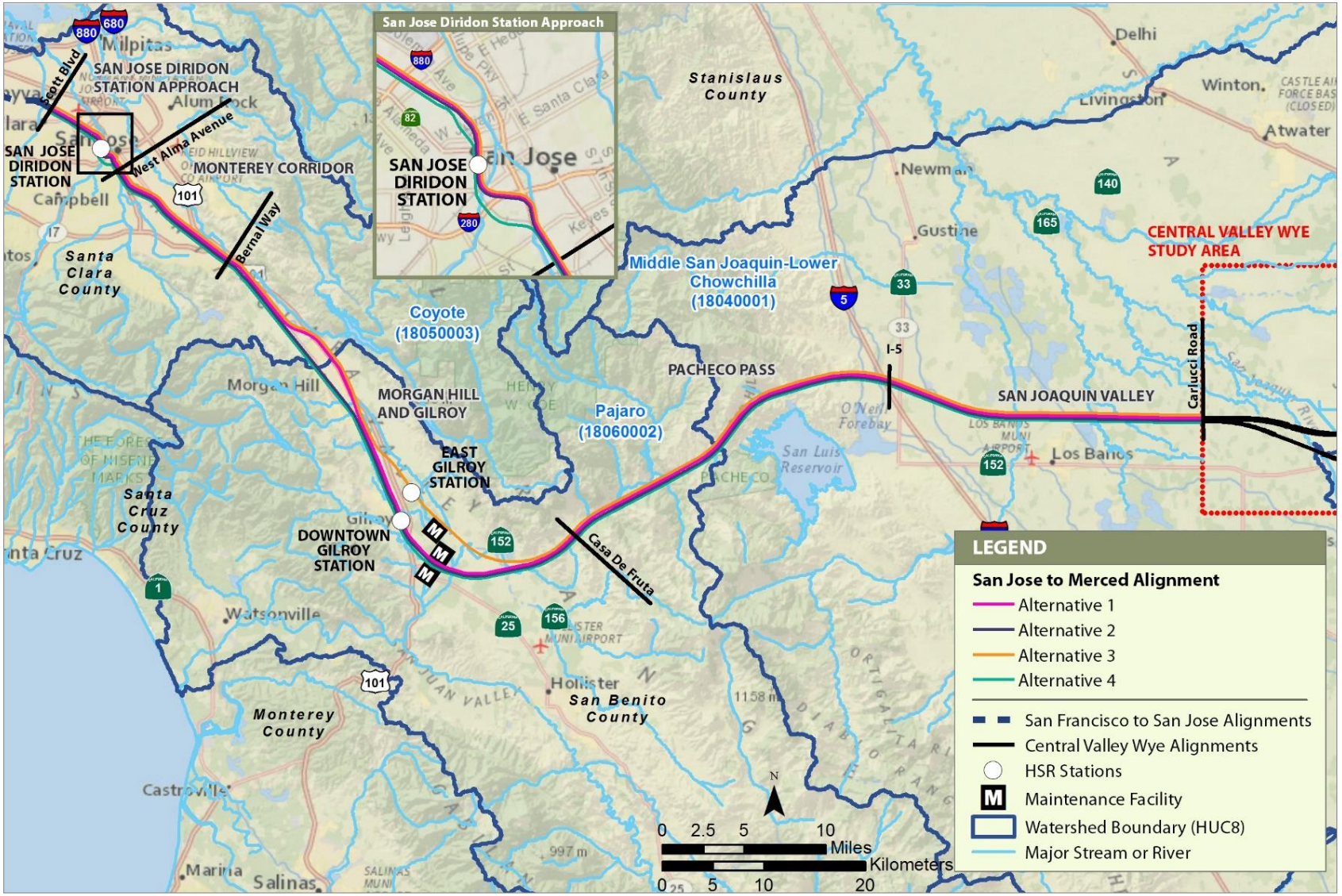
The project extent illustrated on Figure 3.7-3 is located within four HUC-8 cataloguing units: Coyote (HUC 18050003), Pajaro (HUC 18060002), Panoche–San Luis Reservoir (HUC 18040014), and Middle San Joaquin–Lower Chowchilla (HUC 180400001). Prominent water features in the Coyote unit include Coyote Creek, Guadalupe River, and Los Gatos Creek. Prominent water features in the Pajaro unit include Llagas Creek, Pacheco Creek, Pajaro River, San Benito River, Soap Lake, and Uvas Creek. Prominent water features in the Panoche–San Luis Reservoir unit include the Delta-Mendota Canal, California Aqueduct, the San Luis Reservoir, and O'Neil Forebay. Prominent water features in the Middle San Joaquin–Lower Chowchilla unit include the Devon Drain, Mud Slough, Main Canal, and San Luis Wasteway.

Refer to Chapter 5, Existing Conditions and Effects Analysis, of the Hydrology and Water Resources Technical Report (Authority 2020b) for additional information on the hydrologic characteristics in the project extent. (For reference, because of differences in the purposes of the reports, the criteria by which the extent of the waterbodies shown in Table 5-3 of that report were identified and mapped were different from those used in the Biological and Aquatic Resources Technical Report.)

Soils

Analysts reviewed the NRCS (formerly the Soil Conservation Service) Soil Survey Geographic database (NRCS 2017a), State Soil Geographic data (NRCS 2016), and print versions of soil survey reports to describe the general characteristics of the soils in the project extent (Table 3.7-3). The print soil survey reports used were Santa Clara Area (SCS 1958); Supplement to Santa Clara Area, Western Part (NRCS 2015); Eastern Santa Clara Area (SCS 1974); and Merced County, Western Part (SCS 1990). Because of the large area of investigation, soil associations are presented to describe the general distribution of predominant soil series and their associated landforms.

Refer to Section 5.1.2, Soils, of the *San Jose to Merced Project Section: Geology, Soils, and Seismicity Technical Report* (Geology, Soils, and Seismicity Technical Report) (Authority 2019b) for additional information on the soils in the project extent. That report indicates that the soils in the project extent have a wide textural class range (clay to gravelly fine sandy clay loam) and some are underlain by duripans (e.g., San Joaquin series).



Source: USGS 2017

FEBRUARY 2019

Figure 3.7-3 Watersheds and Major Hydrological Features of the San Jose to Central Valley Wye Project Extent

Table 3.7-3 Soil Associations of the San Jose to Central Valley Wye Project Extent

Soil Association (map symbol)	County of Occurrence	Landform
Elnido-Dospalos-Bolfar-Alros (s785)	Merced	Flood plains of the valley basin
Turlock-Triangle-Britto (s786)	Merced	Valley basin and valley basin rim
Dosamigos-Deldota-Chateau (s788)	Merced	Low alluvial fans
Woo-Stanislaus (s789)	Merced	Alluvial fans
Volta-Pedcat-Marcuse (s787)	Merced	Alluvial fans and valley basin rim
Oneil-Apollo (s791)	Merced	Foothills
Los Banos-Damluis-Bapos (s790)	Merced	Terraces
Millsholm-Honker-Gonzaga-Fifield (s793)	Merced	Mountains
Salinas-Mocho-Metz-Cropley (s940)	Santa Clara	Fans and terraces
Sheridan-San Benito-Diablo (s964) Montara-Henneke (s683) Vallecitos-Parrish-Los Gatos-Gaviota (s970)	Santa Clara	Uplands
Willows-Pacheco-Clear Lake (s960)	Santa Clara	Alluvial fans and plains
Pacheco-Clear Lake-Campbell (s967)	Santa Clara	Valley bottoms and alluvial plains
San Ysidro-Pleasanton-Arbuckle (s966)	Santa Clara	Old fans and terraces
Xerorthents-Urban land-Botella (s987)	Santa Clara	Valley bottoms and alluvial fans

Sources: NRCS 2017a

3.7.6.2 Biological Conditions

This section describes the biological conditions of the RSAs. The topics addressed are land cover types, potentially occurring special-status species, non-special-status wildlife, special-status plant communities, aquatic resources, protected trees, wildlife movement, conservation areas, and HCPs. Special-status species potentially affected by the project are summarized in Volume 2, Appendix 3.7-A; the scientific nomenclature of all species mentioned in the text is presented in Volume 2, Appendix 3.7-B.

Land Cover Types

The project extent is located within the California Floristic Province and traverses the San Francisco Bay Area subregion of the Central Western California region, and the San Joaquin Valley subregion of the Great Central Valley region. The San Francisco Bay Area subregion encompasses a diversity of vegetation types, from very wet redwood forest to dry oak/pine woodland and chaparral. The San Joaquin Valley subregion is predominantly agricultural with some grasslands, marshes, vernal pools, riparian woodlands, alkali sink vegetation, and stands of valley oak (Jepson Flora Project 2017).

Table 3.7-4 shows the project-specific land cover types and a crosswalk to the special-status plant communities as defined in the *Manual of California Vegetation* and those in the CWHR, used for habitat modeling. Table 3.7-5 shows the area of land cover within each of the project alternatives. Land cover maps for the habitat study area are provided in Appendix G, Land Cover Maps, of the Biological and Aquatic Resources Technical Report (Authority 2020a). The Biological and Aquatic Resources Technical Report also describes the vegetation structure and composition of each land cover type in greater detail.

Table 3.7-4 Crosswalk of Land Cover Classification to Other Classification Systems

Land Cover Type	MCV Alliance Crosswalk Type*	CWHR Crosswalk Type (code)	Dominant Species or Other Characteristics
Tree-Dominated			
Blue oak–foothill pine	*Blue oak woodland *Quercus douglasii* Woodland Alliance	Blue oak–foothill pine (BOP)	Blue oak, foothill pine, coast live oak, California buckeye, *Ceanothus* spp., manzanita spp.
California sycamore woodland[1]	*California sycamore woodlands *Platanus racemosa* Woodland Alliance	Valley foothill riparian (VRI)	Western sycamore, valley oak.
Coastal oak woodland	Coast live oak woodland *Quercus agrifolia* Woodland Alliance	Coastal oak woodland (COW)	Coast live oak, California bay, madrone, tanbark oak, canyon live oak
Mixed riparian	Arroyo willow thickets *Salix lasiolepis* Shrubland Alliance *California rose briar patches *Rosa californica* Shrubland Alliance *Blue elderberry stands *Sambucus nigra* Shrubland Alliance *Valley oak woodland *Quercus lobata* Woodland Alliance	Valley foothill riparian (VRI)	Willows, button bush, California rose, elderberries, with few tree species such as Fremont cottonwood, western sycamore, valley oak, white alder
Palustrine forested wetland	*Fremont cottonwood forest *Populus fremontii* Forest Alliance	Valley foothill riparian (VRI)	Fremont cottonwood, western sycamore, valley oak
Shrub-Dominated			
Alkali scrub wetland	*Iodine bush scrub *Allenrolfea occidentalis* Shrubland Alliance	Alkali desert scrub (ASC)	Iodine bush, allscale, saltbush species, shadescale
Coastal scrub	Coyote brush scrub *Baccharis pilularis* Shrubland Alliance	Coastal scrub (CSC)	Coyote bush, California buckwheat, sage species
Mixed chaparral	Scrub oak chaparral *Quercus berberidifolia* Shrubland Alliance Wright's buckwheat patches *Eriogonum wrightii* Dwarf Shrubland Alliance	Mixed chaparral (MCH)	Scrub oak, ceanothus species, manzanita species

Land Cover Type	MCV Alliance Crosswalk Type*	CWHR Crosswalk Type (code)	Dominant Species or Other Characteristics
Herbaceous-Dominated			
Alkali marsh	*Alkali heath marsh *Frankenia salina* Herbaceous Alliance	Alkali desert scrub (ASC)	Cattail, alkali bulrush, salt grass, alkali heath
Alkali vernal pool[2]	*Alkali weed–Salt grass playas and sinks *Cressa truxillensis–Distichlis spicata* Herbaceous Alliance	Alkali desert scrub (ASC)	Fremont's goldfields, salt grass, alkali weed
California annual grassland	Wild oats grasslands *Avena (barbata, fatua)* Herbaceous Semi-Natural Alliance; Annual brome grasslands *Bromus* (*diandrus*, *hordeaceus*)–*Brachypodium distachyon* Herbaceous Semi-Natural Alliance; *Purple needle grass grassland *Nassella pulchra* Herbaceous Alliance	Annual grassland (AGS)	Wild oats, brome species, barley, annual fescues, California oatgrass, hairgrass, sweet vernal grass
Freshwater marsh	California bulrush marsh *Schoenoplectus californicus* Herbaceous Alliance; Cattail marshes *Typha (angustifolia, domingensis, latifolia)* Herbaceous Alliance; Pale spike rush marshes *Eleocharis macrostachya* Herbaceous Alliance; *White-root beds *Carex barbarae* Herbaceous Alliance	Fresh emergent wetland (FEW)	Cattail, bulrush, spike rush
Seasonal wetland	Perennial rye grass fields *Lolium perenne* Herbaceous Semi-Natural Alliance; *Common monkey flower seeps *Mimulus (guttatus) Herbaceous* Alliance; *Creeping rye grass turfs *Leymus triticoides* Herbaceous Alliance	Wet meadow (WTM)	Curly dock, rushes, grasses
Vernal pool	*Fremont's goldfields–Salt grass alkaline vernal pools *Lasthenia fremontii–Distichlis spicata* Herbaceous Alliance	Annual grassland (AGS)	Fremont's goldfields, salt grass

Land Cover Type	MCV Alliance Crosswalk Type*	CWHR Crosswalk Type (code)	Dominant Species or Other Characteristics
Aquatic			
Freshwater pond	No corresponding type	Lacustrine (LAC)	Plankton, duckweed, water lilies; intermittent lacustrine system
Natural watercourse	No corresponding type	Riverine (RIV)	Unvegetated, willows, rushes, cattails
Reservoir	No corresponding type	Lacustrine (LAC)	Plankton, duckweed, water lilies; permanent lacustrine system
Developed			
Commercial/ industrial	No corresponding type	Urban (URB)	Warehouses, industrial plants, greenhouses
Constructed basin	No corresponding type	Lacustrine (LAC)	Detention basins, agricultural ponds
Constructed watercourse	No corresponding type	Riverine (RIV)	Canals, drainage ditches
Ornamental woodland	Eucalyptus groves *Eucalyptus* (*globulus*, *camaldulensis*) Woodland Semi-Natural Alliance	Eucalyptus (EUC)	Nonnative horticultural tree species including Eucalyptus
Urban	No corresponding type	Urban (URB)	Pavement, houses, buildings
Urban landscaping	No corresponding type	Urban (URB)	Lawn grasses, ornamental trees, hedge shrubs
Agricultural			
Agricultural field crops	No corresponding type	Cropland (CRP)	Grain crops
Orchard	No corresponding type	Deciduous orchard (DOR)	Almonds, walnuts, cherries, olives
Row crop	No corresponding type	Irrigated row and field crops (IRF)	Tomatoes, cotton, lettuce
Vineyards	No corresponding type	Vineyard (VIN)	Grapes
Nonvegetated			
Rock outcrop	No corresponding type	Barren (BAR)	Rock (boulders)

Sources: CDFG 1988; CNPS 2017; CDFW 2018a
*Special-status plant community (Natural Community with S1-3 rank)
CWHR = California Wildlife Habitat Relationships
MCV = Manual of California Vegetation
[1] California sycamore woodland is also known as sycamore alluvial woodland.
[2] The alkali vernal pool cover type includes polygons mapped as both individual pools as well as vernal pool complexes (i.e., mosaic of vernal pools and California annual grassland).

Table 3.7-5 Land Cover Types within the Project Footprint and Habitat Study Areas (acres)

Land Cover Type	Alternative 1			Alternative 2			Alternative 3			Alternative 4		
	Project Footprint	Core HSA[1]	Auxiliary HSA[2]	Project Footprint	Core HSA	Auxiliary HSA	Project Footprint	Core HSA	Auxiliary HSA	Project Footprint	Core HSA	Auxiliary HSA
Tree-Dominated												
Blue oak–foothill pine woodland	0.0	0.0	1.2	0.0	0.0	1.2	0.0	0.0	1.2	0.0	0.0	1.2
California sycamore woodland	12.6	15.5	7.1	12.6	15.5	7.1	12.6	15.5	7.1	12.6	15.5	7.1
Coast oak woodland	603.2	908.2	2,318.1	604.3	915.7	2,346.4	607.1	910.1	2,321.9	603.4	904.8	2,323.7
Mixed riparian	26.3	57.0	200.1	27.6	62.4	228.5	30.3	53.9	195.4	20.9	49.3	179.1
Palustrine forested wetland	16.3	31.8	83.2	15.9	31.0	71.9	11.6	27.5	51.4	12.9	25.3	55.0
Subtotal	658.3	1,012.5	2,609.7	660.4	1,024.6	2,655.1	661.5	1,007.0	2,577.0	649.7	994.9	2,566.1
Shrub-Dominated												
Alkali scrub wetland	0.8	9.2	42.3	0.8	9.2	42.3	0.8	9.2	42.3	0.8	9.2	42.3
Coastal scrub	0.9	6.5	16.6	4.6	6.9	13.4	0.9	6.5	16.6	3.5	6.2	21.4
Mixed chaparral	35.9	53.6	216.0	35.9	53.6	215.0	35.3	54.2	216.1	35.9	53.6	212.4
Subtotal	37.6	69.3	274.9	41.3	69.7	270.7	37.0	69.9	275.1	40.2	68.9	276.1
Herbaceous-Dominated												
Alkali marsh	9.7	36.3	204.2	9.7	36.3	204.2	9.7	36.3	204.2	9.7	36.3	204.2
Alkali vernal pool[3]	27.1	2.8	0.0	27.1	2.8	0.0	27.1	2.8	0.0	27.1	2.8	0.0
California annual grassland	1,246.7	2,695.9	6,524.8	1,274.6	2,690.8	6,478.1	1,252.8	2,737.1	6,662.6	1,200.0	2,644.7	6,343.1
Freshwater marsh	2.3	20.7	66.6	2.4	20.9	66.0	11.3	39.6	103.0	2.3	20.8	63.4
Seasonal wetland	15.9	64.5	113.0	16.3	64.6	114.4	13.9	58.2	97.7	11.7	56.6	105.6
Vernal pools	0.4	0.9	0.0	0.4	0.9	0.0	0.4	0.9	0.0	0.4	0.9	0.0
Subtotal	1,302.1	2,821.0	6,908.5	1,330.5	2,816.2	6,862.6	1,315.3	2,874.8	7,067.5	1,251.2	2,762.1	6,716.2

Land Cover Type	Alternative 1			Alternative 2			Alternative 3			Alternative 4		
	Project Footprint	Core HSA[1]	Auxiliary HSA[2]	Project Footprint	Core HSA	Auxiliary HSA	Project Footprint	Core HSA	Auxiliary HSA	Project Footprint	Core HSA	Auxiliary HSA
Aquatic												
Freshwater pond	5.4	18.9	45.8	5.4	18.9	49.0	4.5	15.0	56.6	5.4	18.9	38.3
Natural watercourse	31.5	95.4	164.7	32.2	98.0	166.5	33.1	95.0	174.0	28.6	89.7	161.9
Reservoir	0.1	13.3	97.8	0.2	12.8	100.8	0.1	13.3	97.8	0.0	6.3	91.2
Subtotal	37.0	127.6	308.2	37.8	129.7	316.3	37.7	123.3	328.4	34.0	114.8	291.3
Developed												
Commercial/industrial	62.1	133.2	447.6	66.3	159.6	460.9	80.9	149.8	447.0	60.9	143.2	439.3
Constructed basin	56.6	31.6	118.0	63.3	37.0	114.3	41.3	24.9	88.9	40.7	30.1	114.7
Constructed watercourse	35.3	74.7	117.6	38.7	73.3	108.9	35.8	78.8	120.2	33.0	74.3	111.1
Ornamental woodland	17.4	27.2	83.5	22.0	28.1	91.4	25.2	29.0	79.8	0.9	24.6	90.6
Urban	1,079.5	2,896.7	6,192.4	1,498.3	3,070.1	6,442.9	960.1	2,694.9	5,918.9	801.3	2,764.5	6,205.0
Urban landscaping	33.6	60.8	223.6	28.7	65.0	203.1	33.8	62.4	215.5	3.6	46.3	160.5
Subtotal	1,284.4	3,224.1	7,182.7	1,717.2	3,433.1	7,421.5	1,177.1	3,039.8	6,870.4	940.3	3,083.1	7,121.3
Agricultural												
Agriculture	813.6	1,552.2	4,288.3	874.5	1,634.8	4,264.2	822.8	1,592.1	4,352.8	812.7	1,574.5	4,238.9
Orchard	269.3	332.6	844.8	249.3	293.2	749.7	257.1	362.4	854.2	165.7	269.5	780.4
Row crops	499.2	1,217.3	3,212.1	680.0	1,456.3	3,441.0	680.2	1,491.0	3,489.9	426.3	1,240.7	3,290.8
Vineyard	37.7	62.8	187.0	37.7	63.3	186.9	39.3	65.6	188.1	37.7	62.8	186.8
Subtotal	1,619.7	3,164.9	8,532.1	1,841.5	3,447.5	8,641.9	1,799.4	3,511.1	8,885.1	1,442.3	3,147.6	8,496.9

Land Cover Type	Alternative 1			Alternative 2			Alternative 3			Alternative 4		
	Project Footprint	Core HSA[1]	Auxiliary HSA[2]	Project Footprint	Core HSA	Auxiliary HSA	Project Footprint	Core HSA	Auxiliary HSA	Project Footprint	Core HSA	Auxiliary HSA
Nonvegetated												
Rock outcrop	2.2	3.2	6.9	2.2	3.2	6.9	2.2	3.2	6.9	2.2	3.2	6.4
Subtotal	2.2	3.2	6.9	2.2	3.2	6.9	2.2	3.2	6.9	2.2	3.2	6.4
Total	4,941.3	10,422.7	25,823.1	5,631.0	10,924.1	26,174.9	5,030.2	10,629.1	26,010.2	4,360.1	10,174.7	25,474.4

Source: Calculations generated using ESRI ArcGIS 10.3 from data generated by field surveys and aerial photo interpretation during 2010–2018. Minor differences in the totals are the result of rounding.
Each acreage total includes acreages of utility upgrades, which are mapped from the project footprint to the limit of the core habitat study area (250 feet from the project footprint boundary).
HSA = habitat survey area
[1] Acreage between project footprint and 250-foot buffer outside footprint.
[2] Acreage between 250 and 1,000 feet outside project footprint.
[3] The alkali vernal pool type includes areas mapped as vernal pool complexes. Acreage provided is an estimate of the wetted vernal pool area within vernal pool complexes, consisting of 45% wetted area and 55% upland area.

Special-Status Species

This section addresses special-status plant and wildlife species that have a potential to be affected by the project based on the methods and types of data described in Section 3.7.5.3, Methods for Impact Analysis. Information on the distribution, habitat requirements, threats, and occurrence of special-status species potentially affected by the project are listed in Volume 2, Appendix 3.7-A. The analysis of listed species (i.e., protected under FESA or CESA) is described in detail in the habitat model descriptions in Appendix E, Species Habitat Model Descriptions, of the Biological and Aquatic Resources Technical Report (Authority 2020a). Similar information for nonlisted special-status species (e.g., California species of special concern, CRPR 1B) is provided in Appendix B of the Biological and Aquatic Resources Technical Report (Authority 2020a). These tables also include listed and nonlisted species that were considered but determined unlikely to be affected by the project.

Critical Habitat

Designated critical habitat for several listed species occurs in the habitat study area. The specific units for the relevant species are shown by alignment subsection in Table 3.7-6.

Table 3.7-6 Critical Habitat Designations[1] by Subsection

Resource	San Jose Diridon Station Approach	Monterey Corridor	Morgan Hill and Gilroy	Pacheco Pass	San Joaquin Valley
Bay checkerspot butterfly	–	–	Tulare Hill (Unit 6) Hale (Unit 10) San Marin (Unit 12) Kirby (Unit 13)	–	–
Central California coast steelhead	Santa Clara Hydrologic Unit (Coyote Creek, Guadalupe River)	Santa Clara Hydrologic Unit (Coyote Creek, Guadalupe River)	Santa Clara Hydrologic Unit (Coyote Creek)	–	–
South-central California coast steelhead	–	–	Pajaro River Hydrologic Unit (Miller Canal, Llagas Creek, Uvas Creek, Pacheco Creek, Pajaro River)	Pajaro River Hydrologic Unit (Cedar Creek, North Fork Pacheco Creek, Pacheco Creek, South Fork Pacheco Creek)	–
Central Population of California tiger salamander	–	–	San Felipe Unit (EB-12) Lions Peak Unit (10a and 10b)	–	–
California red-legged frog	–	–	Wilson Peak (Unit STC-2)	Wilson Peak (Unit STC-2)	–

Source: USFWS 2016a

[1] Critical habitat designations = critical habitat unit or hydrologic unit names assigned by the U.S. Fish and Wildlife Service or National Marine Fisheries Service in the *Federal Register*, followed by numerical descriptor or streams in parentheses.

Essential Fish Habitat

The habitat study area contains designated freshwater EFH for Pacific coast salmon. Specifically, the Pacific Salmon Fishery Management Plan (PFMC 2014) identifies freshwater EFH for Chinook and coho salmon in the Coyote Creek hydrologic unit (HUC-8 18050003), which is composed of the Saratoga Creek, Guadalupe River, Upper Coyote Creek, and Lower Coyote Creek hydrologic areas. Freshwater EFH for Chinook and coho salmon consists of four major activities: (1) spawning and incubation; (2) juvenile rearing; (3) juvenile migration corridors; and (4) adult migration corridors and adult holding habitat. Chinook salmon EFH includes "all those streams, lakes, ponds, wetlands, tributaries, and other waterbodies currently viable and most of the habitat historically accessible to Chinook salmon within Washington, Oregon, Idaho and California" (PFMC 2014). Coho salmon EFH includes "all habitats currently or historically occupied within Washington, Oregon, and California" (PFMC 2014).

Chinook salmon were once extirpated from Coyote Creek, but have spawned there since at least the mid-1980s. Most spawning has been observed in the lowermost reaches but adults have been observed as far upstream as Metcalf Dam at Anderson Reservoir. Chinook salmon is assumed to occur in the habitat study area, although it is currently unknown if spawning is successful. The SCVWD last captured a few juveniles in both Coyote Creek and the Guadalupe River during a trapping effort in the late 1990s (Smith 2013).

Coho salmon have been extirpated from all tributaries of San Francisco Bay (CDFW 2020) and are therefore not expected to occur in the habitat study area. They are only addressed in this analysis as a component of the freshwater EFH designation in the Coyote Creek hydrologic unit.

Non-Special-Status Wildlife

California has an abundant diversity of wildlife, and the regional RSA is no exception. To describe the various wildlife communities in each of the land cover types traversed by the project extent is beyond the scope of this analysis. Instead, this section provides a general summary of common or unique species assemblages known or expected to occur in the habitat study area that do not meet the definition of special-status species in Section 3.7.1.1, Definition of Terminology, and could potentially be affected by construction and operations of the project.

Amphibians and Reptiles

Most amphibian species likely to occur in the habitat study area breed in streams, ponds, or seasonal pools and either remain near aquatic habitat or move into adjacent uplands in the dry season. Sierran treefrog, arboreal salamander, and California slender salamander are fairly common in both developed and natural land cover types as long as seasonal pools or streams are available for breeding and ground cover (e.g., ornamental or native shrubs, dense ground cover or leaf litter) is present. Other species have narrower habitat requirements and only occur in natural land cover types (e.g., riparian and oak woodland/forest, scrub, chaparral, grassland), occasionally venturing onto rural residential lots within or adjacent to natural land cover. Species in this category include California newt, ensatina, and western toad.

Many reptile species adapted to a variety of land cover types are expected to occur in the habitat study area. Western fence lizard and common garter snake are common species in both developed and natural land cover types as long as hard surfaces for basking (e.g., fence posts, rocks, logs, sides of buildings) are present for the former and water is nearby for the latter. Other species have narrower habitat requirements and only occur in natural land cover types, occasionally venturing onto rural residential lots within or adjacent to natural land cover. Species in this category include southern alligator lizard, northern rubber boa, California kingsnake, gopher snake, striped racer, common sharp-tailed snake, ring-necked snake, and western rattlesnake.

Birds

The official checklist of California birds maintained by the California Bird Records Committee (2017) includes 666 species, one of the highest in the United States. The number of species observed in Santa Clara and Merced Counties at the time of writing was 379 and 297, respectively (Sullivan et al. 2009). Recognizing that any of these species could occur in most

parts of the habitat study area during all or certain times of the year, the following discussion focuses on four species groups: (1) terrestrial birds likely to nest in the habitat study area (including riparian songbirds), (2) waterfowl, (3) shorebirds, and (4) waterbirds. Much of the information on waterfowl, shorebirds, and waterbirds was compiled from documents or articles associated with the Central Valley Joint Venture (CVJV), a coalition of 20 state, federal, and private partners with the common goal of providing sufficient habitat for migrating and resident birds in the Central Valley of California. The 2006 *Central Valley Joint Venture Implementation Plan* (CVJV 2006) is the primary guiding document for this coalition and outlines conservation goals and objectives for wintering waterfowl, breeding waterfowl, nonbreeding shorebirds, breeding shorebirds, waterbirds, and breeding riparian songbirds.

Nesting Terrestrial Birds

The diversity of terrestrial birds likely to nest in the habitat study area reflects the diversity of vegetation, topography, and land uses along the project extent. Many tree- or shrub-nesting species, including Anna's hummingbird, downy woodpecker, California scrub-jay, oak titmouse, bushtit, and California towhee are just as likely to nest in developed areas as in natural woodland or scrub. Others, such as American crow, northern mockingbird, and house finch, are more strongly associated with human development. Common tree-nesting raptors in the region include red-tailed hawk, red-shouldered hawk, Cooper's hawk, and great horned owl, all of which are capable of nesting in urban, rural, and natural landscapes as long as suitable trees are present. Killdeer and western meadowlark are the most common ground-nesting species likely to be encountered in barren areas (e.g., open lots of soil or gravel, levees, roadsides, canal edges) and grassland, respectively. Species that nest in, on, or under human structures (e.g., bridges, highway overpasses, culverts, crevices in buildings) in the area include white-throated swift, black phoebe, cliff swallow, and barn swallow. Open-cup- and cavity-nesting species with strong affinities for natural oak woodland include Nuttall's woodpecker, Hutton's vireo, white-breasted nuthatch, orange-crowned warbler, and spotted towhee. Stands of emergent wetland vegetation in and adjacent to ponds, irrigation ditches, and natural wetlands provide nesting habitat for marsh wren, song sparrow, and red-winged blackbird.

Terrestrial songbird species that breed in riparian vegetation have received increased conservation attention in recent decades due to the limited distribution and decline of riparian plant communities. Riparian-breeding songbirds potentially nesting in the habitat study area include Pacific-slope flycatcher, warbling vireo, black-headed grosbeak, song sparrow, common yellowthroat, and spotted towhee. In addition to the latter four species, the 2006 *Central Valley Joint Venture Implementation Plan* identified western yellow-billed cuckoo, yellow-breasted chat, and yellow warbler as "focal species" to develop its conservation objectives for breeding riparian songbirds. Yellow-breasted chat and yellow warbler were included in the habitat modeling effort described in Section 3.7.5.3, and western yellow-billed cuckoo is not expected to occur in the habitat study area.

Waterfowl

Waterfowl in the regional RSA include both wintering and breeding species. Wintering waterfowl are defined as nonbreeding migrating or wintering ducks, geese, and swans using the Central Valley and Santa Clara Valley between August and March (CVJV 2006: page 39). California's Central Valley, including the portion traversed by the project extent, has been documented as one of the most important regions in western North American for wintering waterfowl (Evens and Tait 2005: page 158), and supports up to 60 percent of the total Pacific Flyway population in some years (CVJV 2006: page 39). Wintering dabbling ducks include gadwall, mallard, northern shoveler, northern pintail, and green-winged teal. Wintering diving ducks include canvasback, ring-necked duck, greater scaup, bufflehead, and ruddy duck. Wintering geese or swan species include greater white-fronted goose, snow goose, Ross's goose, cackling goose, Canada goose, and tundra swan. Wintering waterfowl feed in a variety of wetland and agricultural cover types, with managed seasonal wetlands, rice fields (winter-flooded and dry), and corn fields (winter-flooded and dry) identified as especially important in the Central Valley (CVJV 2006: page 46). Several duck species also breed in the habitat study area, with mallards comprising the majority (CVJV 2006: page 39). Other breeding duck species include cinnamon teal, redhead, gadwall,

and ruddy duck. In addition to wetlands, breeding waterfowl also require dense upland vegetation to provide cover for their nests.

The project extent crosses two important areas for waterfowl. The first is the GEA in the San Joaquin Valley Subsection, a 160,000-acre mosaic of freshwater wetlands, alkali grassland, and riparian thickets cooperatively managed by a variety of private, state, and federal landowners, including USFWS (San Luis and Merced National Wildlife Refuges, Grasslands Wildlife Management Area), CDFW (Volta, Los Banos, and North Grasslands Wildlife Areas), California State Parks (Great Valley Grasslands State Park), and private duck clubs. Because it supports a half-million individual ducks, geese, and swans each year between November and February, it has been identified as an Audubon IBA (National Audubon Society 2017a). The second is Soap Lake (also known as "San Felipe Lake"), just south of State Route (SR) 152 and approximately 10 miles east of Gilroy. The Morgan Hill and Gilroy Subsection passes through the Soap Lake floodplain between Gilroy and Casa de Fruta. This area is part of the Upper Pajaro River (UPR) (Bolsa de San Felipe) Audubon IBA (National Audubon Society 2017b). Soap Lake and adjacent pastures and agricultural fields to the west and south provide migratory stopover and winter foraging and roosting habitat for waterfowl and shorebirds traveling to, from, or between other important wintering sites such as South San Francisco Bay, the Monterey Bay lowlands, and the Central Valley (National Audubon Society 2017b). Wintering ducks occur at both sites but are more abundant at Soap Lake (Sullivan et al. 2009). With the exception of Canada goose, wintering geese are more abundant at the Los Banos Wildlife Area than at Soap Lake, though not in the numbers found to the north in the Sacramento National Wildlife Refuge Complex (Evens and Tait 2005: page 166).

Shorebirds

Many species of wintering and breeding shorebirds occur in the regional RSA. Wintering shorebirds are defined as nonbreeding shorebirds that occur between July and May each year (CVJV 2006: page 145). Similar to waterfowl, California's Central Valley has been identified as one of the most important regions for migratory and wintering shorebirds in western North America (Shuford et al. 1998). Shallow flooded fields and managed seasonal and semi-permanent wetlands support large numbers of migratory and wintering dunlin, western sandpiper least sandpiper, greater yellowlegs, long-billed dowitcher, and whimbrel. Among the shorebirds breeding in the Central Valley, only the American avocet, black-necked stilt, and killdeer are widespread, numerous, and nest in a variety of wetland, agricultural, and water treatment or storage cover types (CVJV 2006: page 191). Barren areas such as abandoned levees, dried ponds, exposed mudflats of managed wetlands, and agricultural evaporation ponds provide nesting habitat for these and other breeding shorebirds such as spotted sandpiper and snowy plover (Hickey et al. 2003).

The GEA and Soap Lake (the latter to a smaller extent) are the two areas of primary importance for waterfowl and for wintering and breeding shorebirds along the project extent. The GEA has been identified as an Audubon IBA (National Audubon Society 2017a) and a Site of International Importance by the Western Hemisphere Shorebird Reserve Network (WHSRN 2017) because it seasonally supports nearly 50 percent of all Central Valley shorebirds during the peak of spring migration (mid-April). Wildlife refuges and private duck clubs in the Central Valley (presumably including those within the habitat study area) manage wetlands to benefit shorebirds to some degree but management is habitat- rather than species-based. The main habitat management techniques for shorebirds are water level management, (slow or staggered drawdowns, timing of drawdowns to match periods of peak use), mechanical vegetation control (burning, disking, mowing), and creation of a variety of habitats and varied topography within and among management units (Hickey et al. 2003).

Waterbirds

For the purposes of this analysis, *waterbirds* refer to species addressed by the *North American Waterbird Conservation Plan*, which "provides a continental-scale framework for the conservation and management of 210 species of…seabirds, coastal waterbirds, wading birds, and marshbirds" (Kushlan et al. 2002: page 3). Common waterbird species using wetlands or open water in the habitat study area include western grebe, California gull, Forster's tern, Virginia rail, and sora.

Western grebe is also one of the seven focal waterbird species used by the CVJV (2006) to facilitate conservation of Central Valley waterbirds. Other focal species representing different families spanning a range of wetland and riparian conditions include snowy egret, white-faced ibis, black tern, black rail, and sandhill crane. With the exception of snowy egret and white-faced ibis, all of these species are special-status species addressed by species habitat modeling described in Section 3.7.5.3 and Appendix E of the Biological and Aquatic Resources Technical Report (Authority 2020a). Snowy egret is a CVJV focal species because it nests colonially in dense woody vegetation, most commonly in riparian settings. The remainder of this section focuses on colonial nesting herons and egrets because of their sensitivity to disturbance and the increased level of conservation attention by the CDFW and public.

Four species of colonial nesting herons or egrets are common in the habitat study area: great blue heron, great egret, snowy egret, and black-crowned night-heron. Two additional species, little blue heron and cattle egret, are less common but have been documented at a few sites in the San Francisco Bay Area. Trees, including nonnative species (e.g., *Eucalyptus* spp.) near developed areas, are most commonly used as nesting substrates. Colonies may consist of several hundred nests or just a few breeding pairs. Nesting herons and egrets feed primarily in wetland (and some upland) habitats within a few to several kilometers of their colonies (Kelly et al. 2006: pages 1–3).

Three known heron and egret nesting colonies occur in the habitat study area. The first two colonies are at Coyote Parkway Lakes and Soap Lake in the Santa Clara Valley and are described in the *Annotated Atlas of Heron and Egret Nesting Colonies in the San Francisco Bay Area* (Kelly et al. 2006), a joint research effort by Audubon Canyon Ranch and the San Francisco Bay Bird Observatory. In 2005, great blue herons nested in cottonwood and sycamore trees downstream of the dam at Coyote Parkway Lakes about 150 feet west of U.S. Highway 101 and north of Metcalf Canyon Road. Great blue herons also nested at Soap Lake in 1996, 1998, 2000, and 2001 but not in 2002. Project biologists found the third colony in a stand of cottonwood trees in the San Joaquin Valley during the May 4, 2016 reconnaissance survey. The trees are approximately 500 feet south-southwest of the junction of Fahey Road and Cherokee Road, approximately 3 miles northwest of Volta and 0.2 mile north of the project footprint. Biologists counted approximately 60 nests of at least three species from nearby roads: great blue heron, great egret, and black-crowned night-heron. A focused survey consisting of multiple visits throughout the nesting season would have likely revealed additional nests and possibly additional species (e.g., cattle or snowy egret).

Mammals

A variety of terrestrial mammals occur in the habitat study area. Common burrowing or ground-dwelling rodents expected to occur in developed areas, woodland, scrub, and/or grassland include California ground squirrel, Botta's pocket gopher, western harvest mouse, house mouse, California deer mouse, and California vole). Small to large-sized generalist species adapted to both urban and natural areas include striped skunk, Virginia opossum, northern raccoon, and mule deer. Several carnivore species, including bobcat, coyote, gray fox, and mountain lion, occasionally venture into and move through developed areas but spend most of their time in undeveloped areas away from human activity. Other species that primarily occur in natural woodland, scrub, or grassland include American badger, western gray squirrel, and Merriam's chipmunk.

Several common bat species occur and may roost in the habitat study area. Roost sites must have an appropriate temperature regime and offer protection from predators and weather. Roost sites fall into three general categories: crevices, cavities/caves, and foliage. In natural settings, cavity-roosting species roost in groups on open surfaces inside dark chambers, such as caves or large tree hollows; crevice-roosting species roost in a variety of "slots" (e.g., rock crevices, exfoliating tree bark, damaged wood in snags). While some species appear to prefer cavities or crevices for roosting, many species use a variety of roost sites. With the exception of a few foliage-roosting species, all North American bat species also roost in cave-like spaces and/or crevices in built structures such as bridges, tunnels, old mines, silos, towers, and tunnels (H. T.

Harvey & Associates 2004). Mexican free-tailed bat, big brown bat, and California myotis are common cavity- or crevice-roosting species in California that may roost under bridges or in large tree hollows, abandoned buildings, rock crevices, mine shafts, or other features in the habitat study area. Hoary bat is a highly migratory foliage-roosting species that may roost in wooded portions of the habitat study area during the spring, summer, and fall. Roosting patterns of these and other bat species potentially occurring in the habitat study area are shown in Table 3.7-7.

Table 3.7-7 Roosting Patterns for Bat Species Potentially Occurring in the Habitat Study Area[1]

Species	Status	Bridge	Cave/ Mine	Building	Cliff/ Rock Crevice	Tree Bark/ Hollow	Tree Foliage
Big brown bat *Eptesicus fuscus*		1	2	1	2	1	
California myotis *Myotis californicus*		2	2	1	1	2	
Hoary bat *Lasiurus cinereus*							1
Mexican free-tailed bat *Tadarida brasiliensis*			1	2	1	1	3
Pallid bat *Antrozous pallidus*	SSC	1	2	1	2	1	
Townsend's big-eared bat *Corynorhinus townsendii*	SSC	2	1	2		3	
Western mastiff bat *Eumops perotis californicus*	SSC			3	1		
Western red bat *Lasiurus blossevillii*	SSC						1

Source: H. T. Harvey & Associates 2004
SSC = California species of special concern
[1] 1 = use frequently; 2 = use sometimes; 3 = use rarely; blank = not known to use

Special-Status Plant Communities

Twelve special-status plant communities identified as potentially occurring in the regional RSA based on CNDDB search results (CDFW 2018b), were identified as having the potential to occur within the special-status plant study area. Land cover types that qualify as special-status plant communities, or that could contain unmapped occurrences of a special-status plant community, are shown in Table 3.7-8.

Table 3.7-8 Special-Status Plant Communities Potentially Occurring in the Special-Status Plant Study Area

Land Cover Type	Corresponding CDFW Natural Community Name
Alkali marsh	*Frankenia salina* Herbaceous Alliance
Alkali scrub wetland	*Allenrolfea occidentalis* Shrubland Alliance
Alkali vernal pool	*Cressa truxillensis–Distichlis spicata* Herbaceous Alliance
California annual grassland	*Nassella pulchra* Herbaceous Alliance
California sycamore woodland	*Platanus racemosa* Woodland Alliance
Freshwater marsh	*Carex barbarae* Herbaceous Alliance
Mixed chaparral	*Eriogonum wrightii* Dwarf Shrubland Alliance
Mixed riparian	*Rosa californica* Shrubland Alliance *Quercus lobata* Woodland Alliance *Sambucus nigra* Shrubland Alliance
Palustrine forested wetland	*Populus fremontii* Forest Alliance
Seasonal wetland	*Leymus triticoides* Herbaceous Alliance; *Mimulus (guttatus)* Herbaceous Alliance
Vernal pool	*Lasthenia fremontii–Distichlis spicata* Herbaceous Alliance

Sources: Holland 1986; CDFW 2018a; CNPS 2017, 2018
CDFW = California Department of Fish and Wildlife

Aquatic Resources

Detailed information regarding aquatic resources identified in the aquatic RSA is presented in the Aquatic Resource Delineation Report (Authority 2019a). Summary information is shown in Table 3.7-9.

Table 3.7-9 Aquatic Resources by Subsection

Resource	San Jose Diridon Station Approach	Monterey Corridor	Morgan Hill and Gilroy	Pacheco Pass	San Joaquin Valley
Alkali marsh	–	–	–	–	Yes
Alkali scrub wetland	–	–	–	–	Yes
Alkali vernal pool	–	–	–	–	Yes
California sycamore woodland	–	–	–	Yes	–
Constructed basin	–	Yes	Yes	Yes	Yes

Resource	San Jose Diridon Station Approach	Monterey Corridor	Morgan Hill and Gilroy	Pacheco Pass	San Joaquin Valley
Constructed watercourse	Guadalupe River	Yes (unnamed)	Cochran Channel/Metcalf Creek, SCVWD Percolation Channel, Madrone Channel/Metcalf Creek, West Little Llagas Creek, Butterfield Channel, West Branch Llagas Creek Channel, Upper Miller Slough, San Ysidro Creek, Pajaro River, Millers Canal, Tequisquita Slough, Pacheco Creek Side Channel, Ortega Creek Tributaries	California Aqueduct, Delta Mendota Canal, Outside Canal	Main Canal, San Luis Wasteway, Santa Fe Canal, San Luis Canal, San Luis Drain, San Pedro Canal, Boundary Drain, Lone Tree Canal, Devon Drain, Midway Swamp Ditch, West Delta Canal, Delta Canal, East Delta Canal, Poso Drain, Belmont Drain, Delta No.1 Canal, San Juan Drain, West San Juan No.1 Canal
Freshwater marsh	–	Yes	Yes	Yes	Yes
Freshwater pond	–	–	Yes	Yes	Yes
Mixed riparian	Yes	Yes	Yes	Yes	Yes
Natural watercourse	Guadalupe River, Los Gatos Creek	Guadalupe River, Coyote Creek,	Coyote Creek, Fisher Creek, Little Llagas Creek, Llagas Creek, West Branch Llagas Creek, Dexter Creek, Jones Creek, Uvas-Carnadero Creek, Pajaro River, Miller Slough, Pacheco Creek, Ortega Creek, Pacheco Creek Tributaries	Pacheco Creek, Pacheco Creek Tributaries, Elephant Head Creek, Harper Canyon Creek, San Luis Reservoir Tributary, Cottonwood Creek, Romero Creek	San Luis Creek, Los Banos Creek, Mud Slough
Palustrine forested wetland	Yes	Yes	Yes	Yes	Yes
Reservoir	–	–	Yes	Yes	–
Seasonal wetland	Yes	Yes	Yes	Yes	Yes
Vernal pool	–	–	–	Yes	Yes

SCVWD = Santa Clara Valley Water District

Wetlands

Wetland types identified within the aquatic resource study area include alkali marsh, alkali scrub wetland, alkali vernal pool, California sycamore woodland, freshwater marsh, mixed riparian, palustrine forested wetland, seasonal wetland, and vernal pool. Of these wetland types, alkali marsh, alkali scrub wetland, alkali vernal pool, California sycamore woodland, seasonal wetland, and vernal pools are considered special-status species habitat or special-status plant communities (see the preceding subsection, Special-Status Plant Communities). For the purposes of this analysis, riparian communities are considered wetlands if they meet the USACE definition of wetlands (i.e., they meet the three-parameter approach outlined by the USACE).

All wetlands identified within the aquatic RSA are considered subject to CWA jurisdiction based on the Preliminary Jurisdictional Determination option as described in the Jurisdictional Determinations, Regulatory Guidance Letter (USACE 2008c). Wetlands are described in Land Cover Types earlier in this section.

Other Waters of the U.S.

Nonwetland waters investigated in the aquatic RSA are constructed basin, constructed watercourse, freshwater pond, natural watercourse, and reservoir. Nonwetland waters are described in Land Cover Types earlier in this section. All natural and constructed waterways are considered potentially subject to CWA jurisdiction under the Preliminary Jurisdictional Determination format (USACE 2016).

Streams, Lakes, and Rivers

Streams, lakes, and rivers identified within the aquatic RSA and potentially regulated under Cal. Fish and Game Code Section 1600 et seq. include natural watercourses, freshwater ponds, reservoirs, and constructed watercourses. Additionally, riparian habitat types adjacent to these features may also be regulated, including California sycamore woodland, mixed riparian, and palustrine forested wetland. The extent of streams, lakes, and rivers (including adjacent riparian habitats) is similar to the extent of wetlands and other waters of the U.S., with some differences primarily in the extent of riparian habitat types.

Protected Trees

Based on reconnaissance field surveys and GIS analysis of the project extent, several land cover types that contain trees are located within the special-status plant study area. Although some of the trees may not be protected under local ordinances, regulations, and policies, a number of them are protected. Table 3.7-10 shows results of GIS analysis of the protected tree habitat locations within each subsection of the project extent.

Table 3.7-10 Potential Presence of Protected Trees by Subsection

Resource	San Jose Diridon Station Approach	Monterey Corridor	Morgan Hill and Gilroy	Pacheco Pass	San Joaquin Valley
Blue oak–foothill pine woodland	–	–	–	Yes	–
California sycamore woodland	–	–	–	Yes	–
Coast oak woodland	–	–	Yes	Yes	–
Mixed chaparral	–	–	Yes	Yes	–
Mixed riparian	Yes	–	Yes	Yes	Yes
Ornamental woodland	Yes	Yes	Yes	Yes	Yes
Palustrine forested wetland	Yes	–	Yes	Yes	Yes
Urban landscaping	Yes	Yes	Yes	–	–

Wildlife Movement

The project extent crosses several wildlife corridors of regional importance. Although corridors occur in all subsections, those in the Santa Clara Valley (specifically, the Coyote Valley) and San Joaquin Valley (GEA) have been identified by the CDFW and local stakeholders as particularly important to wildlife movement and habitat connectivity at the regional and state scale. Further details on existing wildlife corridors within the regional RSA are provided in Chapter 5 of the WCA (Appendix C of the Biological and Aquatic Resources Technical Report [Authority 2020a]).

Conservation Areas

This section identifies conservation areas that could potentially be affected by the project. Conservation areas include public lands (refuges and ecological reserves), conservation easements, and conservation and mitigation banks (Table 3.7-11 and Figure 3.7-4).

Table 3.7-11 Conservation Areas by Subsection[1]

Conservation Area Name	Owner/Manager/Easement Holder
San Jose Diridon Station Approach	
Guadalupe River Park and Gardens	City of San Jose
Morgan Hill and Gilroy	
Coyote Creek Parkway	Santa Clara—Parks and Recreation Department
Fisher Creek Conservation Easement	Silicon Valley Land Conservancy
Pajaro River Agricultural Preserve	Santa Clara County Open Space Authority
Pajaro River Mitigation Bank	Wildlands, Inc.
Soap Lake Properties	The Nature Conservancy
Silveira	Santa Clara—Parks and Recreation Department
Tulare Hill Land Bank	Santa Clara—Parks and Recreation Department
Silacci	Santa Clara County Open Space Authority
Pacheco Pass	
Cottonwood Creek Wildlife Area	California Department of Fish and Wildlife
Pacheco Creek Reserve	Santa Clara Valley Habitat Agency
Romero Ranch Conservation Easement	The Nature Conservancy
San Joaquin Valley	
Mud Slough Conservation Easement	California Department of Fish and Wildlife

Source: GreenInfo Network 2016a
GEA = Grasslands Ecological Area
[1] The GEA is a broadly defined region which encompasses a portion of the project area. Specific conservation areas (i.e., easements, mitigation banks, etc.), some of which overlap with the GEA, are listed individually, however the GEA is not listed in this table.

Conservation Easements

Three conservation easements were identified in the habitat study area (Table 3.7-11). Of these, the Romero Ranch conservation easement, held by The Nature Conservancy, is the most substantial in the habitat study area. In total, this easement occupies nearly 29,000 acres in western Merced County.

Public Lands

Numerous properties, shown in Table 3.7-11, were identified. While not strictly or necessarily open to the public, these lands are generally held by local governments, open space authorities, or conservation organizations for the purposes of preserving and protecting biological resources or open space.

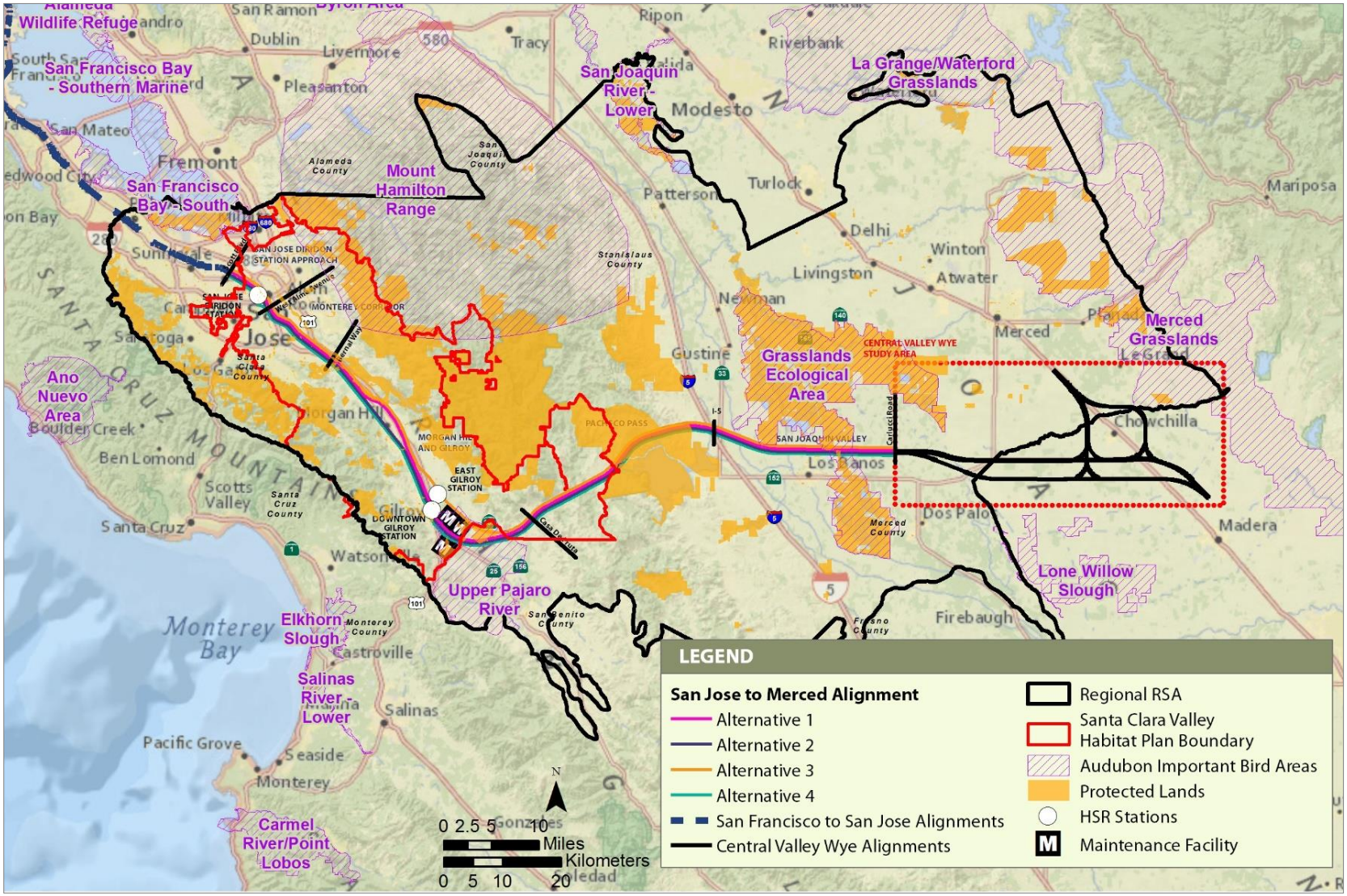
The GEA is the primary geographic area of conservation significance in the San Joaquin Valley portion of the habitat study area. It is a 160,000-acre mosaic of freshwater wetlands, alkali grassland, and riparian thickets cooperatively managed by a variety of private, state, and federal landowners, including USFWS (San Luis and Merced National Wildlife Refuges, Grasslands Wildlife Management Area), CDFW (Volta, Los Banos, and North Grasslands Wildlife Areas), California State Parks (Great Valley Grasslands State Park), and private duck clubs. Although it is not subject to any regional HCPs, it has been identified as an Audubon IBA (National Audubon Society 2017a) and a Site of International Importance by the Western Hemisphere Shorebird Reserve Network (WHSRN 2017) because it seasonally supports nearly 50 percent of all Central Valley shorebirds during the peak of spring migration (mid-April) and a half-million individual ducks, geese, and swans each year between November and February (National Audubon Society 2017a). The project extent passes through the GEA where it parallels Henry Miller Avenue between CDFW's Volta and Los Banos Wildlife Areas.

Conservation/Mitigation Banks

Only one conservation or mitigation bank, the Pajaro River Mitigation Bank, was identified in the habitat study area. It is managed by Wildlands, Inc. and provides credits for jurisdictional wetlands and waters.

Habitat Conservation Plans

The Santa Clara Valley is the subject of three HCPs: the SCVHP (Figure 3.7-4), implemented by the Santa Clara Valley Habitat Agency (SCVHA), the Greenprint, developed by the Santa Clara Valley Open Space Authority (SCVOSA) (SCVOSA 2014), and the *Coyote Valley Landscape Linkage* report, also developed by the SCVOSA (2017). A key component of the SCVHP and Greenprint is the protection and management of serpentine habitat along Coyote Ridge that has also been deemed by the USFWS as essential for the recovery of Bay checkerspot butterfly and other serpentine species in its *Recovery Plan for Serpentine Soil Species of the San Francisco Bay Area* (USFWS 1998). Both plans also emphasize the protection, enhancement, and restoration of aquatic habitat for California tiger salamander, California red-legged frog, western pond turtle, and foothill yellow-legged frog in the foothills on either side of the valley, and open lands on the valley floor and adjacent foothills that provide habitat for burrowing owl. The SCVHP also covers most Santa Clara County lands in the Diablo Range portion of the habitat study area (i.e., from the headwaters of the East and Middle Forks of Coyote Creek south to the county line), including resources associated with Pacheco Creek and its tributaries (e.g., habitat linkages, California sycamore woodland, species habitat). The *Coyote Valley Landscape Linkage* report recommends specific actions to improve wildlife movement across Coyote Valley. Recommendations include enhancements to existing crossings (e.g., Fisher Creek), new crossings (culverts and overpasses), conservation of land, and additional research.



Sources: GreenInfo Network 2016a, 2016b

JANUARY 2019

Figure 3.7-4 Protected Lands and Conservation Planning Boundaries in the Regional RSA

3.7.7 Environmental Consequences

3.7.7.1 Overview

This section discusses the potential impacts on biological and aquatic resources that could result from construction and operations of the project alternatives. The impacts are organized into the following categories:

- Special-status species (plants and animals)
- Non-special-status species (common plants and animals)
- Special-status plant communities
- Jurisdictional aquatic resources (e.g., wetlands)
- Protected trees
- Wildlife movement
- Conservation areas (preserves, conservation easements, and mitigation banks)
- HCPs

Construction and operation of the project could result in temporary and permanent construction impacts as well as intermittent operations impacts on special-status species. Construction and operations impacts on special-status plant and wildlife species could include the direct removal of habitat (i.e., areas known or likely to contain the physical and biological conditions required to support occupancy by individuals or populations of special-status species; see text box in Section 3.7.5.3), mortality or removal of individuals, and modification and fragmentation of habitats. Temporary construction impacts could result from grading, construction of staging areas, temporary roadways, and cut-and-fill slopes. Intermittent operations impacts on special-status species could result from noise, lighting, and maintenance of the HSR right-of-way. The project would also have impacts on critical habitat, designated by USFWS for California tiger salamander, California red-legged frog, and Bay checkerspot butterfly, and by NMFS for steelhead.

Through similar mechanisms, construction and operations of the project could result in temporary and permanent construction impacts as well as intermittent operations impacts on non-special-status wildlife (i.e., common wildlife species), special-status plant communities, jurisdictional aquatic resources, protected trees, wildlife movement, conservation areas, and adopted HCPs.

Indirect impacts (e.g., modification of hydrology, introduction of invasive nonnative species) were not quantified for this analysis. However, indirect impacts were assumed to roughly scale with the extent of direct impacts because for this linear project, alternatives with greater amounts of resources in the project footprint (e.g., special-status species habitat, aquatic resources under regulatory jurisdiction) would also potentially abut greater amounts of such resources adjacent to the footprint.

3.7.7.2 Special-Status Species

No Project Impacts

The population in the regional RSA is expected to grow through 2040 (see Section 2.6.1.1, Projections Used in Planning). Development in the region to accommodate the population increase would continue under the No Project Alternative, resulting in associated direct and indirect impacts on biological and aquatic resources. Such planned projects that are anticipated to be constructed by 2040 include residential, commercial, industrial, recreational, transportation, energy, and agricultural projects. The No Project Alternative considers the impacts of conditions forecast by current plans for land use and transportation in the vicinity of the project extent, including planned improvements to the highway, aviation, conventional passenger rail, freight rail, and port systems through the 2040 planning horizon for the environmental analysis if the proposed project is not built. With no project, there would be a greater amount of vehicle miles traveled (VMT), resulting in increased pressure to improve capacity for all transportation modes throughout the area. The Authority estimates that additional highway and airport projects (up to 4,300 highway lane miles, 115 airport gates, and 4 airport runways) would be planned and constructed to achieve equivalent capacity and relieve this increased pressure (Authority 2012a).

Future development projects in are detailed in in Volume 2, Appendix 3.19-A, Nontransportation Plans and Projects, and Appendix 3.19-B, Transportation Plans and Projects. Under the No Project Alternative, recent development trends are anticipated to continue, leading to impacts on special-status species. Future changes in land use or allowable density of development, as well as ground disturbance associated with future infrastructure improvements such as highway expansions to accommodate population growth, would have impacts on special-status species similar to those that have resulted from past development, such as habitat loss, degradation, and fragmentation; potential mortality of individuals and populations of special-status plant and wildlife species; and possible extirpation events.

Project Impacts

Construction and operations of the project would result in permanent and temporary impacts on land cover potentially suitable as habitat for special-status plant and wildlife species, including state and federally listed species. All aspects of construction and operations have the potential to cause impacts, either from direct removal of habitat or individuals, or from indirect impacts such as introduction of nonnative invasive species or changes in hydrology. Construction impacts on special-status plant species are presented first, followed by construction impacts on special-status wildlife species, then operations impacts on special-status plant species and special-status wildlife species. Table 3.7-12 and Table 3.7-13 show the extent of impacts on special-status plants and wildlife, respectively, by alternative. Table 3.7-14 shows the extent of impacts on designated critical habitat.

Construction Impacts

Impact BIO#1: Permanent Conversion or Degradation of Habitat for Special-Status Plant Species

Effects Other than Potential Tunnel Construction Groundwater Depletion

Construction of the HSR track and systems in all subsections would take place in land cover types that could support special-status plant species, including species listed under FESA and CESA (with the exception of the San Jose Diridon Station Approach Subsection, which only supports habitat for nonlisted special-status species). Such activities would convert and disturb habitat and could result in the removal of special-status plant occurrences.

Table 3.7-12 Impacts on Habitat for Special-Status Plant Species by Project Alternative (acres)

Impacts	Alt 1			Alt 2			Alt 3			Alt 4		
	Perm	Temp	Total	Perm	Temp	Total	Perm	Temp	Total	Perm	Temp	Total
Alkali milkvetch	39.2	38.9	78.1	39.2	38.9	78.1	39.2	38.9	78.1	39.2	38.9	78.1
Bent-flowered fiddleneck	340.5	87.1	427.6	340.5	87.1	427.6	340.5	87.0	427.5	340.5	87.1	427.6
Big-scale balsamroot	0.0	6.9	6.9	0.0	6.9	6.9	0.0	6.9	6.9	0.0	6.8	6.8
Brittlescale	28.3	32.8	61.1	28.3	32.8	61.1	28.3	32.8	61.1	28.3	32.8	61.1
California alkali grass	200.7	101.7	302.4	200.4	101.6	302.0	207.5	102.8	310.3	195.6	98.7	294.3
Caper-fruited tropidocarpum[1]	776.0	366.0	1,142.0	781.2	388.7	1,169.9	777.0	370.5	1,147.5	752.5	342.8	1,095.3
Chaparral ragwort[1]	244.8	102.8	347.6	244.8	102.8	347.6	244.8	102.8	347.6	244.8	102.8	347.6
Colusa grass	1.5	0.5	2.0	1.5	0.5	2.0	1.5	0.5	2.0	1.5	0.5	2.0
Congdon's tarplant	17.0	8.2	25.2	17.7	10.2	27.9	17.7	8.4	26.1	15.9	8.4	24.3
Coulter's goldfields	0.8	0.2	1.0	0.8	0.2	1.0	0.8	0.2	1.0	0.8	0.2	1.0
Coyote ceanothus	3.5	18.1	21.6	8.7	21.5	30.2	3.5	18.1	21.6	1.5	15.8	17.3
Delta button-celery	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.1	0.2
Fragrant fritillary[1]	85.1	118.9	204.0	91.9	143.8	235.7	86.1	123.6	209.7	64.9	95.2	160.1
Hairless popcornflower	8.6	3.5	12.1	8.6	3.5	12.1	10.0	0.1	10.1	6.8	1.2	8.0
Hall's bush-mallow	15.9	4.6	20.5	17.6	6.7	24.3	15.9	4.4	20.3	19.2	3.9	23.1
Heartscale	0.8	0.2	1.0	0.8	0.2	1.0	0.8	0.2	1.0	0.8	0.2	1.0
Hispid salty bird's-beak[1]	762.0	358.8	1,120.8	767.2	382.0	1,149.2	764.4	360.1	1,124.5	736.6	333.4	1,070.0
Hoover's button-celery	3.3	0.6	3.9	2.7	0.5	3.2	0.9	6.0	6.9	2.7	0.0	2.7
Hoover's cryptantha[1]	243.8	124.1	367.9	243.8	124.1	367.9	243.8	124.1	367.9	243.8	124.1	367.9
Hoover's spurge	1.5	0.5	2.0	1.5	0.5	2.0	1.5	0.5	2.0	1.5	0.5	2.0
Hospital Canyon larkspur	135.2	13.7	148.9	135.2	13.7	148.9	135.2	13.7	148.9	135.2	13.7	148.9
Indian Valley bush-mallow	0.0	0.2	0.2	0.6	0.9	1.5	0.0	0.2	0.2	0.6	<0.1	0.6

Impacts	Alt 1			Alt 2			Alt 3			Alt 4		
	Perm	Temp	Total	Perm	Temp	Total	Perm	Temp	Total	Perm	Temp	Total
Legenere	7.6	1.9	9.5	7.0	1.9	8.9	14.0	7.4	21.4	7.1	1.3	8.4
Lemmon's jewelflower[1]	310.6	119.4	430.0	310.6	119.4	430.0	310.6	119.4	430.0	310.6	119.4	430.0
Lesser saltscale	0.8	0.2	1.0	0.8	0.2	1.0	0.8	0.2	1.0	0.8	0.2	1.0
Little mousetail	38.1	38.2	76.3	38.1	38.2	76.3	38.1	38.2	76.3	38.1	38.2	76.3
Loma Prieta hoita	7.9	18.9	26.8	8.2	20.6	28.8	10.1	21.6	31.7	5.0	14.4	19.4
Lost Hills crownscale[1]	313.8	123.1	436.9	313.8	123.1	436.9	313.8	123.1	436.9	313.8	123.1	436.9
Metcalf Canyon jewelflower	10.2	23.8	34.0	15.1	29.0	44.1	10.2	23.8	34.0	11.3	15.8	27.1
Most beautiful jewelflower	3.5	18.0	21.5	8.3	21.5	29.8	3.5	18.0	21.5	1.3	15.7	17.0
Mount Diablo cottonweed	0.0	14.8	14.8	0.0	14.8	14.8	0.0	14.9	14.9	0.0	14.8	14.8
Mount Hamilton fountain thistle	33.2	27.2	60.4	38.2	30.7	68.9	33.2	27.2	60.4	31.0	24.9	55.9
Palmate-bracted bird's-beak	9.2	3.8	13.0	9.2	3.8	13.0	9.2	3.8	13.0	9.2	3.8	13.0
Pink creamsacs	0.0	14.8	14.8	0.0	14.8	14.8	0.0	14.9	14.9	0.0	14.8	14.8
Prostrate vernal pool navarretia	9.9	2.7	12.6	9.3	2.7	12.0	7.4	8.1	15.5	9.3	2.2	11.5
Recurved larkspur[1]	216.2	120.8	337.0	216.2	120.8	337.0	216.2	120.8	337.0	216.2	120.8	337.0
Robust spineflower	0.0	<0.1	0.0	0.0	<0.1	0.0	0.0	<0.1	0.0	0.0	0.0	0.0
Round-leaved filaree[1]	722.3	305.4	1,027.7	726.8	326.1	1,052.9	722.6	309.6	1,032.2	699.9	282.1	982.0
Saline clover	37.0	40.0	77.0	41.5	44.2	85.7	41.7	49.2	90.9	33.4	37.7	71.1
San Antonio Hills monardella	0.2	0.1	0.3	0.2	0.1	0.3	0.2	0.1	0.3	0.2	0.1	0.3
San Francisco collinsia	17.0	30.6	47.6	17.7	32.6	50.3	17.7	30.9	48.6	15.9	30.7	46.6
San Joaquin spearscale[1]	75.9	78.3	154.2	80.7	82.5	163.2	84.4	79.6	164.0	71.0	74.3	145.3
Sanford's arrowhead	16.5	13.4	29.9	16.5	13.4	29.9	16.5	13.4	29.9	16.5	13.4	29.9
Santa Clara Valley dudleya	9.8	20.7	30.5	14.7	25.5	40.2	9.8	20.7	30.5	10.9	12.7	23.6
Shining navarretia[1]	244.8	102.8	347.6	244.8	102.8	347.6	244.8	102.8	347.6	244.8	102.8	347.6
Showy golden madia[1]	585.2	189.7	774.9	585.2	189.7	774.9	585.2	189.6	774.8	585.2	189.7	774.9

Impacts	Alt 1			Alt 2			Alt 3			Alt 4		
	Perm	Temp	Total	Perm	Temp	Total	Perm	Temp	Total	Perm	Temp	Total
Slender-leaved pondweed	<0.1	<0.1	0.0	<0.1	<0.1	0.0	<0.1	<0.1	0.0	<0.1	<0.1	0.0
Smooth lessingia	33.2	27.2	60.4	38.0	30.6	68.6	33.2	27.2	60.4	31.0	24.9	55.9
Tiburon Paintbrush	3.5	18.1	21.6	8.5	21.5	30.0	3.5	18.1	21.6	1.3	15.7	17.0
Two-fork clover	0.0	14.8	14.8	0.0	14.8	14.8	0.0	14.9	14.9	0.0	14.8	14.8
Vernal barley	2.1	0.6	2.7	2.1	0.6	2.7	2.1	0.6	2.7	2.1	0.6	2.7
Vernal pool smallscale	1.5	0.5	2.0	1.5	0.5	2.0	1.5	0.5	2.0	1.5	0.5	2.0
Woodland woollythreads[1]	725.8	222.7	948.5	731.4	237.1	968.5	725.5	223.2	948.7	703.2	202.1	905.3
Woolly-headed lessingia[1]	70.9	114.3	185.2	75.9	135.6	211.5	71.9	122.0	193.9	48.5	91.1	139.6
Wright's trichocoronis	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.1	0.2
Total All Species	**6,415.4**	**3,095.3**	**9,510.7**	**6,493.5**	**3,266.4**	**9,759.9**	**6,447.3**	**3,145.8**	**9,593.1**	**6,252.0**	**2,909.8**	**9,161.8**
Total All Species Habitat Affected (Nonoverlapping)	**1,179.3**	**460.1**	**1,639.4**	**1,185.9**	**487.1**	**1,673.0**	**1,190.8**	**467.5**	**1,658.3**	**1,154.2**	**429.1**	**1,583.3**

Nonoverlapping acreage reflects the *aggregate* areal extent of all species taken together—in other words, the exterior perimeter of the overlapping boundaries of mapped habitat, so that land where habitat has been mapped for more than one species is present, it is only counted once.

[1] Estimated impacts are high because species occurs in land cover type(s) that are abundant throughout the special-status plant study area (e.g., California annual grassland, coastal oak woodland). The actual likelihood of encountering these rare species during botanical field surveys prior to construction is low and the likelihood of direct impacts is even lower because such occurrences may be avoided by construction.

Table 3.7-13 Direct Impacts on Special-Status Wildlife Species Habitat by Project Alternative (acres)

Impacts	Alt 1			Alt 2			Alt 3			Alt 4		
	Perm	Temp	Total	Perm	Temp	Total	Perm	Temp	Total	Perm	Temp	Total
Bay Checkerspot Butterfly												
Suitable habitat	9.8	22.6	32.4	14.7	27.8	42.5	9.8	22.6	32.4	10.9	14.5	25.4
Vernal Pool Crustaceans												
Vernal pool fairy shrimp	27.6	0.0	27.6	0.5	0.0	27.6	27.6	0.0	27.6	27.6	0.0	27.6
Vernal pool tadpole shrimp	27.6	0.0	27.6	0.5	0.0	27.6	27.6	0.0	27.6	27.6	0.0	27.6
Longhorn fairy shrimp	0.5	0.0	0.5	0.5	0.0	0.5	0.5	0.0	0.5	0.5	0.0	0.5
Conservancy fairy shrimp	0.5	0.0	0.5	0.5	0.0	0.5	0.5	0.0	0.5	0.5	0.0	0.5
Nonoverlapping total habitat	27.6	0.0	27.6	27.6	0.0	27.6	27.6	0.0	27.6	27.6	0.0	27.6
Valley Elderberry Longhorn Beetle												
Potentially suitable riparian habitat	1.0	0.4	1.4	1.0	0.4	1.4	1.0	0.4	1.4	1.0	0.4	1.4
Other potentially suitable habitat	101.6	55.9	157.5	101.6	55.9	157.5	101.6	55.9	157.5	101.6	55.9	157.5
Total	102.6	56.3	**158.9**	102.6	56.3	**158.9**	102.6	56.3	**158.9**	102.6	56.3	**158.9**
Crotch Bumble Bee												
Suitable Habitat	1,147.2	436.4	1,583.6	1,154.5	461.8	1,616.3	1,148.8	444.0	1,592.8	1,127.0	412.7	1,539.7
Total	1,147.2	436.4	**1,583.6**	1,154.5	461.8	**1,616.3**	1,148.8	444.0	**1,592.8**	1,127.0	412.7	**1,539.7**
Special-Status Fish Species												
Steelhead—central California coast/south-central California coast DPS	19.9	14.1	34.0	21.6	14.5	36.1	31.5	15.3	46.8	19.3	11.8	31.1
Pacific Coast salmon EFH	3.3	6.5	9.8	1.5	8.7	10.2	3.3	6.5	9.8	2.3	4.3	6.6
Pacific lamprey	138.8	68.6	207.4	141.6	71.5	213.1	147.4	65.2	212.6	138.3	62.2	200.5
Nonoverlapping total habitat	157.3	82.9	240.2	159.4	88.2	247.6	177.4	80.6	258.0	154.9	73.4	228.3

Impacts	Alt 1			Alt 2			Alt 3			Alt 4		
	Perm	Temp	Total	Perm	Temp	Total	Perm	Temp	Total	Perm	Temp	Total
California Tiger Salamander												
Breeding and foraging aquatic habitat	52.5	61.8	114.3	57.1	63.7	120.8	47.3	60.8	108.1	37.0	56.0	93.0
Subtotal Aquatic Habitat	52.5	61.8	114.3	57.1	63.7	120.8	47.3	60.8	108.1	37.0	56.0	93.0
Potential agricultural refugia and dispersal habitat	1,068.1	436.4	1,504.5	1,101.8	585.5	1,687.3	1,258.0	477.0	1,735.0	969.1	388.5	1,357.6
Refugia and dispersal upland habitat	1,128.5	412.4	1,540.9	1,146.2	438.4	1,584.6	1,142.5	418.7	1,561.2	1,120.3	397.7	1,518.0
Subtotal upland/dispersal habitat	2,196.6	848.8	3,045.4	2,248.0	1,023.9	3,271.9	2,400.5	895.7	3,296.2	2,089.4	786.2	2,875.6
Total	2,249.1	910.6	**3,159.7**	2,305.1	1,087.6	**3,392.7**	2,447.8	956.5	**3,404.3**	2,126.4	842.2	**2,968.6**
California Red-Legged Frog												
Breeding season aquatic habitat	85.6	42.6	128.2	90.0	45.9	135.9	81.5	37.5	119.0	72.8	31.0	103.8
Subtotal breeding habitat	85.6	42.6	128.2	90.0	45.9	135.9	81.5	37.5	119.0	72.8	31.0	103.8
Refugia/foraging habitat	507.1	169.5	676.6	519.7	197.3	717.0	499.3	160.7	660.0	494.9	160.0	654.9
Dispersal/seasonal movement habitat	991.5	319.7	1,311.2	1,016.6	437.5	1,454.1	1,046.5	347.9	1,394.4	858.3	276.2	1,134.5
Other potential movement habitat	86.4	53.5	139.9	89.0	81.3	170.3	182.9	75.6	258.5	70.6	32.3	102.9
Permeable movement area (dev, ag, disturbed)	319.8	261.9	581.7	444.7	411.5	856.2	309.1	260.6	569.7	315.9	157.7	473.6
Subtotal nonbreeding habitat	1,904.8	804.6	2,709.4	2,070.0	1,127.6	3,197.6	2,037.8	844.8	2,882.6	1,739.7	626.2	2,365.9
Total	1,990.4	847.2	**2,837.6**	2,160.0	1,173.5	**3,333.5**	2,119.3	882.3	**3,001.6**	1,812.5	657.2	**2,469.7**
Foothill Yellow-Legged Frog												
Primary breeding and foraging habitat	44.4	19.1	63.5	44.4	19.1	63.5	44.4	19.1	63.5	44.4	19.1	63.5
Secondary breeding and foraging habitat	47.3	22.2	69.5	44.8	22.9	67.7	47.5	21.9	69.4	43.9	20.3	64.2
Total	91.7	41.3	**133.0**	89.2	42.0	**131.2**	91.9	41.0	**132.9**	88.3	39.4	**127.7**

Impacts	Alt 1			Alt 2			Alt 3			Alt 4		
	Perm	Temp	Total	Perm	Temp	Total	Perm	Temp	Total	Perm	Temp	Total
Western Spadefoot												
Aquatic breeding habitat	13.9	44.0	57.9	13.9	44.0	57.9	22.4	42.8	65.2	13.9	44.0	57.9
Vernal pool complex, breeding, cover, and aestivation	22.0	28.7	50.7	22.0	28.7	50.7	22.0	28.7	50.7	22.0	28.7	50.7
Subtotal breeding habitat	35.9	72.7	108.6	35.9	72.7	108.6	44.4	71.5	115.9	35.9	72.7	108.6
Terrestrial cover and aestivation habitat	492.8	139.4	632.2	492.8	139.4	632.2	501.8	143.2	645.0	492.8	139.4	632.2
Subtotal nonbreeding habitat	492.8	139.4	632.2	492.8	139.4	632.2	501.8	143.2	645.0	492.8	139.4	632.2
Total	528.7	212.1	**740.8**	528.7	212.1	**740.8**	546.2	214.7	**760.9**	528.7	212.1	**740.8**
Western Pond Turtle												
Potentially suitable foraging and basking habitat	97.3	90.7	188.0	105.4	94.3	199.7	93.6	88.0	181.6	82.2	83.3	165.5
Potentially suitable primary nesting and overwintering habitat	2,002.8	956.9	2,959.7	2,118.6	1,113.0	3,231.6	1,967.6	931.0	2,898.6	1,947.7	820.1	2,767.8
Potentially suitable secondary nesting and movement habitat	510.5	242.8	753.3	582.3	374.6	956.9	484.2	247.1	731.3	431.7	152.2	583.9
Total	2,610.6	1,290.4	**3,901.0**	2,806.3	1,581.9	**4,388.2**	2,545.4	1,266.1	**3,811.5**	2,461.6	1,055.6	**3,517.2**
Blunt-Nosed Leopard Lizard												
Core suitable habitat	270.7	96.9	367.6	270.7	96.9	367.6	270.7	96.9	367.6	270.7	96.9	367.6
Potentially suitable habitat	66.8	66.1	132.9	66.8	66.1	132.9	66.8	66.1	132.9	66.8	66.1	132.9
Atypical habitat	139.6	56.2	195.8	139.6	56.2	195.8	139.6	56.2	195.8	139.6	56.2	195.8
Total	477.1	219.2	**696.3**	477.1	219.2	**696.3**	477.1	219.2	**696.3**	477.1	219.2	**696.3**

Impacts	Alt 1			Alt 2			Alt 3			Alt 4		
	Perm	Temp	Total	Perm	Temp	Total	Perm	Temp	Total	Perm	Temp	Total
San Joaquin Coachwhip, Northern California Legless Lizard, and Coast Horned Lizard												
San Joaquin coachwhip	632.0	223.9	855.9	632.0	223.9	855.9	632.0	223.8	855.8	632.0	223.9	855.9
Northern California legless lizard	15.9	3.9	19.8	15.9	3.9	19.8	15.9	3.8	19.7	15.9	3.9	19.8
Coast horned lizard	964.6	262.5	1,227.1	964.6	262.5	1,227.1	964.5	262.3	1,226.8	964.6	262.5	1,227.1
Nonoverlapping total habitat	992.9	279.7	1,272.6	992.9	279.7	1,272.6	992.9	279.5	1,272.4	992.9	279.7	1,272.6
Giant Garter Snake												
Potentially suitable aquatic habitat	25.6	18.2	43.8	25.6	18.2	43.8	25.6	18.2	43.8	25.6	18.2	43.8
Potentially suitable upland habitat	349.3	158.9	508.2	349.3	158.9	508.2	349.3	158.9	508.2	349.3	158.9	508.2
Potentially suitable movement habitat	10.5	5.5	16.0	10.5	5.5	16.0	10.5	5.5	16.0	10.5	5.5	16.0
Total	385.4	182.6	**568.0**	385.4	182.6	**568.0**	385.4	182.6	**568.0**	385.4	182.6	**568.0**
Short-Eared Owl and Grasshopper Sparrow												
Short-eared owl	352.5	162.4	514.9	352.5	162.4	514.9	352.5	162.4	514.9	352.5	162.4	514.9
Grasshopper sparrow	690.5	255.3	945.8	690.5	255.3	945.8	690.5	255.2	945.7	690.5	255.3	945.8
Nonoverlapping total habitat	1,043.1	417.7	1,460.8	1,043.1	417.7	1,460.8	1,043.0	417.6	1,460.6	1,043.1	417.7	1,460.8
Mountain Plover and Western Snowy Plover												
Mountain plover	593.2	314.4	907.6	593.2	314.4	907.6	593.2	314.4	907.6	593.2	314.4	907.6
Western snowy plover	20.3	14.8	35.1	20.3	14.8	35.1	20.3	14.8	35.1	20.3	14.8	35.1
Nonoverlapping total habitat	613.5	329.2	942.7	613.5	329.2	942.7	613.5	329.2	942.7	613.5	329.2	942.7
Burrowing Owl												
Occupied breeding and foraging habitat	3.1	0.0	3.1	7.7	1.4	9.1	3.1	0.0	3.1	0.7	0.0	0.7
Potential nesting and foraging habitat	1,028.8	469.4	1,498.2	1,132.5	624.0	1,756.5	1,180.7	506.9	1,687.6	954.4	384.0	1,338.4
Subtotal breeding habitat	1,031.9	469.4	1,501.3	1,140.2	625.4	1,765.6	1,183.8	506.9	1,690.7	955.1	384.0	1,339.1

Impacts	Alt 1			Alt 2			Alt 3			Alt 4		
	Perm	Temp	Total	Perm	Temp	Total	Perm	Temp	Total	Perm	Temp	Total
Overwintering habitat	509.6	165.9	675.5	509.6	165.9	675.5	510.5	165.1	675.6	509.6	165.9	675.5
Subtotal overwintering habitat	509.6	165.9	675.5	509.6	165.9	675.5	510.5	165.1	675.6	509.6	165.9	675.5
Total	1,541.5	635.3	**2,176.8**	1,649.8	791.3	**2,441.1**	1,694.3	672.0	**2,366.3**	1,464.7	549.9	**2,014.6**
Golden Eagle and Bald Eagle												
Golden eagle												
Suitable nesting	348.6	61.9	410.5	349.1	62.5	411.6	349.2	65.1	414.3	348.6	62.0	410.6
Suitable foraging	776.0	366.0	1,142.0	781.2	388.7	1,169.9	777.0	370.5	1,147.5	752.5	342.8	1,095.3
Total	1,124.6	427.9	**1,552.5**	1,130.3	451.2	**1,581.5**	1,126.2	435.6	**1,561.8**	1,101.1	404.8	**1,505.9**
Bald eagle												
Suitable nesting	348.6	61.9	410.5	349.1	62.5	411.6	349.2	65.1	414.3	348.6	62.0	410.6
Suitable foraging	55.2	71.1	126.3	63.0	74.2	137.2	43.2	69.1	112.3	40.3	64.8	105.1
Total	403.8	133.0	**536.8**	412.1	136.7	**548.8**	392.4	134.2	**526.6**	388.9	126.8	**515.7**
Nonoverlapping total habitat	1,179.8	499.0	1,678.8	1,193.2	525.4	1,718.6	1,169.4	504.7	1,674.1	1,141.5	469.6	1,611.1
American Peregrine Falcon, Northern Harrier, and White-Tailed Kite												
American peregrine falcon	3,065.5	1,529.2	4,594.7	3,277.7	2,010.0	5,287.7	3,125.4	1,557.2	4,682.6	2,825.4	1,187.1	4,012.5
Northern harrier	1,697.0	784.1	2,481.1	1,805.3	946.0	2,751.3	1,851.3	823.7	2,675.0	1,618.5	738.1	2,356.6
White-tailed kite	2,299.3	919.1	3,218.4	2,356.8	1,121.7	3,478.5	2,444.9	968.0	3,412.9	2,136.5	835.4	2,971.9
Nonoverlapping total habitat	6,151.5	2,819.5	8,971.0	6,426.4	3,526.1	9,952.5	6,359.4	2,897.6	9,257.0	5,723.2	2,368.3	8,091.5
Swainson's Hawk												
Active nesting site	0.1	0.0	0.1	0.1	3.8	3.9	0.1	0.0	0.1	0.1	0.0	0.1
Inactive nesting site	25.6	43.8	69.4	25.6	43.8	69.4	25.6	43.8	69.4	25.6	43.8	69.4
Potential nesting habitat	8.1	4.2	12.3	8.1	4.2	12.3	8.1	4.2	12.3	8.1	4.2	12.3
Total nesting habitat	33.8	48.0	**81.8**	33.8	51.8	**85.6**	33.8	48.0	**81.8**	33.8	48.0	**81.8**

Impacts	Alt 1			Alt 2			Alt 3			Alt 4		
	Perm	Temp	Total	Perm	Temp	Total	Perm	Temp	Total	Perm	Temp	Total
Primary active foraging habitat	303.7	141.0	444.7	322.8	162.9	485.7	303.7	141.0	444.7	316.8	141.0	457.8
Secondary active foraging habitat	493.4	294.4	787.8	522.9	350.8	873.7	493.4	294.4	787.8	485.9	282.5	768.4
Tertiary active foraging habitat	124.6	95.5	220.1	165.6	132.9	298.5	124.6	95.5	220.1	102.6	70.2	172.8
Total foraging habitat	921.7	530.9	**1,452.6**	1,011.3	646.6	**1,657.9**	921.7	530.9	**1,452.6**	905.3	493.7	**1,399.0**
Total foraging and nesting habitat	955.5	578.9	**1,534.4**	1,045.1	698.4	**1,743.5**	955.5	578.9	**1,534.4**	939.1	541.7	**1,480.8**
Loggerhead Shrike, Purple Martin and Olive-Sided Flycatcher												
Loggerhead shrike	2,334.3	941.5	3,275.8	2,391.7	1,144.1	3,535.8	2,478.7	993.0	3,471.7	2,171.5	857.7	3,029.2
Purple martin	371.0	72.8	443.8	371.0	72.8	443.8	370.9	71.1	442.0	371.0	72.8	443.8
Olive-sided flycatcher	386.9	76.7	463.6	386.9	76.7	463.6	386.8	74.9	461.7	386.9	76.7	463.6
Nonoverlapping total habitat	2,334.3	941.5	3,275.8	2,391.7	1,144.1	3,535.8	2,478.7	993.0	3,471.7	2,171.5	857.7	3,029.2
Least Bell's Vireo, Yellow Warbler, and Yellow-Breasted Chat												
Least Bell's vireo	67.7	51.6	119.3	70.1	54.4	124.5	70.1	50.6	120.7	62.4	42.9	105.3
Yellow warbler	31.3	22.9	54.2	31.1	24.0	55.1	32.8	20.7	53.5	27.9	17.4	45.3
Yellow-breasted chat	27.3	19.8	47.1	27.3	19.8	47.1	28.7	17.6	46.3	27.2	16.9	44.1
Nonoverlapping total habitat	126.2	94.3	220.5	128.5	98.1	226.6	131.6	88.9	220.5	117.5	77.2	194.7
Tricolored Blackbird and Yellow-Headed Blackbird												
Tricolored blackbird												
Previously occupied colony habitat	4.5	4.9	9.4	3.3	4.9	8.2	4.5	5.1	9.6	2.6	3.2	5.8
Potentially suitable colony habitat	74.7	83.2	157.9	80.9	85.7	166.6	84.0	81.7	165.7	72.2	77.5	149.7
Total nesting habitat	79.2	88.1	**167.3**	84.2	90.6	**174.8**	88.5	86.8	**175.3**	74.8	80.7	**155.5**
Breeding season foraging—natural	772.1	362.3	1,134.4	777.2	385.1	1,162.3	773.1	366.9	1,140.0	748.6	339.2	1,087.8
Breeding season foraging—agriculture	905.8	422.8	1,328.6	1,008.8	561.0	1,569.8	1,057.2	464.1	1,521.3	852.7	402.2	1,254.9
Total foraging habitat	1,677.9	785.1	**2,463.0**	1,786.0	946.1	**2,732.1**	1,830.3	831.0	**2,661.3**	1,601.3	741.4	**2,342.7**

Impacts	Alt 1			Alt 2			Alt 3			Alt 4		
	Perm	Temp	Total	Perm	Temp	Total	Perm	Temp	Total	Perm	Temp	Total
Total tricolored blackbird habitat	1,757.1	873.2	**2,630.3**	1,870.2	1,036.7	**2,906.9**	1,918.8	917.8	**2,836.6**	1,676.1	822.1	**2,498.2**
Yellow-headed blackbird	6.7	3.9	10.6	6.7	3.9	10.6	6.7	3.9	10.6	6.7	3.9	10.6
Nonoverlapping total habitat	1,763.8	877.2	2,641.0	1,877.0	1,040.6	2,917.6	1,925.5	921.7	2,847.2	1,682.8	826.0	2,508.8
Sandhill Crane												
Greater sandhill crane												
Known roosting and foraging habitat	38.1	22.9	61.0	38.1	22.9	61.0	38.1	22.9	61.0	38.1	22.9	61.0
Potential roosting and foraging habitat	257.2	206.4	463.5	257.2	206.4	463.5	257.2	206.4	463.5	257.2	206.4	463.5
Total	295.3	229.3	**524.5**	295.3	229.3	**524.5**	295.3	229.3	**524.5**	295.3	229.3	**524.5**
Lesser sandhill crane												
Known roosting and foraging habitat	38.1	22.9	61.0	38.1	22.9	61.0	38.1	22.9	61.0	38.1	22.9	61.0
Potential roosting and foraging habitat	344.2	264.0	608.1	344.2	264.0	608.1	344.2	264.0	608.1	344.2	264.0	608.1
Total	382.3	286.9	**669.1**	382.3	286.9	**669.1**	382.3	286.9	**669.1**	382.3	286.9	**669.1**
San Joaquin Kit Fox												
High value suitable habitat	13.0	20.8	33.8	13.0	20.8	33.8	13.0	20.8	33.8	13.0	20.8	33.8
Moderate value suitable habitat	193.3	66.7	260.0	193.3	66.7	260.0	196.2	66.5	262.7	193.4	66.4	259.8
Low value suitable habitat	1,815.2	772.6	2,587.8	1,815.2	772.6	2,587.8	1,857.0	760.9	2,617.9	1,816.7	770.7	2,587.4
Total	2,021.5	860.1	**2,881.6**	2,021.5	860.1	**2,881.6**	2,066.2	848.2	**2,914.4**	2,023.1	857.9	**2,881.0**
Fresno Kangaroo Rat												
Potentially suitable habitat	58.8	46.3	105.1	58.8	46.3	105.1	58.8	46.3	105.1	58.8	46.3	105.1
American Badger												
Potentially suitable habitat	798.6	374.5	1,173.1	805.4	399.3	1,204.7	799.6	378.9	1,178.5	778.4	350.7	1,129.1
San Francisco Dusky-Footed Woodrat and Ringtail												
Potentially suitable habitat	400.1	102.3	502.4	399.6	113.2	512.8	402.6	110.7	513.3	395.9	84.0	479.9

Impacts	Alt 1			Alt 2			Alt 3			Alt 4		
	Perm	Temp	Total	Perm	Temp	Total	Perm	Temp	Total	Perm	Temp	Total
Special-Status Bats												
Pallid Bat												
Roosting and foraging habitat	1.9	14.7	16.6	1.5	13.7	15.2	1.9	14.7	16.6	0.0	4.6	4.6
Foraging habitat	2,680.6	1,431.1	4,111.7	2,895.0	1,903.1	4,798.1	2,738.0	1,450.6	4,188.6	2,448.0	1,106.7	3,554.7
Total	2,682.5	1,445.8	**4,128.3**	2,896.5	1,916.8	**4,813.3**	2,739.9	1,465.3	**4,205.2**	2,448.0	1,111.3	**3,559.3**
Townsends' Big-Eared Bat												
Roosting habitat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Foraging habitat	1,601.6	519.3	2,120.9	1,659.0	711.4	2,370.4	1,755.7	562.3	2,318.0	1,423.7	426.8	1,850.5
Total	1,601.6	519.3	**2,120.9**	1,659.0	711.4	**2,370.4**	1,755.7	562.3	**2,318.0**	1,423.7	426.8	**1,850.5**
Western Mastiff Bat												
Roosting and foraging habitat	0.0	4.5	4.5	0.2	4.6	4.8	0.0	4.5	4.5	0.0	4.5	4.5
Foraging habitat	2,302.6	1,108.8	3,411.4	2,517.0	1,580.8	4,097.8	2,360.0	1,128.3	3,488.3	2,070.0	784.4	2,854.4
Total	2,302.6	1,113.3	**3,415.9**	2,517.2	1,585.4	**4,102.6**	2,360.0	1,132.8	**3,492.8**	2,070.0	788.9	**2,858.9**
Western Red Bat												
Roosting and foraging habitat	384.9	98.1	483.0	382.7	106.9	489.6	387.4	106.6	494.0	377.4	80.4	457.8
Foraging habitat	2,680.6	1,431.1	4,111.7	2,895.0	1,903.1	4,798.1	2,738.0	1,450.6	4,188.6	2,448.0	1,106.7	3,554.7
Total	3,065.5	1,529.2	**4,594.7**	3,277.7	2,010.0	**5,287.7**	3,125.4	1,557.2	**4,682.6**	2,825.4	1,187.1	**4,012.5**
Nonoverlapping total habitat	3,383.1	1,612.8	4,995.9	3,599.7	2,116.9	5,716.6	3,446.2	1,650.5	5,096.7	3,133.7	1,252.7	4,386.4

Nonoverlapping acreage reflects the *aggregate* areal extent of all species taken together—in other words, the exterior perimeter of the overlapping model boundaries, so that land where modeled habitat for more than one species is present is only counted once.
DPS = distinct population segment

Table 3.7-14 Impacts on Critical Habitat by Project Alternative

Impacts	Alt 1		Alt 2		Alt 3		Alt 4	
	Perm	Temp	Perm	Temp	Perm	Temp	Perm	Temp
Permanent Conversion or Degradation of Critical Habitat								
Bay checkerspot butterfly[1]	4.3	21.7	9.4	25.4	4.3	21.7	1.9	19.1
California tiger salamander[2]	213.1	65.4	213.1	65.4	213.1	65.3	213.1	65.4
California red-legged frog[3]	739.5	184.1	739.5	184.1	738.7	184.3	739.5	184.1
Steelhead—Central coast/south-central California coast DPS	5.1	3.1	5.8	3.6	5.9	3.5	5.0	2.5
Total	**962.0**	**274.3**	**967.8**	**278.5**	**962.0**	**274.8**	**959.5**	**271.1**

DPS = distinct population segment
[1] Impacts would occur in four critical habitat units—Tulare Hill (Unit 6), Hale (Unit 10), San Martin (Unit 12), and Kirby (Unit 13)
[2] Impacts would occur in two critical habitat units—Lion's Peak (Units 10A and 10B) and San Felipe (Unit 12)
[3] Impacts would occur in the Wilson Peak Unit (Unit STC-2)

The Authority has incorporated IAMFs into the project design to avoid and minimize project effects. The IAMFs particular to special-status plants would also pertain to most other biological and aquatic resources. The Authority would submit to the appropriate wildlife agencies the names and qualifications of project biologists, designated biologists, species-specific biological monitors, and general biological monitors retained to conduct biological resource monitoring activities and implement avoidance and minimization measures (BIO-IAMF#1). The project biologist would prepare a biological resources management plan (BRMP) consolidating permit conditions and an array of other requirements relevant to protection of sensitive biological resources (BIO-IAMF#5), including special-status species habitat. Workers would be provided with worker environmental awareness program (WEAP) training to help them understand their responsibilities in following procedures to reduce impacts and to increase their capability to identify and avoid special-status species and their habitat in the work area (BIO-IAMF#3). Staging areas would be sited away from sensitive resources (BIO-IAMF#8). The Authority would develop a best management practices (BMP) field manual that would address proper waste management and storage, nonstormwater management, and other general site cleanliness measures to avoid spills of hazardous materials, reducing degradation of suitable habitat (BIO-IAMF#11).

Excavated soils or waste materials unsuitable for treatment or reuse would be disposed at an off-site location (BIO-IAMF#9), avoiding degradation of habitat. Construction equipment would be cleaned before entering work areas to minimize opportunities for weeds and invasive species to enter the project footprint (BIO-IAMF#10).

The areal extent of direct permanent and temporary impacts (conversion and disturbance of habitat, habitat fragmentation, introduction and spread of invasive plants, hydrologic changes, and introduction of hazardous materials) on habitat for both listed and nonlisted special-status plant species is shown in Table 3.7-12. All four project alternatives would be nearly identical with respect to the number of species potentially affected. The aggregate magnitude of permanent and temporary impacts by alternative would be, in descending order, 1,190.8 acres and 467.5 acres, respectively, under Alternative 3; 1,185.9 acres and 487.1 acres under Alternative 2; 1,179.3 acres and 460.1 acres under Alternative 1; and 1,154.2 acres and 429.1 acres under Alternative 4.

While pre-construction and construction actions to protect habitat for special-status plants are part of the project, these actions would not prevent the permanent conversion of habitat and temporary disturbance of other habitat in the project footprint. Work to construct Tunnels 1 and 2 would affect the greatest area of special-status plant habitat because of the extent of undeveloped native plant communities at the portal sites (e.g., chaparral, oak woodland, California sycamore woodland). Construction activities would result in the temporary disturbance of habitat during construction and reduced habitat value for some period of time after construction is completed.

Effects Related to Potential Tunnel Construction Groundwater Depletion

The Authority has incorporated IAMF-HYD#5 into the design and construction methods for Tunnels 1 (Morgan Hill and Gilroy Subsection) and 2 (Pacheco Pass Subsection) to avoid or minimize groundwater inflows into and around tunnels during and after construction. As discussed in Impact HYD#10 in Section 3.8, although IAMF-HYD#5 will reduce the amount of potential groundwater depletion due to tunnel construction, based on the available information and based on prior tunnel construction experience in the Pacheco Pass and elsewhere, some groundwater inflow into and around the tunnel would occur during construction. This groundwater flow could result in localized depletion of groundwater that could have temporary indirect effects on the hydrology of groundwater-dependent surface water features, including streams, creeks, springs, ponds and wetlands that provide habitat for special-status plants. For example, tunnel boring through an underground aquifer or fractured bedrock that conveys groundwater to a wetland on the surface could alter the duration of the feature's inundation (referred to as the hydroperiod) or lower the water table, causing desiccation and mortality of special-status wetland plants. Within the tunnel groundwater study area, groundwater-dependent surface water features that provide habitat for special-status plants could also be affected. In addition, as discussed below, upland trees with deep roots that can reach to groundwater (such as oaks) could also be affected.

As discussed in Section 3.8, several sources of information have been developed to support the environmental process and guide the design of the proposed tunnels, including preliminary groundwater monitoring, plans and profiles of the tunnels in relation to geologic units, conceptual tunnel design reports, and technical design memoranda. As explained in Section 3.8, these documents summarize the existing information concerning groundwater conditions. Regarding biological resources over the tunnel alignments, available information includes aerial photography, mapping, and habitat typing using remote-sensing data. A major constraint on collecting information on groundwater, surface water, and biological resources over the tunnel alignment is the lack of site access at present.

While the available information is adequate to conclude that effects of tunnel construction on groundwater and surface water flows and biological resources supported by affected water resources are reasonably foreseeable, the Authority has determined that the information needed to fully and comprehensively identify the specific effects on groundwater and surface water hydrology and dependent biological resources is incomplete or unavailable. Therefore, the following analysis complies with the requirements described in 40 C.F.R. § 1502.22 concerning NEPA analysis when information is incomplete or unavailable. In accordance with this regulation, the following narrative is organized as follows:

- Statement of incomplete or unavailable information regarding tunneling effects
- Relevance of incomplete or unavailable information to evaluating tunneling effects
- Existing information relevant to evaluating tunneling effects
- Effect evaluation following theoretical approaches

The discussion applies to special status plant, fish and wildlife species, aquatic resources and protected trees. It is not repeated in discussions of other species and aquatic resources to avoid redundancy.

Statement of Incomplete or Unavailable Information Regarding Tunneling Effects

As discussed in Section 3.8, despite the preliminary assessments of subsurface conditions along the proposed tunnel alignments that have been conducted to date and the information derived from construction of other tunnels, many aspects of the groundwater conditions that would be encountered during tunnel construction have been only partially defined and there are data gaps surrounding bedrock, groundwater, soil, and surface hydrology conditions present in the vicinity of the proposed tunnels. Regarding biological resources, the potential biological resources found along the proposed tunnel alignments are generally identified in this document, but a specific inventory of biological and aquatic resources has not been prepared due to the lack of site access.

Additional data are planned to be collected during geotechnical investigations along the proposed tunnel alignments during the design phase once the Authority gains access to privately owned property overlying the proposed tunnel alignments, and these are discussed in Section 3.8. Once the Authority gains access, biological and aquatic resource inventories, similar to those prepared for areas where the Authority presently has access, will be prepared.

Much of the land overlying the proposed tunnels is privately owned, and these areas were inaccessible for field surveys and preliminary investigations into hydrologic and biological resource conditions during preparation of this environmental document. The Authority attempted to gain access to these areas to investigate these conditions during the environmental phase of the project, but the property owners did not grant permission to enter. At this time, the only avenue through which the Authority could gain access to these properties would be to acquire them through eminent domain. The process to exercise eminent domain is lengthy and would result in a delay to complete the NEPA/CEQA process.

Even assuming the Authority received permission to enter privately owned property overlying the tunnel for the purposes of obtaining the incomplete or unavailable information without going through eminent domain, and these investigations are performed as part of the environmental phase prior to completing the NEPA/CEQA process, it would result in a delay of the entire project of approximately 3 years. Such a delay would result in substantial cost increases in terms of both construction costs

due to escalation as well as costs associated with delayed operation of HSR service within the project extent. The Authority considers the cost of delay to be an exorbitant cost.

Relevance of Incomplete/Unavailable Information to Evaluating Tunneling Effects

As discussed in Section 3.8, understanding the potential groundwater conditions that may be encountered by a proposed tunnel is essential so that tunnel structures are designed to avoid and minimize project effects on groundwater and related surface water resources. Evaluating the existing hydrologic conditions of surface water resources overlying the tunnel alignments is essential to understanding the connections between groundwater and surface water flows. Predictive groundwater modeling methods can be used to estimate potential groundwater conditions that may be encountered by a proposed tunnel only when adequate input data, including site-specific geotechnical and hydrologic data collected by subsurface investigations, in situ monitoring, and field investigations, are available. Hydrologic information is also needed to fully and comprehensively identify specific effects on the biota of surface water features (including special-status species habitat) because some surface water features are influenced by groundwater but others are not (i.e., some but not all special-status species habitat in the tunnel groundwater study area would be affected). The species habitat models used to estimate direct impacts on special-status species in the project footprint are not appropriate for estimating effects on individual surface water features in the tunnel groundwater study area because the models are intended to evaluate effects at a much larger (i.e., landscape) scale. To refine the models so that potential depletion groundwater effects could be analyzed requires additional site-specific knowledge of the hydrology of the existing features. This knowledge can only be gained by collecting hydrological data for each of the potentially affected features in the field.

A complete field investigation into the groundwater, surface water, and biological resources overlying the proposed tunnel alignments can only be conducted once the Authority gains access to the privately owned properties overlying the proposed tunnel alignments.

Lacking the detailed subsurface and field investigations into existing geologic, hydrologic, and biologic conditions overlying the proposed tunnels, the data needed to fully estimate the extent, intensity, and duration of tunneling effects on biological conditions are not available. Accordingly, the following narrative and analysis relies on existing data for the tunnel alignments, prior tunneling experience in the Pacheco Pass and elsewhere, and a relative risk assessment of areas of greater or lesser potential effects on biological resources

Existing Information Relevant to Tunneling Effects

As explained in further detail in Section 3.8, based on the information gained from construction of the Irvington Tunnels and the Arrowhead Tunnels, it is expected that the proposed HSR tunnel construction is likely to affect groundwater and surface water resources within a maximum distance of approximately 1 mile from the tunnel alignments. However, similar to those tunnels, it is expected that only a subset of the resources within 1 mile would be affected. The groundwater and surface water resources that directly overlie or are within proximity to the proposed tunnel alignments are anticipated to have the highest potential to be affected by tunneling, with most effects located within 0.25 to 0.5 mile of the tunnel alignments and with many resources within 1 mile of the tunnel alignments having no effects or limited effects. As explained in Section 3.8, based in prior tunnel construction monitoring, these effects are expected to be temporary, lasting months or up to several years after the tunnels become watertight.

As explained in Section 3.8, groundwater conditions vary along the length of Tunnel 1 and Tunnel 2. While many sections have low hydraulic conductivity with a relatively lower potential for groundwater depletion, there are localized areas, such as around the Ortigalita fault where tunnel inflows and potential groundwater depletion are likely high. As described in Section 3.8, based on the current understanding of geology and the prior experience of constructing Central Valley project tunnels in Pacheco Pass, the relative risk of groundwater depletion and resultant effects on groundwater dependent biological resources is as follows:

- Tunnel 1
  - The entire tunnel (1.5 miles) is expected to encounter mostly dry or moist conditions with inflows up to 15 gallons per minute persisting for up to several days. The relative risk of groundwater depletion on this segment is low.
- Tunnel 2
  - Approximately 8.1 miles of Tunnel 2 (segments A and B) is expected to encounter primarily moist conditions with local groundwater inflows up to or greater than 200 gallons per minute persisting for up to several days. The relative risk of groundwater depletion on this segment is high.
  - Approximately 4.3 miles of Tunnel 2 (segment C) is expected to be mostly dry to moist, with local heading inflows up to 100 gallons per minute persisting for up to several days. The relative risk of groundwater depletion on this segment is moderate
  - Approximately 0.2 mile of Tunnel 2 (segment D) would pass through or near the Ortigalita fault zone, which may contain substantial quantities of groundwater. The relative risk to groundwater depletion on this segment is high
  - Approximately 1 mile of Tunnel 2 (segment E) is expected to encounter mostly dry or moist conditions with temporary inflows up to 15 gallons per minute persisting for up to several days. The relative risk of groundwater depletion on this segment is low.

Effect Evaluation using Theoretical Approaches

Based on the information gained from construction of the Irvington Tunnels and the Arrowhead Tunnels, it is expected that the proposed HSR tunnel construction is likely to affect groundwater and surface water resources within a maximum distance of approximately 1 mile from the tunnel alignments, with most effect occurring on groundwater and surface water (and groundwater-dependent biological resource) located directly over the alignment and within 0.25 to 0.5 mile of the alignment.

Assuming that the proposed design and construction methods (HYD-IAMF#5) would not completely avoid the potential for groundwater inflows during tunneling, and that the quantity of groundwater inflows into the proposed tunnels would indicate a corresponding effect on surface hydrology conditions, a relative risk for effects on groundwater-dependent biological resources can be assigned to specific segments of the proposed tunnels. To generate this relative risk assessment, locations where more groundwater inflows are anticipated were assumed to have a higher potential for groundwater and surface hydrology effects; conversely, locations where less groundwater would be encountered were assumed to have a lower potential for groundwater and surface hydrology effects. While this theoretical approach to evaluating the potential effect provides a useful tool for identifying segments of the tunnels that are more or less vulnerable to surface water effects in comparison to other portions of the tunnels, it does not allow for a full evaluation of foreseeable effects, including extent, intensity, or duration. Given the current uncertainties and data gaps, there is potential for surface water effects to occur even in locations with a low risk of effect, and there could be instances where little groundwater inflow would occur in areas with a high risk for effect.

Table 3.8-28 in Section 3.8 shows the relative risk for effects from tunneling on groundwater and surface water resources that have the highest potential to be affected (i.e., features that cross directly over or very close to the tunnel alignments). Figures 3.8-12 to 3.8-15 in Section 3.8 illustrate the alignments of the proposed tunnels in relation to the locations of seeps/springs and surface water resources.

Surface water resources within 1 mile of the proposed tunnel alignments include the following: 132 streams and creeks; 42 wetlands, ponds, and reservoirs; and 11 seeps and springs. However, not all of these resources are expected to be affected by tunnel construction because of the following: (1) many of the streams and creeks are likely not supported by groundwater flow; (2) most of the tunnel alignment is in areas of low groundwater conductivity where

groundwater flows are expected to be limited and the implementation of HYD-IAMF#5 will lower the potential for large-scale effects to reach every feature within the RSA; and (3) prior tunneling experience has indicated that the bulk of the effects on water resources would occur on resources located over the tunnel alignment or much closer to the alignment than 1 mile.

Table 3.8-28 and Figures 3.8-12 to 3.8-15 in Section 3.8 show that tunneling may directly or indirectly affect water levels in 43 creeks, 3 ponds, the San Luis Reservoir, and a seep/spring. Of these 48 resources overlying or in proximity to the proposed tunnel alignments, the hydrology of 44 waterbodies have the potential to be directly affected by groundwater depletion associated with tunneling, and three other waterbodies (Ortega Creek, Romero Creek, and San Luis Reservoir) could be indirectly affected through altered hydrology of their tributaries). The potential for all surface water resources overlying the tunnels to be affected is expected to vary along the tunnel alignment: the waterbodies near Tunnel 1 and segment E of Tunnel 2 have a relatively low risk for hydrology effects, while the remainder of Tunnel 2 has a moderate to high potential to affect surface water hydrology.

The types and approximate number of surface water features within 250 feet of the underground easements for the two tunnels are shown in Table 3.7-15. Other surface water features within the tunnel groundwater study area (i.e., greater than 250 feet from the project footprint but within 1 mile of underground easements for tunnels) may also be affected. The impact on groundwater-dependent surface water features from tunnel construction would be the same under all four alternatives because their alignments are identical at the two tunnels.

Table 3.7-15 Surface Waters Overlying Tunnels 1 and 2[1]

Aquatic Resource	Tunnel 1	Tunnel 2
Freshwater marsh	0	1
Freshwater pond	1	9
Natural watercourse[2]	11	91
Seasonal wetland	0	4

[1] The 250-foot buffer was chosen for this table because it is the same distance at which indirect impacts on aquatic resources are evaluated and conservatively estimates the number of surface features that could be affected by tunnel construction underground. Other surface water features within 1 mile of the underground easements for the tunnels could also be affected but are not quantified for this analysis.
[2] Reflects number of crossings over the tunnel easements

Upland vegetation such as grassland and shrubs would not be affected by potential groundwater depletion because these vegetation types and shallow roots and are not dependent on groundwater, and thus are not discussed further. However, certain upland trees, such as oaks, can have deep roots that can reach to groundwater. Within the groundwater study area, common upland oak tree species include blue oak, coast live oak, and scrub oak and valley oak are found within riparian areas of the study area. Oaks derive water from direct precipitation, shallow infiltration, the vadose zone above groundwater, and groundwater. While oaks (and other trees) have their vast bulk of their roots located within 1 to 2 meters (3 to 6 feet) of the surface (Perry 1989), some oaks, can have deep roots that can reach in excess of 70 feet below the surface level (Lewis and Burgy 1964). It possible that some oaks could be sustaining themselves in part from groundwater, particularly in summer or drought conditions. As discussed in Section 3.8, the groundwater study area is a complex geological area with extensive local faulting and the water table elevation has not been comprehensively mapped to date. Therefore, it is possible that upland trees may be affected if they are located in areas with a relatively shallow water table (defined for this analysis as less than 70 feet). It should be noted that upland trees are primarily dependent on direct precipitation and shallow saturation of their primary root mass for water and are therefore less likely to be affected by a lowering of the groundwater table. In contrast, riparian trees like valley oak trees are more perennially dependent on surface and shallow groundwater. Therefore, potential groundwater lowering in the study area would not affect the primary source of

water for upland trees but could affect the “reserve” water source provided by deep tree roots in areas where the water table is shallow enough to be reached by tree roots.

The duration of temporary effects for any biological resource would depend on the hydrologic conditions, subsurface conditions, and amount of groundwater inflow into the tunnel, none of which can be estimated at this time as discussed under Impact HYD-10 in Section 3.8. As discussed under Impact HYD-10 in Section 3.8, the duration of groundwater inflows into and around the tunnel at any one location is expected to be a matter of days to months; the potential period of effect on groundwater due to tunnel construction could be days to months up to several years after tunnel completion. As explained in Section 3.8, post-project monitoring of surface water features near the Arrowhead Tunnels in the San Bernardino Mountains in southern California found that groundwater recovery from tunnel construction period depletion took up to 5 years for some features (Berg 2012).

As discussed in Section 3.8, groundwater depletion and effects on biological resources indirectly dependent on groundwater is not anticipated to occur during project operation because designs which permanently limit or eliminate the leakage of water into the tunnel following construction would be used.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the project could have substantial adverse effects, through conversion or degradation of habitat, on special-status plant species, including species listed under FESA and CESA. While actions would be implemented before and during construction to reduce the potential for direct impacts on special-status plants and to minimize the loss of habitat, the project would result in loss and degradation of habitat and could result in in the loss of special-status plant occurrences. These impacts would eliminate or reduce the viability of local occurrences and contribute to rangewide or statewide declines of these species. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Impact BIO#2: Permanent Conversion or Degradation of Habitat for and Mortality of Bay Checkerspot Butterfly

Construction of the HSR track and systems in the Monterey Corridor and Morgan Hill and Gilroy Subsections would take place in suitable grassland habitat (including designated critical habitat in the Morgan Hill and Gilroy Subsection) for Bay checkerspot butterfly, a species listed as threatened under FESA. Construction activities would convert and destroy grassland habitat and could result in individual fatalities; presence of HSR components could interfere with necessary life cycle behaviors. The Authority has incorporated BIO-IAMF#1, BIO-IAMF#3, BIO-IAMF#5, BIO-IAMF#8, BIO-IAMF#9, BIO-IAMF#10, and BIO-IAMF#11 (described in Impact BIO#1) into project design to avoid and minimize impacts on Bay checkerspot butterfly.

The areal extent of direct permanent and temporary impacts (conversion and disturbance of habitat) on habitat for the species is shown in Table 3.7-13. Impacts on critical habitat are shown in Table 3.7-14. Because of its larger project footprint in the Tulare Hill area, Alternative 2 would have the most extensive impacts on suitable habitat. The impacts under Alternatives 1 and 3 would be identical. Alternative 4 would have the least impact because of its reduced footprint in the Coyote Valley (Morgan Hill and Gilroy Subsection). Other direct impacts could include mortality and injury of individual adults, eggs, and larvae. The magnitude of permanent and temporary impacts would be 9.8 acres and 22.6 acres, respectively, under Alternatives 1 and 3; 14.7 acres and 27.7 acres under Alternative 2; and 10.9 and 14.5 acres under Alternative 4. The magnitude of indirect impacts (habitat modification through introduction of invasive nonnative plants, alteration of flight behavior), while not quantified, would generally be proportional to the quantity of direct impacts except for potential long-term impacts on flight behavior. Bay checkerspot butterflies generally follow landform contours close to the ground surface, and they avoid patches of shade in their flight path. The general direction of flight would be east to west across the alignment, from Coyote Ridge (the core population) to suitable habitat west of U.S. Highway 101 on Tulare Hill or at Santa Teresa Park. Consequently, Alternatives 1 and 3 have the

potential to alter flight behavior because the shadow created by the viaduct could create a barrier to movement. Alternatives 2 and 4 would have the least impact on flight behavior because both alternatives would be at grade in Coyote Valley. Alternative 2 would result in more extensive conversion of butterfly habitat than Alternative 4.

Although serpentine grasslands are typically more resistant to invasion by nonnative species than many other land cover types, nonnative species eventually degrade serpentine grasslands. For example, barbed goatgrass (*Aegilops triuncialis*) is an invasive grass that has been documented on Coyote Ridge and is the subject of focused management and monitoring by the SCVOSA (McGraw 2015: page 68).

While actions to minimize habitat disturbance are part of the project, construction would result in loss and disturbance of habitat for Bay checkerspot butterfly. Construction activities could crush host plants supporting egg masses and larvae, and ground- and vegetation-disturbing activities conducted during March and April could kill adults feeding on nectar plants. Alternative 2 would result in the loss of more habitat than Alternatives 1, 3, and 4 because it would involve additional staging areas or temporary construction easements (TCE) in suitable habitat; on the other hand, the viaduct associated with Alternatives 1 and 3 could impede butterflies' movement between habitat patches because they can perceive shadows as impassable barriers.

CEQA Conclusion

The impact under CEQA would be significant for all four project alternatives because construction activities would have a substantial adverse effect, through both direct mortality and habitat modification, on the Bay checkerspot butterfly. While actions would be implemented before and during construction to reduce the potential for direct harm to individuals and to minimize the loss of habitat, the project would result in loss of habitat for Bay checkerspot butterfly (including critical habitat), could result in long-term behavioral changes in flight patterns, and could cause direct impacts on individuals (injury and mortality) if any are present in affected habitat. In the absence of mitigation, such impacts would reduce the viability of the Coyote Ridge core population, which is the only remaining population of this species. Any habitat loss in this area would reduce opportunities for recovery of this endangered species. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Impact BIO#3: Permanent Conversion or Degradation of Habitat for and Mortality of Vernal Pool Crustaceans

Construction of the HSR track and systems in the San Joaquin Valley Subsection would take place in suitable habitat for four federally listed vernal pool crustaceans: Conservancy fairy shrimp, longhorn fairy shrimp, and vernal pool tadpole shrimp, all listed as endangered under FESA; and vernal pool fairy shrimp, listed as threatened. Construction in the Morgan Hill and Gilroy and Pacheco Pass Subsections would take place in suitable habitat for vernal pool tadpole shrimp. Construction activities would convert habitat and could result in the mortality of individual crustaceans or their cysts, as well as degrading habitat that is not directly affected. The Authority has incorporated BIO-IAMF#1, BIO-IAMF#3, BIO-IAMF#5, BIO-IAMF#8, BIO-IAMF#9, BIO-IAMF#10, and BIO-IAMF#11 (described in Impact BIO#1) into project design to avoid and minimize impacts on vernal pool crustaceans.

All four species are entirely aquatic, although their cysts remain dormant in the soil during the summer and fall when vernal pools are dry. All vernal pool invertebrate species occurrences in the regional RSA are associated with vernal pools, alkali sink scrub, and alkali grassland in the San Joaquin Valley and lower Sierra Nevada foothills east of Merced, with the exception of longhorn fairy shrimp, which is associated with grassland vernal pools in the San Joaquin Valley, and vernal pool tadpole shrimp, for which suitable habitat is present in seasonal wetlands of the Santa Clara Valley. With the exception of vernal pool tadpole shrimp, which also occurs in the Morgan Hill and Gilroy and Pacheco Pass Subsections, all potentially suitable habitat for the four species is limited to the San Joaquin Valley Subsection because the species' ranges overlaps only this subsection.

Because of the limited extent and fragility of vernal pool habitat for these species, all impacts are considered permanent. The areal extent of direct permanent impacts (conversion and disturbance of habitat, mortality of individuals and cysts) on suitable habitat for the species is shown in Table 3.7-13. Because all four alternatives would be identical in the San Joaquin Valley Subsection, there would be no difference in the area of impacts among alternatives. All four alternatives would affect 27.6 acres of suitable habitat for these species. While the USFWS has designated critical habitat for vernal pool ecosystems as well as for all four crustacean species, the project would not intersect or affect any critical habitat units.

While pre-construction and construction actions to protect habitat for listed vernal pool crustaceans are part of the project, these actions would not prevent the conversion and disturbance of habitat in and near the project footprint. If construction in the project footprint alters a hydrologic regime that supplies water to vernal pools within 250 feet of the footprint, such hydrological modifications could indirectly affect habitat by altering the pools' ponding duration and causing pools to evaporate before vernal pool crustaceans complete their life cycles (USFWS 2005: page I-20). Similarly, ground-disturbing activities that result in perforation or fracture of the water-restricting layer that allows vernal pools to pond could, even outside the project footprint, lead to the loss of suitable habitat.

CEQA Conclusion

The impact under CEQA would be significant for all four project alternatives because construction activities would have a substantial adverse effect, both directly and indirectly and through habitat modification, on Conservancy fairy shrimp, longhorn fairy shrimp, vernal pool fairy shrimp, and vernal pool tadpole shrimp. While actions would be implemented before and during construction to reduce the potential for direct harm to populations and to minimize the loss of habitat, the project would nevertheless result in loss of a habitat type that has already experienced considerable decline. In the absence of mitigation, such loss would reduce the viability of local populations and contribute to the decline of federally listed species that are dependent upon a sensitive habitat type. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Impact BIO#4: Removal or Pruning of Elderberry Plants Potentially Supporting Valley Elderberry Longhorn Beetle

Construction of the HSR track and systems in the San Joaquin Valley Subsection would take place in habitat for valley elderberry longhorn beetle, a species listed as threatened under FESA. Construction could necessitate the removal of red or blue elderberry—the obligatory host species for the beetle. The Authority has incorporated BIO-IAMF#1, BIO-IAMF#3, BIO-IAMF#5, BIO-IAMF#8, BIO-IAMF#9, BIO-IAMF#10, and BIO-IAMF#11 (described in Impact BIO#1) into project design to avoid and minimize impacts on valley elderberry longhorn beetle.

The areal extent of direct permanent impacts (conversion and disturbance of habitat, mortality of individuals) on riparian and other habitat for the species is shown in Table 3.7-13. Because all four alternatives would be identical in the San Joaquin Valley Subsection, there would be no difference in the extent of impacts between alternatives. All four project alternatives would result in permanent and temporary impacts on up to 102.6 acres and 56.3 acres, respectively, of suitable habitat. While the USFWS has designated critical habitat for valley elderberry longhorn beetle, the project would not intersect any critical habitat units.

While pre-construction and construction actions to protect habitat for valley elderberry longhorn beetle are part of the project, these actions would not prevent the loss of habitat in the project footprint. Because of the dependence of this species on host plants, loss of occupied host plants would result in mortality of individual beetles.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the project could have a substantial adverse effect, through both direct mortality and habitat modification, on valley elderberry longhorn beetle. While actions would be implemented before and during construction

to reduce the potential for direct harm to occupied host plants and to minimize the loss of habitat (i.e., unoccupied host plants that could be occupied in the future), the project would nevertheless result in removal of riparian vegetation that could support host plants. If such host plants were occupied by valley elderberry longhorn beetles, their removal would result in take of a federally listed species. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Impact BIO#5: Permanent Conversion or Degradation of Habitat for and Mortality of Crotch Bumble Bee

Construction of the HSR track and systems in all subsections would take place in suitable habitat for the Crotch bumble bee, a candidate for listing as endangered under CESA. Construction activities would convert and disturb habitat and could result in the mortality of individual bees if underground nest colonies or overwintering queens are present in the project footprint at the time of construction. The Authority has incorporated IAMF-BIO#1, IAMF-BIO#3, IAMF-BIO#5, IAMF-BIO#8, IAMF-BIO#9, IAMF-BIO#10, and IAMF-BIO#11 (described in Impact BIO#1) into project design to avoid and minimize impacts on Crotch bumble bee.

The areal extent of direct permanent and temporary impacts (conversion and disturbance of habitat) on habitat for the species is shown in Table 3.7-13**.** The magnitude of permanent and temporary impacts would be, in descending order, 1,154.5 acres and 461.8 acres, respectively, under Alternative 2; 1,148.8 acres and 444.0 acres under Alternative 3; 1,147.2 acres and 436.4 acres under Alternative 1; and 1,127.0 and 412.7 acres under Alternative 4.

While pre-construction and construction actions to protect habitat for the Crotch bumble bee are part of the project, these actions would not prevent the conversion and disturbance of habitat in and near the project footprint. Ground disturbance could crush or excavate underground burrows supporting active nest colonies or soils or leaf litter supporting overwintering queens.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the project could have a substantial adverse effect, through both direct mortality and habitat modification, on the Crotch bumble bee. While actions would be implemented before and during construction to reduce the potential for direct harm to individuals and to minimize the loss of habitat, the project would result in loss of habitat for Crotch bumble bee and could cause direct impacts on individuals if any are present in affected habitat. In the absence of mitigation, such impacts would reduce the viability of local populations and contribute to the rangewide decline of the species. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Impact BIO#6: Permanent Conversion of Habitat for and Direct Mortality of Steelhead and Pacific Lamprey, and Permanent Conversion of Essential Fish Habitat for Pacific Coast Salmon

Construction of HSR track and systems in all subsections except the San Joaquin Valley Subsection would take place in habitat for steelhead and Pacific lamprey and designated freshwater EFH for Pacific Coast salmon (collectively referred to as special-status fish). Central California coast (CCC) and south-central California coast (SCCC) steelhead are both federally listed as threatened under FESA, Pacific lamprey is a federal species of concern and a CDFW species of special concern, and the project extent intersects designated EFH for Chinook and coho salmon. Construction activities would result in permanent conversion of some habitat to transportation uses and could cause injury and mortality to individual fish that are present in work areas. Because such activities could adversely affect EFH for Pacific Coast salmon by altering the physical, chemical, or biological conditions of affected steams, consultation with NMFS would be required and effects would be described in the BA.

The Authority has incorporated BIO-IAMF#1, BIO-IAMF#3, BIO-IAMF#5, BIO-IAMF#8, BIO-IAMF#9, BIO-IAMF#10, and BIO-IAMF#11 (described in Impact BIO#1) into project design to avoid and minimize impacts on steelhead, Pacific lamprey, and EFH. In addition, the Authority would require preparation of other plans to guide project activities: preparation and

implementation of a stormwater pollution prevention plan and plans governing the handling and management of hazardous materials (HMW-IAMF#3 and HMW-IAMF#6, respectively, as described in Section 3.10, Hazardous Materials and Wastes) would minimize the risk of contaminants discharging into waterbodies. Tunnels would be designed and constructed to avoid or minimize groundwater inflows into tunnels during construction that may affect surface water resources, including Pacheco Creek (HYD-IAMF#5).

The areal extent of direct permanent and temporary impacts (conversion and temporary dewatering of habitat, injury or mortality resulting from pile-driving activities) on habitat for the species is shown in Table 3.7-13. The magnitude of permanent and temporary impacts by alternative would be, in descending order, 177.4 acres and 80.6 acres, respectively, under Alternative 3; 159.4 acres and 88.2 acres under Alternative 2, 157.3 acres and 82.9 acres under Alternative 1, and 154.9 acres and 73.4 acres under Alternative 4. The project would also intersect designated critical habitat for CCC and SCCC steelhead as shown in Table 3.7-14. In the Morgan Hill and Gilroy Subsection, Alternative 2 would affect more habitat and designated critical habitat for SCCC steelhead than Alternatives 1, 3, and 4 because of TCEs over Llagas Creek; at the same time, Alternative 3 would affect more critical habitat for SCCC steelhead than Alternatives 1, 2, and 4 because of additional crossings of the Pajaro River and Llagas Creek.

Floodplain habitats used by steelhead would be affected under all project alternatives, though impacts would be minimized through a variety of project design and construction features (HYD-IAMF#2). At the Guadalupe River and Llagas Creek crossings, bridge abutments or pile bents would be placed in the floodplain; there would be minimal physical barriers which would not impede fish movement in the floodplain in these areas. In the Soap Lake floodplain, the project would be constructed as viaduct in Alternatives 1, 3, and 4; viaduct columns would not obstruct flow or steelhead movement in the floodplain, but MOWF construction would place fill in the floodplain west of the Pajaro River crossing. The project would maintain circulation of flood flows around and past the MOWF. Moreover, the MOWF is located high in the floodplain, and would not obstruct most flood flows (i.e., the 10-year or more frequent flood). The alignment in the vicinity of Soap Lake would be on embankment in Alternative 2, and culverts incorporated into project design would ensure maintenance of flow across the alignment during times of flooding. In upper Pacheco Creek, the alignment in the vicinity of the floodplain under all four alternatives would be viaduct, with columns placed in the floodplain. The columns would not obstruct flood flows or steelhead movement. However, local small areas of fill would be placed in the floodplain along its southern edge. Design in accordance with HYD-IAMF#2 would minimize the hydraulic effects of fill.

As discussed in Impact BIO#1, construction of Tunnels 1 and 2 could have temporary indirect impacts on the hydrology of groundwater-dependent surface waters, including habitat and designated critical habitat for SCCC steelhead in Pacheco Creek near Casa de Fruta (i.e., northeast of Tunnel 1 and northwest of Tunnel 2). A drop in groundwater inflow to Pacheco Creek (directly or via upstream tributaries) could alter instream habitat conditions and fish movement potential. As discussed in Impact HYD-10 in Section 3.8, the duration of this impact would depend on the hydrologic conditions, subsurface conditions, and the amount of lowering of groundwater tables or tunnel dewatering discharge, none of which can be estimated at this time.

In addition, if tunnel dewatering discharges at the Tunnel 2 west portal were routed to Pacheco Creek, such discharges could affect fish movement through the scour of creeks or banks that could alter channel conditions as well as through the introduction of abnormally warm water that could be a thermal barrier to safe fish passage. As discussed in Section 3.8, to meet water quality standards for beneficial reuse, settling ponds, storage tanks, and a series of treatment systems may be necessary. Only treated groundwater that meets appropriate water quality standards would be beneficially reused or discharged into receiving waterbodies. The application of regulatory discharge controls would avoid water quality effects related to fish habitat conditions and fish movement.

While pre-construction and construction actions to protect habitat for special-status fish species are part of the project, these actions would not prevent the conversion and disturbance of aquatic

habitat where work must be conducted. In addition to habitat loss and temporary disturbance, construction activities could temporarily limit fish access to seasonal floodplain habitats; temporarily remove riparian vegetation, resulting in decreased stream shading; ground-disturbing activities could result in increased sediment discharge; and dewatering could result in stranding and death of individual fish.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the project could have a substantial adverse effect, through both direct mortality and habitat modification, on steelhead, Pacific lamprey, and EFH for Pacific Coast salmon. While actions would be implemented before and during construction to minimize the loss of habitat, the project would result in loss of habitat and could result in mortality of individuals, if present in affected habitat. Such loss would constitute a substantial adverse impact because the loss of even a few reproductive adults in these small populations can substantially reduce subsequent years' population levels and reproductive potential. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Impact BIO#7: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Tiger Salamander

Construction of the HSR track and systems in all subsections would take place in suitable habitat for the California tiger salamander, a species listed as threatened under the FESA and CESA. Such activities would convert suitable habitat and reduce the quality of the remaining suitable habitat, and could result in the injury or mortality of individual California tiger salamanders.

The Authority has incorporated BIO-IAMF#1, BIO-IAMF#3, BIO-IAMF#5, BIO-IAMF#8, BIO-IAMF#9, BIO-IAMF#10, and BIO-IAMF#11 (described in Impact BIO#1) into project design to avoid and minimize impacts on California tiger salamander. In addition, erosion control materials that could entrap salamanders would be prohibited (BIO-IAMF#6) to prevent mortality and harm associated with inadvertent entrapment. Covering trenches, pits, and other excavations when not in use and inspecting them regularly (BIO-IAMF#7) would prevent salamanders from falling into these areas and being trapped there. Tunnels would be designed and constructed to avoid or minimize groundwater inflows into the tunnel during construction that may affect surface water resources in areas overlying the tunnel alignment (HYD-IAMF#5), including those that provide aquatic habitat for California tiger salamander.

The areal extent of direct permanent and temporary impacts (conversion and disturbance of habitat) on aquatic and upland (both agricultural and nonagricultural) habitat for the species is shown in Table 3.7-13. The magnitude of permanent and temporary impacts by alternative would be, in descending order, 2,447.8 acres and 956.5 acres, respectively, under Alternative 3; 2,305.1 acres and 1,087.6 acres under Alternative 2; 2,249.1 acres and 910.6 acres under Alternative 1, and 2,126.4 acres and 842.2 acres under Alternative 4. In addition to habitat loss, other direct impacts could include injury and mortality of individual salamanders through such mechanisms as vehicle strike, entrapment in construction areas or materials, and crushing or entombment in burrows.

All four project alternatives would have generally similar impacts on the California tiger salamander. While suitable habitat is present in all five subsections, the greatest amount is in the Pacheco Pass and San Joaquin Valley Subsections, where all four alternatives would be identical. The most extensive impacts on suitable habitat would result from work on the portals for Tunnel 1 in the Pacheco Pass Subsection, requiring large areas of grading and earthmoving for slope stabilization. The other differences between alternatives would be in the Monterey Corridor and Morgan Hill and Gilroy Subsections. Alternatives 2 and 3 would have the most extensive potential impacts because they would be largely on embankment in those subsections, resulting in a larger project footprint and more ground disturbance. Alternative 4 would have the least impact because of its reduced footprint associated with the existing at-grade Caltrain tracks.

Additionally, as shown in Table 3.7-14, the project would have impacts on two units of designated critical habitat. The impacts associated with work on Tunnel 1 would take place in the San Felipe

Unit (Unit 12). Primarily temporary impacts would result from Pacific Gas and Electric Company (PG&E) work to upgrade the electrical network in the Lion's Peak Units (10A and 10B), but these impacts would not be extensive. Impacts on California tiger salamander critical habitat would be nearly identical for all four alternatives because their footprints are nearly the same at Tunnel 1 and PG&E work would occur at the same locations.

As discussed in Impact BIO#1, construction of Tunnels 1 and 2 could have temporary indirect impacts on the hydrology of groundwater-dependent surface waters, including ponds that provide aquatic breeding habitat for California tiger salamander. The majority of the area subject to potential temporary indirect effects is within the range and has the correct general habitat attributes to be suitable aquatic and upland habitat for California tiger salamander and thus would likely support breeding, foraging, and refugia of the species. Because hydroperiod and the amount of emergent wetland vegetation are two of the most important factors influencing suitability of a given pond for California tiger salamander (Ford et al. 2013: page 11), any reductions in groundwater supply to occupied ponds could reduce reproductive success of salamanders breeding in such ponds.

While pre-construction and construction actions to protect the tiger salamander are part of the project, these actions would not prevent the conversion of habitat and temporary disturbance of other habitat in the project footprint. Because the salamanders are small and can be distributed throughout suitable habitats, their exclusion from construction areas cannot be guaranteed. Earthmoving, excavation, and vehicle operation during construction could crush, entomb, or physically disturb the salamanders. Ground disturbance, noise, and vibration associated with these activities could disrupt the activities of individual salamanders and may impair normal life cycle behaviors. The use of chemicals and hazardous substances during construction (e.g., oils, gasoline) may also cause salamander mortality if individuals enter aquatic habitat that has been contaminated by accidental spills or other vehicle and equipment leaks. If construction in the project footprint alters a hydrologic regime that supplies water to vernal pools (suitable breeding habitat for the species) within 250 feet of the footprint, such hydrological modifications could indirectly affect habitat by altering the pools' ponding duration and rendering aquatic habitat unsuitable to support breeding behavior and the development of eggs and larvae. The introduction of nonnative plant species to upland habitat could reduce California tiger salamander dispersal to nonbreeding sites (i.e., burrows) because dense herbaceous vegetation could impede movement. While many protections would be implemented, the potential for physical harm and mortality of individuals would not be eliminated.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the project could have a substantial adverse effect, through both direct mortality and habitat modification, on the California tiger salamander. While actions would be implemented before and during construction to reduce the potential for direct harm to individuals and to minimize the loss of habitat, the project would result in substantial loss and degradation of habitat and could cause injury or mortality of individuals. In the absence of mitigation, such impacts would reduce the viability of local populations and contribute to the rangewide decline of species, and could also impede recovery of the species in historical portions of its range. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Impact BIO#8: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Red-Legged Frog

Construction of the HSR track and systems in all subsections except the San Joaquin Valley Subsection would take place in suitable habitat for the California red-legged frog, a species listed as threatened under the FESA and a CDFW species of special concern. Such activities would convert habitat and reduce the quality of the remaining suitable habitat, and could result in the injury or mortality of individual red-legged frogs.

The Authority has incorporated BIO-IAMF#1, BIO-IAMF#3, BIO-IAMF#5, BIO-IAMF#6, BIO-IAMF#7, BIO-IAMF#8, BIO-IAMF#9, BIO-IAMF#10, and BIO-IAMF#11 (described in Impact BIO#1

and Impact BIO#6) into project design to avoid and minimize impacts on California red-legged frog. Tunnels would be designed and constructed to avoid or minimize groundwater inflow into tunnels during construction that may affect surface water resources overlying the tunnel alignment (IAMF-HYD#5), including those that provide aquatic habitat for California red-legged frog.

The areal extent of direct permanent and temporary impacts (conversion and disturbance of habitat, injury and mortality of individuals) on breeding and nonbreeding habitat for the species is shown in Table 3.7-13. The magnitude of permanent and permanent impacts by alternative would be, in descending order, 2,160.0 acres and 1,173.5 acres, respectively, under Alternative 2; 2,119.3 acres and 882.3 acres under Alternative 3; 1,990.4 acres and 847.2 acres under Alternative 1; and 1,812.5 acres and 657.2 acres under Alternative 4. In addition, the USFWS has designated critical habitat for this species; all four alternatives would affect nearly identical amounts of this critical habitat (Unit STC-2).

As discussed in Impact BIO#1, construction of Tunnels 1 and 2 could have temporary indirect impacts on the hydrology of groundwater-dependent surface water features, including ponds, wetlands, streams, and riparian vegetation that provide habitat for California red-legged frog. Because California red-legged frog breeding sites must be inundated long enough to allow for tadpole development and metamorphosis (Ford et al. 2013: page 5), any reductions in groundwater supply to occupied ponds, streams, or wetlands could reduce reproductive success of the affected population. Reductions in groundwater supply to riparian vegetation could result in the desiccation of vegetation and degradation of foraging/refugia and movement habitat.

All four project alternatives would have similar impacts on California red-legged frog because the portions of the project that would intersect habitat for the species have similar footprints. Work to construct Tunnels 1 and 2 (in the Morgan Hill and Gilroy and the Pacheco Pass Subsections, respectively) would have the greatest amount of impact on aquatic and upland habitat as well as critical habitat for the species, because the east and west portals of Tunnel 1 and the west portal of Tunnel 2 would be in the Wilson Peak Unit of designated critical habitat.

While pre-construction and construction actions to protect the California red-legged frog are part of the project, these actions would not prevent the conversion of habitat and temporary disturbance of other habitat in the project footprint. Because frogs can be distributed throughout suitable habitats, their exclusion from construction areas cannot be guaranteed. Earthmoving, excavation, and vehicle operation during construction could crush, entomb, or physically disturb individual frogs. Ground disturbance, noise, and vibration associated with these activities could disrupt the activities of individual frogs and may impair normal life cycle behaviors. If construction in the project footprint alters a hydrologic regime that supplies water to aquatic habitat features within 250 feet of the footprint, such hydrological modifications could indirectly affect habitat by altering the pools' ponding duration and rendering aquatic habitat unsuitable to support breeding behavior and the development of eggs and larvae. The use of chemicals and hazardous substances during construction (e.g., oils, gasoline) may cause mortality if individuals enter aquatic habitat that has been contaminated by accidental spills or other vehicle and equipment leaks. While many protections would be implemented, the potential for physical harm and mortality of individuals would not be eliminated.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the project could have a substantial adverse effect, through both direct mortality and habitat modification, on the California red-legged frog. While actions would be implemented before and during construction to reduce the potential for direct harm to individuals and to minimize the loss of habitat, the project would result in substantial loss and degradation of habitat and could cause injury or mortality of individuals. In the absence of mitigation, such impacts could reduce the viability of local populations and contribute to the rangewide decline of the species and could also impede recovery of the species into historical portions of its range. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Impact BIO#9: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Foothill Yellow-Legged Frog

Construction of the HSR track and systems in the Monterey Corridor, Morgan Hill and Gilroy, and Pacheco Pass Subsections would take place in suitable habitat for the foothill yellow-legged frog, a CDFW species of special concern, a candidate for state listing as threatened under CESA, and a species under review for federal listing under FESA. Such activities would convert habitat and reduce the quality of the remaining suitable habitat, and could result in the injury or mortality of individual yellow-legged frogs. The Authority has incorporated BIO-IAMF#1, BIO-IAMF#3, BIO-IAMF#5, BIO-IAMF#6, BIO-IAMF#7, BIO-IAMF#8, BIO-IAMF#9, BIO-IAMF#10, and BIO-IAMF#11 (described in Impact BIO#1 and Impact BIO#6) into project design to avoid and minimize impacts on foothill yellow-legged frog. Tunnels would be designed and constructed to avoid or minimize groundwater inflow into tunnels during construction that may affect surface water resources overlying the tunnel alignment (IAMF-HYD#5), including those that provide aquatic habitat for foothill yellow-legged frog.

The areal extent of direct permanent and temporary impacts (conversion and disturbance of habitat, injury and mortality of individuals) on breeding and foraging habitat for the species is shown in Table 3.7-13. All four project alternatives would have virtually identical impacts on habitat for this species, varying by only a very few acres, because the portions of the project that would intersect habitat for the species have similar footprints. Work to construct Tunnels 1 and 2 (in the Morgan Hill and Gilroy and the Pacheco Pass Subsections, respectively) would have the greatest amount of impact on aquatic and upland habitat.

The magnitude of permanent impacts by alternative would be, in descending order, 91.9 acres under Alternative 3, 91.7 acres under Alternative 1, 89.2 acres under Alternative 2, and 88.3 acres under Alternative 4. The extent of temporary impacts would be 42.0 acres under Alternative 2, 41.3 acres under Alternative 1, 41.0 acres under Alternative 3, and 39.4 acres under Alternative 4. The magnitude of indirect impacts (e.g., hydrologic modification, introduction of contaminants into watercourses), while not quantified through the modeling effort, would be generally proportional to the quantity of direct impacts.

As discussed in Impact BIO#1, construction of Tunnels 1 and 2 could have temporary indirect impacts on the hydrology of groundwater-dependent surface waters, including streams that provide aquatic habitat for foothill yellow-legged frog. Because foothill yellow-legged frogs require gently flowing water for breeding (Hayes et al. 2016: pages 5-6), any reductions in groundwater supply to occupied streams could result in mortality of eggs or larvae. If occupied streams become dry, juvenile and adult frogs would have to seek other aquatic habitat and individuals could be injured or killed during movement. Conversely, sudden discharges of groundwater inflows to occupied streams could remove egg masses attached to cobbles and boulders. Both impacts would reduce the reproductive success of the affected population.

While pre-construction and construction actions to protect the foothill yellow-legged frog are part of the project, these actions would not prevent the conversion of habitat and temporary disturbance of other habitat in the project footprint. Because frogs can be distributed throughout suitable habitats, their exclusion from construction areas cannot be guaranteed. Earthmoving, excavation, and vehicle operation during construction could crush, entomb, or physically disturb individual frogs. Ground disturbance, noise, and vibration associated with these activities could disrupt the activities of individual frogs and may impair normal life cycle behaviors. If construction in the project footprint alters a hydrologic regime, such hydrological modifications could indirectly affect habitat by altering the stream's flow regime and rendering aquatic habitat unsuitable to support breeding behavior and the development of eggs and larvae. The use of chemicals and hazardous substances during construction (e.g., oils, gasoline) may cause mortality if individuals enter aquatic habitat that has been contaminated by accidental spills or other vehicle and equipment leaks. While many protections would be implemented, the potential for physical harm and mortality of individuals would not be eliminated.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the project could have a substantial adverse effect, through both direct mortality and habitat modification, on the foothill yellow-legged frog. While actions would be implemented to reduce the potential for direct harm to individuals and to minimize the loss of habitat, in the absence of mitigation, the project could result in substantial loss and degradation of habitat and could cause injury or mortality of individuals. Such impacts could reduce the viability of local populations and contribute to the rangewide decline of the species. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Impact BIO#10: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Western Spadefoot

Construction of the HSR track and systems in the Morgan Hill and Gilroy, Pacheco Pass, and San Joaquin Valley Subsections would take place in suitable habitat for the western spadefoot, a CDFW species of special concern. Construction activities would convert suitable habitat and reduce the quality of the remaining suitable habitat, and could result in the injury or mortality of spadefoot individuals. The Authority has incorporated BIO-IAMF#1, BIO-IAMF#3, BIO-IAMF#5, BIO-IAMF#6, BIO-IAMF#7, BIO-IAMF#8, BIO-IAMF#9, BIO-IAMF#10, and BIO-IAMF#11 (described in Impact BIO#1 and Impact BIO#6) into project design to avoid and minimize impacts on western spadefoot.

The areal extent of direct permanent and temporary impacts (conversion and disturbance of habitat, injury and mortality of individuals) in breeding and nonbreeding habitat for the species is shown in Table 3.7-13. The four alternatives would have identical impacts on habitat for this species in the San Joaquin Valley Subsection and similar impacts (varying by only a few acres) in the San Jose Diridon Station Approach and Monterey Corridor Subsections. Alternative 2 would have the most extensive potential impact in the Morgan Hill and Gilroy Subsection because it would be largely on embankment, resulting in a larger project footprint and more ground disturbance.

The permanent and temporary impacts under Alternatives 1, 2, and 4 would be 528.7 acres and 212.1 acres, respectively. Alternative 4 would result in 760.9 acres and 214.7 acres, respectively. The magnitude of indirect impacts (e.g., hydrologic modification, introduction of contaminants into watercourses, introduction of invasive nonnative plant species), while not quantified through the modeling effort, would be generally proportional to the quantity of direct impacts.

While pre-construction and construction actions to protect the western spadefoot are part of the project, these actions would not prevent the conversion of habitat and temporary disturbance of other habitat in the project footprint. Because spadefoots can be distributed throughout suitable habitats, their exclusion from construction areas cannot be guaranteed. Earthmoving, excavation, and vehicle operation during construction could crush, entomb, or physically disturb individual spadefoots. Ground disturbance, noise, and vibration associated with these activities could disrupt the activities of individuals and may impair normal life cycle behaviors. If construction in the project footprint alters a hydrologic regime, such hydrological modifications could indirectly affect habitat by altering the stream's flow regime or vernal pool's ponding duration and rendering aquatic habitat unsuitable to support breeding behavior and the development of eggs and larvae. The use of chemicals and hazardous substances during construction (e.g., oils, gasoline) may cause mortality if individuals enter aquatic habitat that has been contaminated by accidental spills or other vehicle and equipment leaks. While many protections would be implemented, the potential for physical harm and mortality of individuals would not be eliminated.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the project could have a substantial adverse effect, through both direct mortality and habitat modification, on the western spadefoot. While actions would be implemented before and during construction to reduce the potential for direct harm to individuals and to minimize the loss of habitat, the project would result in substantial loss and degradation of habitat and could cause injury or mortality of individuals. Such impacts would reduce the viability of local populations and contribute to the

rangewide decline of the species. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Impact BIO#11: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Western Pond Turtle

Construction of the HSR track and systems would take place in suitable habitat for the western pond turtle, a CDFW species of special concern. While suitable habitat is present in all five subsections, most of it occurs in the Morgan Hill and Gilroy, Pacheco Pass, and San Joaquin Valley Subsections. Construction activities would convert suitable habitat and reduce the quality of the remaining suitable habitat, and could result in the injury or mortality of individual pond turtles. The Authority has incorporated BIO-IAMF#1, BIO-IAMF#3, BIO-IAMF#5, BIO-IAMF#6, BIO-IAMF#7, BIO-IAMF#8, BIO-IAMF#9, BIO-IAMF#10, and BIO-IAMF#11 (described in Impact BIO#1 and Impact BIO#6) into project design to avoid and minimize impacts on western pond turtle. Tunnels would be designed and constructed to avoid or minimize groundwater inflows during construction that may affect surface water resources overlying the tunnel alignment (IAMF-HYD#5), including those that provide aquatic habitat for western pond turtle.

The areal extent of direct permanent and temporary impacts (conversion and disturbance of habitat, injury and mortality of individuals) in habitat for the species is shown in Table 3.7-13. The magnitude of permanent and temporary impacts by alternative would be, in descending order, 2,806.3 acres and 1,581.9 acres, respectively, under Alternative 2; 2,610.6 acres and 1,290.4 acres under Alternative 1; 2,545.4 acres and 1,266.1 acres under Alternative 3; and 2,461.6 and 1,055.6 acres under Alternative 4. The magnitude of indirect impacts (e.g., hydrologic modification, introduction of contaminants into watercourses), while not quantified through the modeling effort, would be generally proportional to the quantity of direct impacts.

As discussed in Impact BIO#1, construction of Tunnels 1 and 2 could have temporary indirect impacts on the hydrology of groundwater-dependent surface waters, including those that provide aquatic habitat for western pond turtle. Because western pond turtles are associated with ponds or streams that hold water year-round, any reductions in groundwater supply to occupied ponds and streams could reduce the availability of foraging and basking habitat for the affected population. Sudden decreases in water levels could strand basking individuals, forcing them to move to other aquatic habitat, if any is available nearby.

While pre-construction and construction actions to protect the western pond turtle are part of the project, these actions would not prevent the conversion and temporary disturbance of suitable habitat in the project footprint. Because pond turtles can be distributed throughout suitable habitats and can aestivate in underground refugia, their exclusion from construction areas cannot be guaranteed. Earthmoving, excavation, and vehicle operation during construction could crush, entomb, or physically disturb individual turtles. Ground disturbance, noise, and vibration associated with these activities could disrupt the activities of individuals and may impair normal life cycle behaviors. If construction in the project footprint alters a hydrologic regime, such hydrological modifications could indirectly affect habitat by rendering aquatic habitat unsuitable to support pond turtle populations. The use of chemicals and hazardous substances during construction (e.g., oils, gasoline) may cause mortality if individuals enter aquatic habitat that has been contaminated by spills or other vehicle and equipment leaks. While many protections would be implemented, the potential for physical harm and mortality of individuals would not be eliminated.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the project could have a substantial adverse effect, through both direct mortality and habitat modification, on the western pond turtle. While actions would be implemented before and during construction to reduce the potential for direct harm to individuals and to minimize the loss of habitat, the project would result in substantial loss and degradation of habitat and could cause injury or mortality of individuals. Such impacts would reduce the viability of local populations and contribute to the rangewide decline of the species. Mitigation measures to address this impact are identified in

Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Impact BIO#12: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Blunt-Nosed Leopard Lizard

Construction of the HSR track and systems in the eastern portion of the Pacheco Pass Subsection would take place in suitable habitat for blunt-nosed leopard lizard, a species listed as endangered under both FESA and CESA. Construction activities would convert habitat and reduce the quality of the remaining suitable habitat, and could result in the injury or mortality of individual leopard lizards. The Authority has incorporated BIO-IAMF#1, BIO-IAMF#3, BIO-IAMF#5, BIO-IAMF#6, BIO-IAMF#7, BIO-IAMF#8, BIO-IAMF#9, BIO-IAMF#10, and BIO-IAMF#11 (described in Impact BIO#1 and Impact BIO#6) into project design to avoid and minimize impacts on blunt-nosed leopard lizard.

The areal extent of direct permanent and temporary impacts (conversion and disturbance of habitat, injury and mortality of individuals) in suitable habitat for the species is shown in Table 3.7-13. Because the only suitable habitat for this species occurs in the Pacheco Pass and San Joaquin Valley Subsections, where all four project alternatives would be identical, the impacts would similarly be identical, concentrated in the area east of Tunnel 2. The project would result in permanent and temporary impacts on 477.1 and 219.2 acres of potentially suitable habitat, respectively. The magnitude of indirect impacts (e.g., topographic modification, introduction of contaminants into habitat, introduction of nonnative plant species), while not quantified through the modeling effort, would be generally proportional to the quantity of direct impacts.

While pre-construction and construction actions to protect the blunt-nosed leopard lizard are part of the project, these actions would not prevent the conversion and temporary disturbance of suitable habitat in the project footprint. Because leopard lizards can be distributed throughout suitable habitats and primarily occur underground, their exclusion from work areas cannot be guaranteed. Grading, excavation, and vehicle movement could kill individuals on the surface and could crush adults or eggs in underground refugia. Lizards that fall into uncovered trenches, pits, or other excavations could die from desiccation, entombment, or starvation. Lizards that enter habitat where toxic substances have been accidentally discharged could be poisoned either directly or through eating contaminated prey. The introduction of nonnative plants could render habitat less suitable for leopard lizard occupancy. While some protections would be implemented, the potential for physical harm and mortality of individuals would not be eliminated.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the project could have a substantial adverse effect, through both direct mortality and habitat modification, on the blunt-nosed leopard lizard. While actions would be implemented before and during construction to reduce the potential for direct harm to individuals and to minimize the loss of habitat, the project would result in loss and degradation of habitat and could cause injury or mortality of individuals. Such impacts would reduce the viability of local populations and contribute to the rangewide decline of the species and could also impede recovery of the species in historical portions of its range. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Impact BIO#13: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Joaquin Coachwhip, Northern California Legless Lizard, and Coast Horned Lizard

Construction of the HSR track and systems in the eastern portion of the Morgan Hill and Gilroy Subsection and throughout the Pacheco Pass Subsection would take place in suitable habitat for San Joaquin coachwhip, northern California legless lizard, and coast horned lizard, all of which are CDFW species of special concern. Construction activities would convert suitable habitat and reduce the quality of the remaining habitat, and could result in the injury or mortality of individuals of all three species. The Authority has incorporated BIO-IAMF#1, BIO-IAMF#3, BIO-IAMF#5, BIO-IAMF#6, BIO-IAMF#7, BIO-IAMF#8, BIO-IAMF#9, BIO-IAMF#10, and BIO-IAMF#11

(described in Impact BIO#1 and Impact BIO#6) into project design to avoid and minimize impacts on San Joaquin coachwhip, northern California legless lizard, and coast horned lizard.

The areal extent of direct permanent and temporary impacts (conversion and disturbance of habitat, injury and mortality of individuals) on suitable habitat for these species is shown in Table 3.7-13. Because the only habitat for these species occurs in the Morgan Hill and Gilroy and Pacheco Pass Subsections, in areas where all four project alternatives are identical, the impacts would be identical. The permanent and temporary impacts would be 992.9 acres and 279.7 acres, respectively. The magnitude of indirect impacts (e.g., topographic modification, introduction of contaminants into habitat, introduction of nonnative plant species), while not quantified through the modeling effort, would be generally proportional to the quantity of direct impacts.

All four project alternatives would have similar impacts on each of these species because the portions of the project that would intersect habitat for the species have identical footprints. Work to construct Tunnels 1 and 2 (in the Morgan Hill and Gilroy and the Pacheco Pass Subsections, respectively) would have the greatest amount of impact on suitable habitat for San Joaquin coachwhip and coast horned lizard; work to construct Tunnel 1 and the western portal for Tunnel 2 would have the greatest amount of impact on suitable habitat for northern California legless lizard.

While pre-construction and construction actions to protect special-status reptiles are part of the project, these actions would not prevent the conversion and temporary disturbance of suitable habitat in the project footprint. Because coachwhips and horned lizards can move through small openings and can take refuge in burrows and under surface objects, and because legless lizards are primarily subterranean, their exclusion from work areas cannot be guaranteed. Grading, excavation, and vehicle movement could kill individuals on the surface and could crush adults or eggs in underground refugia. Reptiles that fall into uncovered trenches, pits, or other excavations could die from desiccation, entombment, or starvation. Reptiles that enter habitat where toxic substances have been accidentally discharged could be poisoned either directly or through eating contaminated prey. The introduction of nonnative plants could render habitat less suitable for occupancy. While many protections would be implemented, the potential for physical harm and mortality of individuals would not be eliminated.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the project could have a substantial adverse effect, through both direct mortality and habitat modification, on San Joaquin coachwhip, northern California legless lizard, and coast horned lizard. While actions would be implemented before and during construction to reduce the potential for direct harm to individuals and to minimize the loss of habitat, the project would result in loss and degradation of habitat and could cause injury or mortality of individuals. Such impacts would reduce the viability of local populations and contribute to rangewide declines of these species. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Impact BIO#14: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Giant Garter Snake

Construction of the HSR track and systems in the eastern portion of the Pacheco Pass and the San Joaquin Valley Subsections would take place in suitable habitat for the giant garter snake, a species listed as threatened under both FESA and CESA. Construction activities would convert and disturb suitable habitat and could reduce the quality of remaining suitable habitat, and could result in the injury or mortality of individual giant garter snakes. The Authority has incorporated BIO-IAMF#1, BIO-IAMF#3, BIO-IAMF#5, BIO-IAMF#6, BIO-IAMF#7, BIO-IAMF#8, and BIO-IAMF#11 (described in Impact BIO#1 and Impact BIO#6) into project design to avoid and minimize impacts on giant garter snake.

The areal extent of direct permanent and temporary impacts (conversion and disturbance of aquatic and upland habitat, injury and mortality of individuals) in habitat for giant garter snake is shown in Table 3.7-13. Because suitable habitat occurs only in the two subsections where all four alternatives follow identical alignments and profiles, the impacts would be identical. The

magnitude of permanent and temporary impacts would be 385.4 acres and 182.6 acres, respectively. The magnitude of indirect impacts (e.g., hydrologic modification, downstream impacts of dewatering or diversion, introduction of contaminants into habitat), while not quantified through the modeling effort, would be generally proportional to the quantity of direct impacts.

While pre-construction and construction actions to protect giant garter snakes are part of the project, these actions would not prevent the conversion and temporary disturbance of suitable habitat in the project footprint. Most impacts would occur in upland habitat, which is more abundant in the project footprint than aquatic habitat. Most impacts on aquatic habitat would be associated with construction of stream crossings. Because garter snakes can move through small openings and take refuge in burrows, their exclusion from work areas cannot be guaranteed. Grading, excavation, and vehicle movement could kill individuals on the surface and could crush snakes in underground refugia. Garter snakes that fall into uncovered trenches, pits, or other excavations could die from entombment or starvation. Snakes that enter habitat where toxic substances have been accidentally discharged could be poisoned either directly or through eating contaminated prey. Dewatering or diversion of waterbodies could reduce availability and quality of habitat both where work is underway and downstream.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the project could have a substantial adverse effect, through both direct mortality and habitat modification, on giant garter snake. While actions would be implemented before and during construction to reduce the potential for direct harm to individuals and to minimize the loss of habitat, the project would result in loss and degradation of habitat and could cause injury or mortality of individuals. Such impacts would reduce the viability of local populations and contribute to the rangewide decline of the species, and could also impede recovery of the species in historical portions of its range. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Impact BIO#15: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Short-Eared Owl and Grasshopper Sparrow

Construction of the HSR track and systems in the Pacheco Pass and San Joaquin Valley Subsections would take place in suitable habitat for short-eared owl and grasshopper sparrow, both of which are CDFW species of special concern. Habitat for grasshopper sparrow also occurs in the eastern portion of the Morgan Hill and Gilroy Subsection. Construction activities would convert and temporarily disturb suitable habitat and could result in injury and mortality of individual birds and eggs, as well as nest abandonment. Temporarily disturbed areas may be susceptible to increased cover of tall invasive weeds with thick stems and dense growth (e.g., thistles, mustard, perennial pepperweed), which would reduce the herbaceous ground cover preferred for nesting by these species.

The Authority has incorporated BIO-IAMF#1, BIO-IAMF#3, BIO-IAMF#5, BIO-IAMF#8, BIO-IAMF#10, and BIO-IAMF#11 (described in Impact BIO#1) into project design to avoid and minimize impacts on short-eared owl and grasshopper sparrow. The areal extent of direct permanent and temporary impacts (conversion and disturbance of habitat, injury and mortality of individuals) on habitat for these two ground-nesting species is shown in Table 3.7-13. Because most suitable habitat occurs only in the two subsections where all four alternatives follow identical alignments and profiles, the impacts would be nearly identical. The magnitude of permanent and temporary impacts would be 1,043.1 acres and 417.7 acres, respectively. (Alternative 3 would result in 0.1 acre less of temporary impact on habitat for grasshopper sparrow.) The magnitude of indirect impacts (e.g., introduction of invasive nonnative plant species), while not quantified through the modeling effort, would be generally proportional to the quantity of direct impacts.

While pre-construction and construction actions to minimize impacts on short-eared owl and grasshopper sparrow habitat are part of the project, these actions would not prevent the conversion and temporary disturbance of suitable habitat in the project footprint, nor would they eliminate the risk of injury, mortality, and disturbance of individual birds. Ground disturbance (e.g., grubbing during site preparation) in suitable nesting habitat for these species could crush eggs or

kill nestlings in active nests. Construction-generated noise and vibration near active nests could cause adults to abandon eggs or recently hatched young if they perceive such disturbances as a threat. Artificial lighting of nighttime construction activities near active nests could also potentially cause nest abandonment. Cleaning of construction equipment may not entirely prevent invasive plants from spreading into the habitat study area.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the project could have a substantial adverse effect, through both direct mortality and habitat modification, on short-eared owl and grasshopper sparrow. While actions would be implemented before and during construction to reduce the potential for direct harm to individuals and to minimize the loss of habitat, the project would result in substantial loss and degradation of habitat for both species, could result in the destruction of active nests, and could cause nest abandonment through noise- and vibration-related disturbance beyond the project footprint. These impacts would reduce the viability of local populations and contribute to rangewide declines of these species. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Impact BIO#16: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Mountain Plover and Western Snowy Plover (Interior Population)

Construction of the HSR track and systems in the San Joaquin Valley Subsection would take place in suitable habitat for mountain plover and western snowy plover (interior population), both of which are CDFW species of special concern. Suitable habitat for mountain plover also occurs at the eastern end of the Pacheco Pass Subsection. Construction activities would convert and temporarily disturb habitat and could result in injury and mortality of individual western snowy plovers and their eggs, as well as nest abandonment. Mountain plovers do not breed in California; they occur September to mid-March (with peak numbers from December through February). Construction activities could result in loss or conversion of mountain plover habitat, as well as disturbance of wintering individuals. Increased cover of invasive weeds would degrade habitat for both species because both prefer areas with short, sparse, or no vegetation.

The Authority has incorporated BIO-IAMF#1, BIO-IAMF#3, BIO-IAMF#5, BIO-IAMF#8, BIO-IAMF#10, and BIO-IAMF#11 (described in Impact BIO#1) into project design to avoid and minimize impacts on mountain plover and western snowy plover (interior population). The areal extent of direct permanent and temporary impacts (conversion and disturbance of habitat; disturbance, injury, and mortality of individuals) on habitat for these two species is shown in Table 3.7-13. Because suitable habitat occurs only in the two subsections where all four alternatives follow identical alignments and profiles, the impacts would be identical. The magnitude of permanent and temporary impacts would be 613.5 acres and 329.2 acres, respectively. The magnitude of indirect impacts (introduction of invasive nonnative plant species that would degrade habitat), while not quantified through the modeling effort, would be generally proportional to the quantity of direct impacts.

While pre-construction and construction actions to minimize impacts on mountain plover and western snowy plover habitat are part of the project, these actions would not prevent the conversion and temporary disturbance of suitable habitat in the project footprint, nor would they eliminate the risk of disturbance of individual birds. Construction activities in the San Joaquin Valley Subsection and at the eastern end of the Pacheco Pass Subsection from September to mid-March could cause mountain plovers resting or foraging in affected agricultural and grassland habitat to flee if they perceive such activities as a threat. Artificial lighting of nighttime construction activities could also disturb roosting plovers. While such disturbance would not kill or injure the birds, they would consume more energy flying and searching for food than they would in the absence of such disturbance. Construction-generated noise and vibration near active western snowy plover nests could cause nest abandonment; which could reduce breeding success of the local population of western snowy plover. Artificial lighting of nighttime construction activities near active nests could also potentially cause nest abandonment. Cleaning of construction equipment may not entirely prevent invasive plants from spreading into the habitat study area.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the project could have a substantial adverse effect, through both disturbance of individuals and habitat modification, on mountain plover and the interior population of western snowy plover. While actions would be implemented before and during construction to reduce the potential for disturbance of individuals and minimize the loss of habitat, the project would result in loss and degradation of habitat for both species as well as noise- and vibration-related disturbance beyond the project footprint. In the absence of mitigation, such impacts would reduce the viability of local snowy plover populations and impair the energy budget of mountain plovers during their wintering period, contributing to rangewide declines of these species. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Impact BIO#17: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Burrowing Owl

Construction of the HSR track and systems in all five subsections would take place in suitable habitat for the burrowing owl, a CDFW species of special concern. Most impacts would occur in the Morgan Hill and Gilroy, Pacheco Pass, and San Joaquin Valley Subsections. Construction activities would convert and temporarily disturb habitat and could result in injury and mortality of individual owls and eggs, as well as nest abandonment. Ground disturbance and vehicle traffic could injure or kill burrowing owls by crushing occupied burrows or collapsing burrow entrances, trapping any owls inside. Although some burrowing owls in urban and agricultural landscapes appear relatively tolerant of human disturbance (Poulin et al. 2011), it is difficult to predict how and at what distance a given nesting pair would react to noise and vibration. Consequently, it is possible that construction-generated noise and vibration near nest burrows could cause adult owls to abandon eggs or recently hatched young. Artificial lighting of nighttime construction activities near active nest burrows could also potentially cause nest abandonment. Increased cover of invasive weeds could reduce habitat suitability for burrowing owls because they prefer areas with short, sparse vegetation (CDFG 2012).

The Authority has incorporated BIO-IAMF#1, BIO-IAMF#3, BIO-IAMF#5, BIO-IAMF#8, BIO-IAMF#10, and BIO-IAMF#11 (described in Impact BIO#1) into project design to avoid and minimize impacts on burrowing owl. The areal extent of direct permanent and temporary impacts (conversion and disturbance of habitat; disturbance, injury, and mortality of individuals) on breeding and foraging habitat for burrowing owl is shown in Table 3.7-13. The four alternatives would have identical impacts on habitat in the Pacheco Pass and San Joaquin Valley Subsections. Alternatives 2 and 3 would have broadly similar impacts on habitat for this species in the remaining subsections. Alternative 1 would affect a similar amount of habitat as Alternatives 2 and 3 in the San Jose Diridon Station Approach and Monterey Corridor Subsections, but would affect less habitat in the Morgan Hill to Gilroy Subsection because of the increased extent of viaduct that would result in less ground disturbance. Alternative 4 would affect the least amount of habitat because of its reduced footprint. The magnitude of permanent impacts by alternative would be, in descending order, 1,694.3 acres under Alternative 3; 1,649.8 acres under Alternative 2; 1,541.5 acres under Alternative 1; and 1,464.7 acres under Alternative 4. The magnitude of temporary impacts by alternative would be, in descending order, 791.3 acres under Alternative 2, 672.0 acres under Alterative 3, 635.3 acres under Alternative 1, and 549.9 acres under Alternative 4. The magnitude of indirect impacts (introduction of invasive nonnative plant species), while not quantified through the modeling effort, would be generally proportional to the quantity of direct impacts.

While pre-construction and construction actions to minimize impacts on burrowing owl habitat are part of the project, these actions would not prevent the conversion and temporary disturbance of suitable habitat in the project footprint, nor would they eliminate the risk of injury, mortality, and disturbance of individual owls.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the project could have a substantial adverse effect, through both direct mortality and disturbance of individuals and habitat modification, on burrowing owl. While actions would be implemented before and during construction to reduce the potential for direct harm to individuals and to minimize the loss of habitat, the project would result in substantial loss and degradation of habitat for a population that has already experienced considerable decline in the South San Francisco Bay area, could result in the destruction of active nests, and could cause nest abandonment through noise- and vibration-related disturbance beyond the project footprint. The loss of even a few adults from the dwindling South Bay population would be a substantial impact because reductions in adult survival may contribute to long-term population declines for this species (Barclay et al. 2011). Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Impact BIO#18: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Golden Eagle and Bald Eagle

Construction of the HSR track and systems in all five subsections would take place in suitable habitat for both bald and golden eagles. The bald eagle is listed as endangered under CESA; both species are fully protected under Cal. Fish and Game Code and both are protected under the BGEPA. Construction activities would convert and temporarily disturb habitat and could result in disturbance, injury, or mortality of nesting eagles if any are present in the vicinity.

The Authority has incorporated BIO-IAMF#1, BIO-IAMF#3, BIO-IAMF#5, and BIO-IAMF#8 (described in Impact BIO#1) into project design to avoid and minimize impacts on bald and golden eagles. The areal extent of direct permanent and temporary impacts (conversion and disturbance of habitat, disturbance of individuals) on nesting and foraging habitat for both species is shown in Table 3.7-13. The aggregate (nonoverlapping) extent of permanent impacts by alternative would be, in descending order, 1,193.2 acres under Alternative 2; 1,179.8 acres under Alternative 1; 1,169.4 acres under Alternative 3; and 1,141.5 acres under Alternative 4. The extent of temporary impacts would be 525.4 acres under Alternative 2, 504.7 acres under Alternative 3, 499.0 acres under Alternative 1, and 469.6 acres under Alternative 4.

While pre-construction actions to minimize impacts on bald and golden eagles and their habitat are part of the project, these actions would not prevent the conversion and temporary disturbance of habitat in the project footprint, nor would they eliminate the risk of removing active eagle nests or disturbing nesting eagles in the vicinity if any are present in sight or hearing range of construction activities. Although there were no known eagle nests in the habitat study area at the time this analysis was conducted, construction would take place in nesting habitat for both species. There is wide variation in reported distances at which raptors are disturbed by human activities (PG&E 2016: page 4-4), so making broad generalizations about disturbance distances is difficult. For the purpose of this analysis and based on previous buffers for these species recommended by the USFWS (2007, 2013), any bald or golden eagles nesting within 0.5 mile of the project footprint (generally, topography that blocks line of sight could shorten this typical distance) could be disturbed by construction noise or vibration, potentially causing nest abandonment. Artificial lighting of nighttime construction activities near active nests could also potentially cause nest abandonment.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the project could have a substantial adverse effect, through both direct mortality or disturbance of individuals and habitat modification, on bald and golden eagles. While actions would be implemented before and during construction to reduce the potential for direct harm to individuals and to minimize the loss of suitable habitat, the project would result in loss and degradation of habitat for both species, could result in the destruction of active nests, and could cause nest abandonment through noise- and vibration-related disturbance beyond the project footprint. The loss of eagle nests would be a substantial impact because eagles have a low reproductive rate and the loss of eggs or young could result in population decline. Mitigation measures to address this impact are identified in Section 3.7.10,

CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Impact BIO#19: Injury or Disturbance of California Condor

Construction of the HSR track and systems at the eastern end of the Morgan Hill and Gilroy Subsection and in the Pacheco Pass Subsection would take place within the range of California condor (USFWS 2019a). Construction activities could result in injury or disturbance of condors if any are present in the vicinity.

The Authority has incorporated BIO-IAMF#1, BIO-IAMF#3, BIO-IAMF#5, and BIO-IAMF#8 (described in Impact BIO#1) into project design to avoid and minimize impacts on California condor. The likelihood of injuring or disturbing condors would be identical for all four alternatives because of their identical footprints at the eastern end of the Morgan Hill and Gilroy Subsection and in the Pacheco Pass Subsection. Habitat was not modeled for this species because any natural cover types in the Diablo Range could theoretically be used for foraging.

While pre-construction actions to minimize impacts on special-status species and their habitat are part of the project, these actions would not eliminate the risk of injuring or disturbing condors in the vicinity if any are foraging over or roosting in sight or hearing range of construction activities. Although there were no known condor roosts in the habitat study area at the time this analysis was conducted, construction would take place near suitable roosting habitat (e.g., Lover's Leap south of SR 152). For the purpose of this analysis, it is assumed that any condors roosting within 0.5 mile of the project footprint (topography that blocks line of sight could shorten this distance) could be disturbed by construction noise or vibration, potentially causing roost abandonment. Artificial lighting of nighttime construction activities near active roost sites could also potentially cause roost abandonment. Construction materials (i.e., ropes and cables) as well as permanent wires associated with the overhead contact system (OCS) and new power lines, would pose a hazard to any foraging condors because they could become entangled in the wires. If left untended on the landscape, "microtrash" (e.g., broken glass, bottle caps, can tabs, nuts, bolts, screws) generated during construction could be ingested by adult condors or carried to distant nest sites by adults and fed to chicks. Such microtrash could get stuck in the gastrointestinal tract of condors and cause impaction, resulting in starvation and death (USFWS 2016c).

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the project could have a substantial adverse effect, through direct mortality or disturbance of individuals, on California condor. While actions would be implemented before and during construction to reduce the potential for direct harm to individuals, the project could cause roost abandonment through noise- and vibration-related disturbance beyond the project footprint, injury of adults through entanglement in new electrical lines, and mortality of adults and chicks through ingestion of trash generated by construction. The loss of a single condor from the state population would be a substantial impact because condors have a low reproductive rate and a limited number of condors are released into the wild from the USFWS' captive rearing program. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation measures, describes these measures in detail.

Impact BIO#20: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Special-Status Raptors (American Peregrine Falcon, Northern Harrier, White-Tailed Kite) and Other Raptors

Construction of the HSR track and systems in all five subsections would take place in suitable habitat for three special-status raptor species: American peregrine falcon, northern harrier, and white-tailed kite. Peregrine falcon and white-tailed kite are California fully protected species, and northern harrier is a California species of special concern. Moreover, the same habitat is also suitable to support other raptors (e.g., red-tailed hawk and Cooper's hawk), collectively referred to as "raptors" in this impacts discussion. Construction activities would convert and temporarily disturb suitable habitat and could result in disturbance, injury, or mortality of nesting raptors if any are present in the vicinity.

The Authority has incorporated BIO-IAMF#1, BIO-IAMF#3, BIO-IAMF#5, and BIO-IAMF#8 (described in Impact BIO#1) into project design to avoid and minimize impacts on special-status and other raptors. The areal extent of direct permanent and temporary impacts (conversion and disturbance of habitat, disturbance of individuals) on habitat for the three special-status raptors is shown in Table 3.7-13. The aggregate magnitude of permanent and temporary impacts by alternative would be, in descending order, 6,426.4 acres and 3,526.1 acres, respectively, under Alternative 2; 6,359.4 acres and 2,897.6 acres under Alternative 3; 6,151.5 acres and 2,819.5 acres under Alternative 1; and 5,723.2 acres and 2,368.3 acres under Alternative 4.

While pre-construction actions to minimize impacts on special-status raptors and their habitat are part of the project, these actions would not prevent the conversion and temporary disturbance of habitat in the project footprint, nor would they necessarily eliminate the risk of removing active raptor nests or disturbing nesting raptors in the vicinity if any are present in sight or hearing range of construction activities. There is wide variation in reported distances at which raptors are disturbed by human activities (PG&E 2016: page 4-4), making broad generalizations about disturbance distances difficult. For the purpose of this analysis and based on typical guidance on disturbance distances from CDFW, any raptors nesting within 500 feet of the project footprint (i.e., habitat study area) could potentially be disturbed by construction noise or vibration, potentially causing nest abandonment. Artificial lighting of nighttime construction activities near active nests could also potentially cause nest abandonment.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the project could have a substantial adverse effect, through both direct mortality or disturbance of individuals and habitat modification, on American peregrine falcon, northern harrier, white-tailed kite, and non-special-status raptors. While actions would be implemented before and during construction to reduce the potential for direct harm to individuals and to minimize the loss of habitat, the project would result in loss and degradation of habitat for all three species, could result in the destruction of active nests, and could cause nest abandonment through noise- and vibration-related disturbance beyond the project footprint. The loss of raptor nests would be a substantial impact because raptors have low reproductive rates and loss of eggs or young would reduce the viability of local populations and could result in rangewide population declines. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Impact BIO#21: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Swainson's Hawks

Construction of the HSR track and systems in all subsections except the San Jose Diridon Station Approach Subsection would take place in suitable habitat for the Swainson's hawk, a species listed as threatened under CESA. Construction activities would convert and temporarily disturb habitat and could result in disturbance, injury, or mortality of nesting Swainson's hawks if any are present in the vicinity.

The Authority has incorporated BIO-IAMF#1, BIO-IAMF#3, BIO-IAMF#5, and BIO-IAMF#8 (described in Impact BIO#1) into project design to avoid and minimize impacts on Swainson's hawk. The areal extent of direct permanent and temporary impacts (conversion and disturbance of habitat, disturbance of individuals) on nesting and foraging habitat for Swainson's hawk is shown in Table 3.7-13. The four alternatives would have broadly similar impacts on suitable habitat; impacts would be identical under Alternatives 1 and 3. The magnitude of permanent and temporary impacts by alternative in descending order would be 1,045.1 acres and 698.4 acres, respectively, under Alternative 2; 955.5 acres and 578.9 acres under Alternatives 1 and 3; and 939.1 acres and 541.7 acres under Alternative 4. The more extensive impacts under Alternative 2 would result from its alignment through more agricultural lands in the Monterey Corridor and Morgan Hill and Gilroy Subsections than Alternatives 1, 3, and 4. Most of the active nesting habitat in the habitat study area is in the San Joaquin Valley Subsection, including several nests along Henry Miller Road.

While pre-construction actions to minimize impacts on Swainson's hawks and their habitat are part of the project, these actions would not prevent the conversion and temporary disturbance of suitable habitat in the project footprint, nor would they eliminate the risk of removing active Swainson's hawk nests or disturbing nesting Swainson's hawks in the vicinity if any are present in sight or hearing range of construction activities. For the purpose of this analysis, any Swainson's hawks nesting within 0.5 mile of the project footprint (i.e., habitat study area) could potentially be disturbed by construction noise or vibration, potentially causing nest abandonment. Artificial lighting of nighttime construction activities near active nests could also potentially cause nest abandonment.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the project could have a substantial adverse effect, through both direct mortality or disturbance of individuals and habitat modification, on the Swainson's hawk. While actions would be implemented before and during construction to reduce the potential for direct harm to individuals and to minimize the loss of habitat, the project would result in loss and degradation of habitat, could result in the destruction of active nests, and could cause nest abandonment through noise- and vibration-related disturbance beyond the project footprint. The loss of Swainson's hawk nests would be a substantial impact because this species has a low reproductive rate and loss of eggs or young would reduce the viability of the San Joaquin Valley population and contribute to the statewide decline of this species. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Impact BIO#22: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Purple Martin, Olive-Sided Flycatcher, and Loggerhead Shrike

Construction of the HSR track and systems in all five subsections would take place in suitable habitat for three special-status tree-nesting species: purple martin, olive-sided flycatcher, and loggerhead shrike, all of which are CDFW species of special concern. Nesting habitat for purple martin and olive-sided flycatcher is limited to the Pacheco Pass Subsection. Construction activities would convert and temporarily disturb suitable habitat and could result in disturbance, injury, or mortality of nesting birds and the destruction of eggs and nests.

The Authority has incorporated BIO-IAMF#1, BIO-IAMF#3, BIO-IAMF#5, and BIO-IAMF#8 (described in Impact BIO#1) into project design to avoid and minimize impacts on purple martin, olive-sided flycatcher, and loggerhead shrike. The areal extent of direct permanent and temporary impacts (conversion and disturbance of habitat, disturbance of individuals) in habitat for these species is shown in Table 3.7-13. All four project alternatives would have similar impacts on purple martin and olive-sided flycatcher because habitat for those two species is present only in the Pacheco Pass Subsection, where all four alternatives would be identical, with a small amount of habitat at the extreme southeastern edge of the Morgan Hill and Gilroy Subsection. The aggregate extent of permanent impacts by alternative would be, in descending order, 2,478.7 acres under Alternative 3; 2,391.7 acres under Alternative 2; 2,334.3 acres under Alternative 1; and 2,171.5 acres under Alternative 4. The extent of temporary impacts by alternative would be, in descending order, 1,144.1 acres under Alternative 2; 993.0 acres under Alternative 3; 941.5 acres under Alternative 1; and 857.7 acres under Alternative 4.

While pre-construction actions to minimize impacts on purple martin, olive-sided flycatcher, and loggerhead shrike and their habitat are part of the project, these actions would not prevent the conversion and temporary disturbance of suitable habitat in the project footprint, nor would they eliminate the risk of injury, mortality, and disturbance of nesting birds. Ground-disturbing activities (e.g., grubbing and vegetation removal during site preparation) in suitable nesting habitat could crush eggs or kill nestlings in active nests. Construction-generated noise and vibration near active nests could cause nest abandonment. Artificial lighting of nighttime construction activities near active nests could also potentially cause nest abandonment.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the project could have a substantial adverse effect, through both direct mortality or disturbance of individuals and habitat modification, on loggerhead shrike, purple martin, and olive-sided flycatcher. While actions would be implemented before and during construction to reduce the potential for direct harm to individuals and to minimize the loss habitat, the project would result in loss and degradation of habitat, could result in the destruction of active nests, and could cause nest abandonment through noise- and vibration-related disturbance beyond the project footprint. These impacts would reduce the viability of local populations and contribute to the statewide decline of these species. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Impact BIO#23: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Least Bell's Vireo, Yellow Warbler, and Yellow-Breasted Chat

Construction of the HSR track and systems would take place in suitable habitat for three special-status riparian species: least Bell's vireo, yellow warbler, and yellow-breasted chat. Least Bell's vireo is listed as endangered under the FESA and CESA; yellow warbler and yellow-breasted chat are CDFW species of special concern. Although habitat is present in all five subsections, the highest quality habitat occurs in the Morgan Hill and Gilroy and Pacheco Pass Subsections. Construction activities would convert and temporarily disturb suitable habitat and could result in disturbance, injury, or mortality of nesting birds and the destruction of eggs and nests. Ground disturbance and vegetation removal in riparian habitat would create areas of bare soil susceptible to colonization by nonnative invasive plant species such as giant reed, tamarisk, and perennial pepperweed. Dense stands of these species would degrade riparian habitat for least Bell's vireos and other riparian birds by outcompeting willows and other native plants that provide nest sites.

The Authority has incorporated BIO-IAMF#1, BIO-IAMF#3, BIO-IAMF#5, BIO-IAMF#8, BIO-IAMF#10, and BIO-IAMF#11 (described in Impact BIO#1) into project design to avoid and minimize impacts on least Bell's vireo, yellow warbler, and yellow-breasted chat. The areal extent of direct permanent and temporary impacts (conversion and disturbance of habitat; disturbance, injury, and mortality of individuals) in habitat for the three special-status riparian birds is shown in Table 3.7-13. Tunnels would be designed and constructed to avoid or minimize groundwater inflow into tunnels during construction that may affect surface water resources overlying or near the tunnel alignment (IAMF-HYD#5), including riparian habitat for least Bell's vireo and other riparian birds.

The aggregate extent of permanent impacts by alternative is broadly similar for all alternatives and would be, in descending order, 131.6 acres under Alternative 3; 128.5 acres under Alternative 2; 126.2 acres under Alternative 1; and 117.5 acres under Alternative 4. The extent of temporary impacts would be, in descending order, 98.1 acres under Alternative 2; 94.3 acres under Alternative 1; 88.9 acres under Alternative 3; and 77.2 acres under Alternative 4.

As discussed in Impact BIO#1, construction of Tunnels 1 and 2 could have temporary indirect impacts on the hydrology of groundwater-dependent surface water features, including riparian vegetation along Pacheco Creek that provides habitat for least Bell's vireo and other riparian birds. Reductions in groundwater supply to riparian vegetation could result in the desiccation of vegetation and degradation of habitat for these species.

While pre-construction and construction actions to minimize impacts on least Bell's vireo, yellow warbler, and yellow-breasted chat and their habitat are part of the project, these actions would not prevent the conversion and temporary disturbance of suitable habitat in the project footprint, nor would they eliminate the risk of injury, mortality, and disturbance of nesting birds. Ground-disturbing activities (e.g., grubbing and vegetation removal during site preparation) in suitable nesting habitat could crush eggs or kill nestlings in active nests if not found during pre-construction surveys. Construction-generated noise and vibration near active nests could cause nest abandonment. Artificial lighting of nighttime construction activities near active nests could also potentially cause nest abandonment. Cleaning of construction equipment may not entirely eliminate invasive plants from the habitat study area.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the project could have a substantial adverse effect, through both direct mortality and disturbance of individuals and habitat modification, on least Bell's vireo, yellow warbler, and yellow-breasted chat. While actions would be implemented before and during construction to reduce the potential for direct harm to individuals and to minimize the loss of habitat, the project would result in loss and degradation of habitat for these species, could result in the destruction of active nests, and could cause nest abandonment through noise- and vibration-related disturbance beyond the project footprint. These impacts would reduce the viability of local populations and contribute to rangewide declines of these species, and could also impede recovery of least Bell's vireo in historical portions of its range. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Impact BIO#24: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Tricolored Blackbird and Yellow-Headed Blackbird

Construction of the HSR track and systems in all five subsections would take place in suitable habitat for two special-status marsh birds: tricolored blackbird and yellow-headed blackbird. Nesting habitat for yellow-headed blackbird is limited to the San Joaquin Valley Subsection. Construction activities would convert and temporarily disturb habitat and could result in disturbance, injury, or mortality of nesting birds and the destruction of eggs and nests.

The Authority has incorporated BIO-IAMF#1, BIO-IAMF#3, BIO-IAMF#5, BIO-IAMF#8, BIO-IAMF#10, and BIO-IAMF#11 (described in Impact BIO#1) into project design to avoid and minimize impacts on tricolored blackbird and yellow-headed blackbird. Tunnels would be designed and constructed to avoid or minimize groundwater inflows into tunnel during construction that may affect surface water resources overlying the tunnel alignment (IAMF-HYD#5), including those that provide nesting habitat for tricolored blackbird.

The areal extent of direct permanent and temporary impacts (conversion and disturbance of habitat, disturbance of individuals) in habitat for the two special-status marsh birds is shown in Table 3.7-13. The aggregate extent of permanent impacts by alternative would be, in descending order, 1,925.5 acres under Alternative 3; 1,877.0 acres under Alternative 2; 1,763.8 acres under Alternative 1; and 1,682.8 acres under Alternative 4. The extent of temporary impacts by alternative would be, in descending order, 1,040.6 acres under Alternative 2; 921.7 acres under Alternative 3; 877.2 acres under Alternative 1; and 826.0 acres under Alternative 4. The magnitude of indirect impacts (introduction of invasive nonnative plant species), while not quantified through the modeling effort, would be generally proportional to the quantity of direct impacts.

As discussed in Impact BIO#1, construction of Tunnels 1 and 2 could have temporary indirect impacts on the hydrology of groundwater-dependent surface waters, including ponds and wetlands that may support freshwater emergent vegetation suitable for nesting by tricolored blackbirds. Any reductions in groundwater supply to such ponds and wetlands could result in the gradual desiccation of emergent vegetation, reducing or eliminating suitable nesting habitat in subsequent nesting seasons.

While pre-construction and construction actions to protect special-status marsh birds are part of the project, these actions would not prevent the conversion and temporary disturbance of suitable habitat in the project footprint, nor would they necessarily eliminate the risk of injury, mortality, and disturbance of nesting birds. Ground-disturbing activities (e.g., grubbing and vegetation removal during site preparation) in suitable nesting habitat could crush eggs or kill nestlings in active nests. Construction-generated noise and vibration near active nests could cause nest abandonment. Artificial lighting of nighttime construction activities near active nests could also potentially cause nest abandonment. Additionally, increased cover of invasive weeds (e.g., perennial pepperweed) in wetlands could reduce emergent wetland vegetation that provides cover for nesting by these species.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the project could have a substantial adverse effect, through both direct mortality or disturbance of individuals and habitat modification, on tricolored blackbird and yellow-headed blackbird. While actions would be implemented before and during construction to reduce the potential for direct harm to individuals and to minimize the loss of habitat, the project would result in loss and degradation of habitat for these species, could result in the destruction of active nests, and could cause nest abandonment through noise- and vibration-related disturbance beyond the project footprint. These impacts would reduce the viability of local populations and contribute to the rangewide decline of these species. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Impact BIO#25: Permanent Conversion or Degradation of Habitat for and Disturbance of Sandhill Crane

Construction of the HSR track and systems in the San Joaquin Valley Subsection would take place in suitable habitat for sandhill crane. The greater subspecies is listed as endangered under CESA and is fully protected under the Cal. Fish and Game Code; the lesser subspecies is a CDFW species of special concern. Construction activities would convert and temporarily disturb habitat and could result in disturbance of roosting and foraging cranes.

The Authority has incorporated BIO-IAMF#1, BIO-IAMF#3, BIO-IAMF#5, BIO-IAMF#8, BIO-IAMF#10, and BIO-IAMF#11 (described in Impact BIO#1) into project design to avoid and minimize impacts on sandhill crane. The areal extent of direct permanent and temporary impacts (conversion and disturbance of habitat, disturbance of individuals) in roosting and foraging habitat for sandhill crane is shown in Table 3.7-13. The impacts would be identical for all four project alternatives because the alternatives would be the same in the San Joaquin Valley Subsection. The magnitude of permanent and temporary impacts would be 382.3 acres and 286.9 acres, respectively. The magnitude of indirect impacts (introduction of invasive nonnative plant species), while not quantified through the modeling effort, would be generally proportional to the quantity of direct impacts.

While pre-construction and construction actions to minimize impacts on sandhill cranes and their habitat are part of the project, these actions would not prevent the conversion and temporary disturbance of suitable habitat in the project footprint, nor would they necessarily eliminate the risk of disturbance of foraging and roosting cranes. Construction activities from October to mid-March could cause sandhill cranes resting or foraging in nearby agricultural and grassland habitat to flee if they perceive such activities as a threat. Artificial lighting of nighttime construction activities could also disturb roosting plovers. While such disturbance would not kill or injure individual cranes, they would consume more energy flying and searching for food than they would in the absence of such disturbance. Additionally, increased cover of invasive weeds (e.g., thistles, mustard, perennial pepperweed) in grassland or wetlands would degrade habitat the sandhill crane because invasive plants have been shown to adversely affect roosting habitat in other portions of its range (Kessler et al. 2011).

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the project could result in a substantial adverse effect, through both disturbance of individuals and habitat modification, on greater sandhill crane and lesser sandhill crane. While actions would be implemented before and during construction to reduce the potential for direct harm to individuals and minimize the loss of habitat, the project would result in loss and degradation of habitat for these subspecies as well as noise- and vibration-related disturbance beyond the project footprint. These impacts could adversely affect the energy budget of wintering sandhill cranes, potentially reducing the viability of migratory populations and contributing to rangewide declines of these subspecies. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Impact BIO#26: Loss of Denning and Dispersal Habitat for and Direct Mortality or Disturbance of San Joaquin Kit Fox

Construction of the HSR track and systems in the eastern portion of the Morgan Hill and Gilroy Subsection and throughout the Pacheco Pass and San Joaquin Valley Subsections would take place in suitable habitat for San Joaquin kit fox, a species listed as endangered under FESA and threatened under CESA. Construction activities would convert and temporarily disturb habitat and could result in the disturbance, injury, and mortality of individual foxes.

The Authority has incorporated BIO-IAMF#1, BIO-IAMF#3, BIO-IAMF#5, BIO-IAMF#7, BIO-IAMF#8, BIO-IAMF#9, BIO-IAMF#10, and BIO-IAMF#11 (described in Impact BIO#1 and Impact BIO#6) into project design to avoid and minimize impacts on San Joaquin kit fox. The areal extent of direct permanent and temporary impacts (conversion and disturbance of habitat; disturbance, injury, and mortality of individuals) in habitat for San Joaquin kit fox is shown in Table 3.7-13. In the Pacheco Pass and San Joaquin Valley Subsections, because the alternatives would be identical, the impacts would also be identical. In the Morgan Hill and Gilroy Subsection, there would be a minimal difference between Alternative 3 and Alternatives 1, 2, and 4, associated with the alignment of Alternative 3 through east Gilroy. The magnitude of permanent impacts, in descending order, would be 2,914.4 acres under Alternative 3; 2,023.1 acres under Alternative 4; and 2,021.5 acres under Alternatives 1 and 2. The extent of temporary impacts, in descending order, would be 860.1 acres under Alternatives 1 and 2; 857.9 acres under Alternative 4; and 848.2 acres under Alternative 3. The magnitude of indirect impacts (introduction of invasive nonnative plants), while not quantified through the modeling effort, would be generally proportional to the quantity of direct impacts.

While pre-construction and construction actions to protect San Joaquin kit foxes are part of the project, these actions would not prevent the conversion and temporary disturbance of habitat in the project footprint, nor would they necessarily eliminate the risk of disturbance, injury, or mortality of individual foxes. Construction-related ground disturbance (e.g., grading, excavation) and vehicle traffic may injure or kill foxes by crushing occupied dens or colliding with moving foxes. Foxes may become entrapped in excavated areas, pipes, or other equipment used for construction. Noise and vibration generated by construction activities may impair fox breeding, feeding, and sheltering behaviors. Potential hazardous material and pollutant releases and maintenance activities that involve pesticides or herbicides could degrade habitat or reduce prey species composition over the long term. Introduction of invasive nonnative vegetation could alter the structure of the vegetation community, making it less suitable to support kit foxes, and could adversely affect the productivity of the prey base.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the project could result in a substantial adverse effect, through both direct mortality or disturbance of individuals and habitat modification, on San Joaquin kit fox. While actions would be implemented before and during construction to reduce the potential for direct harm to individuals and to minimize the loss of habitat, the project would result in loss and degradation of habitat, could result in injury or mortality of individuals, and could cause noise- and vibration-related disturbance beyond the project footprint. These impacts would reduce the viability of local subpopulations and contribute to the rangewide decline of this species. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Impact BIO#27: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Fresno Kangaroo Rat

Construction of the HSR track and systems in the San Joaquin Valley Subsection would take place in suitable habitat for Fresno kangaroo rat, a species listed as endangered under both FESA and CESA. Although there are no known occurrences in the regional RSA, if any individuals are present, construction activities would convert and temporarily disturb habitat and could result in the disturbance, injury, and mortality of individual kangaroo rats.

The Authority has incorporated BIO-IAMF#1, BIO-IAMF#3, BIO-IAMF#5, BIO-IAMF#6, BIO-IAMF#7, BIO-IAMF#8, BIO-IAMF#9, BIO-IAMF#10, and BIO-IAMF#11 (described in Impact BIO#1 and Impact BIO#6) into project design to avoid and minimize impacts on Fresno kangaroo rat. The areal extent of direct permanent and temporary impacts (conversion and disturbance of habitat; disturbance, injury, and mortality of individuals) in habitat for Fresno kangaroo rat is shown in Table 3.7-13. In the San Joaquin Valley Subsection, because the alternatives would be identical, the impacts would also be identical. The magnitude of permanent and temporary impacts would be 58.8 acres and 46.3 acres, respectively, under all four alternatives. The magnitude of indirect impacts (introduction of invasive nonnative plants), while not quantified through the modeling effort, would be generally proportional to the quantity of direct impacts.

While pre-construction and construction actions to protect Fresno kangaroo rats are part of the project, these actions would not prevent the conversion and temporary disturbance of suitable habitat in the project footprint, nor would they necessarily eliminate the risk of disturbance, injury, or mortality of individual kangaroo rats. Construction-related ground disturbance (e.g., grading, excavation) and vehicle traffic may injure or kill kangaroo rats by crushing occupied burrows or running over moving individuals. Kangaroo rats may become entrapped in excavated areas. Noise and vibration generated by construction activities may impair breeding, feeding, and sheltering behaviors. Potential hazardous material and pollutant releases and maintenance activities that involve pesticides or herbicides could degrade habitat over the long term. Introduction of invasive nonnative plants could alter the structure of vegetation, making it less suitable to support kangaroo rats and other small mammals.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the project could result in a substantial adverse effect, through both direct mortality or disturbance of individuals and habitat modification, on Fresno kangaroo rat. While actions would be implemented before and during construction to reduce the potential for direct harm to individuals and to minimize the loss habitat, the project would result in loss and degradation of habitat, could result in injury or mortality of individuals, and could cause noise- and vibration-related disturbance beyond the project footprint. The current distribution of this species is very restricted (i.e., it only occurs in a few area of natural habitat surrounded by inhospitable land use) and the population size is low. Therefore, any reduction in available habitat or mortality of individuals would contribute to the further decline of this endangered species. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Impact BIO#28: Loss of Denning and Dispersal Habitat for and Direct Mortality or Disturbance of American Badger

Construction of the HSR track and systems would take place in suitable habitat for American badger, a CDFW species of special concern. While habitat is present in all five subsections, the preponderance is in the Morgan Hill and Gilroy and Pacheco Pass Subsections because of the extensive and unfragmented grassland, chaparral, and scrub in these areas. Construction activities would convert and temporarily disturb habitat and could result in the disturbance, injury, and mortality of individual badgers.

The Authority has incorporated BIO-IAMF#1, BIO-IAMF#3, BIO-IAMF#5, BIO-IAMF#7, BIO-IAMF#8, BIO-IAMF#9, BIO-IAMF#10, and BIO-IAMF#11 (described in Impact BIO#1 and Impact BIO#6) into project design to avoid and minimize impacts on American badger. The areal extent of direct permanent and temporary impacts (conversion and disturbance of habitat; disturbance, injury, and mortality of individuals) in habitat for American badger is shown in Table 3.7-13. The magnitude of permanent impacts would be, in descending order, 805.4 acres and 399.3 acres, respectively under Alternative 2; 799.6 acres and 378.9 acres under Alternative 3; 798.6 acres and 374.5 acres under Alternative 1; and 778.4 acres and 350.7 acres under Alternative 4. Work on Tunnels 1 and 2 would result in the most extensive impacts. The magnitude of indirect impacts (introduction of invasive nonnative plants), while not quantified through the modeling effort, would be generally proportional to the quantity of direct impacts.

While pre-construction and construction actions to protect American badgers are part of the project, these actions would not prevent the conversion and temporary disturbance of suitable habitat in the project footprint, nor would they necessarily eliminate the risk of disturbance, injury, or mortality of individual badgers. Construction-related ground disturbance (e.g., grading, excavation) and vehicle traffic may injure or kill badgers by crushing occupied burrows or by vehicle strike. Badgers could become entrapped in excavated areas as well as in pipe and other construction materials and equipment. Noise and vibration generated by construction activities may impair breeding, feeding, and sheltering behaviors. Potential hazardous material and pollutant releases and maintenance activities that involve pesticides or herbicides could degrade habitat or reduce prey species composition over the long term. Introduction of invasive nonnative vegetation could alter the structure of the vegetation community, making it less suitable to support badgers, and could adversely affect the productivity of the prey base.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the project could result in a substantial adverse effect, through both direct mortality or disturbance of individuals and habitat modification, on American badger. While actions would be implemented before and during construction to reduce the potential for direct harm to individuals and to minimize the loss of habitat, the project would result in loss and degradation of habitat, could result in injury or mortality of individuals, and could cause noise- and vibration-related disturbance beyond the project footprint. American badgers are uncommon, have large home ranges, and produce few offspring (two to three young per litter). Therefore, any reduction in available habitat or displacement of badgers from the habitat study area would reduce the viability of the regional population and contribute to the statewide decline of the species. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Impact BIO#29: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Francisco Dusky-Footed Woodrat and Ringtail

Construction of the HSR track and systems in all subsections except the San Joaquin Valley Subsection would take place in suitable habitat for San Francisco dusky-footed woodrat, a CDFW species of special concern and ringtail, fully protected under the Cal. Fish and Game Code. Construction activities would convert and temporarily disturb habitat and could result in the disturbance, injury, and mortality of individual woodrats and ringtails.

The Authority has incorporated BIO-IAMF#1, BIO-IAMF#3, BIO-IAMF#5, BIO-IAMF#7, BIO-IAMF#8, BIO-IAMF#9, BIO-IAMF#10, and BIO-IAMF#11 (described in Impact BIO#1 and Impact BIO#6) into project design to avoid and minimize impacts on San Francisco dusky-footed woodrat and ringtail. The areal extent of direct permanent and temporary impacts (conversion and disturbance of habitat; disturbance, injury, and mortality of individuals) in habitat for these two riparian mammals is shown in Table 3.7-13. The extent of permanent impacts by alternative is generally similar for all alternatives and would be, in descending order, 402.6 acres under Alternative 3; 400.1 acres under Alternative 1; 399.6 acres under Alternative 2; and 395.9 acres under Alternative 4. The extent of temporary impacts, in descending order, would be 113.2 acres under Alternative 2; 110.7 acres under Alternative 3; 102.3 acres under Alternative 1; and 84.0 acres under Alternative 4.

While pre-construction and construction actions to protect San Francisco dusky-footed woodrats and ringtails are part of the project, these actions would not prevent the conversion and temporary disturbance of suitable habitat in the project footprint, nor would they necessarily eliminate the risk of disturbance, injury, or mortality of individual animals. Construction-related ground disturbance (e.g., grading, vegetation removal) and vehicle traffic may injure or kill woodrats or ringtails by destroying woodrat stick houses or ringtail nests or by vehicle strike. Animals could become entrapped in excavated areas as well as in pipe and other construction materials and equipment. Noise and vibration generated by construction activities may impair breeding, feeding, and sheltering behaviors or cause adults to abandon their young in areas subject to such disturbance. Potential hazardous material and pollutant releases and maintenance activities that involve

pesticides or herbicides could degrade habitat or reduce prey species composition over the long term. Introduction of invasive nonnative vegetation could alter the structure of the vegetation community, making it less suitable to support woodrats and ringtails, and could adversely affect the productivity of the food web upon which these species depend.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the project could result in a substantial adverse effect, through both direct mortality or disturbance of individuals and habitat modification, on San Francisco dusky-footed woodrat and ringtail. While actions would be implemented before and during construction to reduce the potential for direct harm to individuals and to minimize the loss of habitat, the project would result in loss and degradation of habitat, could result in injury or mortality of individuals, and could cause noise- and vibration-related disturbance beyond the project footprint. Both species nest in specific microhabitats (i.e., woodlands with dense understory and abundant woody debris, hollow logs, and tree crevices) and are therefore patchily distributed within suitable habitat. San Francisco dusky-footed woodrat also has a limited distribution. Therefore, any reduction in available habitat or displacement of individuals from the habitat study area would reduce the viability of affected populations. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Impact BIO#30: Loss of Roost Sites for and Direct Mortality or Disturbance of Special-Status Bats

Construction of the HSR track and systems in all subsections would take place in suitable habitat for pallid bat, Townsend's big-eared bat, western mastiff bat, and western red bat, all of which are CDFW species of special concern. Construction activities would convert and temporarily disturb habitat and could result in the disturbance, modification, or loss of both night and maternity roost sites, as well as associated injury and mortality of roosting individuals. Ground-disturbing activities (including tunnel boring), vegetation removal, and structure demolition (e.g., removal or modification of culverts, bridges, and old buildings) in suitable habitat for these species could destroy occupied roost sites, resulting in injury or mortality of adults and young. Construction-generated noise and vibration near potential roost sites, including caves or mines in or near the project footprint for Tunnels 1 and 2, could disturb maternity roosts and cause bats to abandon their young.

The Authority has incorporated BIO-IAMF#1, BIO-IAMF#3, BIO-IAMF#5, and BIO-IAMF#8 (described in Impact BIO#1) into project design to avoid and minimize impacts on special-status bats. The areal extent of direct permanent and temporary impacts (conversion and disturbance of habitat; disturbance, injury, and mortality of individuals and roost sites) in roosting and foraging habitat for special-status bats is shown in Table 3.7-13. The aggregate magnitude of permanent and temporary impacts on nonoverlapping total habitat (i.e., roosting and foraging) for special-status bats would be, in descending order, 3,599.7 acres and 2,116.9 acres, respectively, under Alternative 2; 3,446.2 acres and 1,650.5 acres under Alternative 3; 3,383.1 acres and 1,612.8 acres under Alternative 1; and 3,133.7 acres and 1,252.7 acres under Alternative 4.

While pre-construction actions to protect special-status species are part of the project, these actions would not prevent the conversion and temporary disturbance of suitable habitat for special-status bats in the project footprint, nor would they necessarily eliminate the risk of disturbance, injury, or mortality of individual bats or the disruption of roost sites.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the project could have a substantial adverse effect, through disturbance, modification, or loss of maternity roosts, on pallid bat, Townsend's big-eared bat, western mastiff bat, and western red bat. The loss of roosting habitat is considered one of the primary conservation issues facing bat populations, with loss of maternity roosts considered especially significant (H.T. Harvey & Associates 2004: page 21). While actions would be implemented before construction to reduce the potential for direct harm to individuals and to minimize the loss of habitat, the project would result in loss and degradation of habitat for these species, could result in injury or mortality of individuals (including maternity and hibernacula roosts), and could cause roost abandonment through noise- and

vibration-related disturbance beyond the project footprint. These impacts could reduce the viability of local populations and contribute to the statewide decline of these species. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Operations Impacts

Project operations would involve scheduled train travel between San Jose and Merced, as well as inspection and maintenance along the track and railroad right-of-way; at stations; at traction power sites, communications, and maintenance facilities; and along fencing and power transmission lines. General impact mechanisms associated with these activities include ground disturbance, vegetation removal, hazardous material and pollutant release, noise, vibration, visual disturbance, artificial light, and vehicle strike. Additional information on specific impact mechanisms is provided in the discussion of Impact Types and Mechanisms in Section 3.7.5.3.

Impact BIO#31: Intermittent Disturbance or Degradation of Habitat for Special-Status Plants during Operations

Project operations would include inspection and maintenance activities along the HSR right-of-way. Prior to initiating operations and maintenance (O&M) activities, the Authority would require that all workers attend WEAP training about sensitive biological resources (BIO-IAMF#4). This training would be provided to all employees prior to their involvement in any O&M activity and repeated on an annual basis. Training materials would identify and describe land cover types that may support special-status plants (e.g., vernal pools, freshwater emergent wetland) and their approximate locations within or adjacent to the right-of-way.

Right-of-way maintenance activities would include minor grading, clearing, and excavation needed to maintain adequate drainage or repair infrastructure; vegetation management, including application of herbicide to invasive weeds growing within the right-of-way; and vehicle traffic along maintenance roads. These activities may cause reduced survival of special-status plants inside the right-of-way that were avoided during construction, as well as any occurring outside of but within 100 feet of the right-of-way (i.e., special-status plant study area). Minor ground disturbance within the right-of-way may result in minor direct (filling, sedimentation, inadvertent release of oils and chemicals from parked vehicles or equipment) or indirect (hydrological interruption, introduction of invasive species) effects on special-status plant habitat in and adjacent to the right-of-way. If applied during high winds, herbicides could drift onto and cause mortality of special-status plants. Dust generated from maintenance vehicles could settle on the leaves of special-status plants, increasing the rate of water loss (i.e., transpiration). Such direct and indirect effects would degrade special-status plant habitat within the special-status plant study area and could lead to the eventual extirpation of special-status plant occurrences.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because HSR operations could have a substantial adverse effect, both directly and through habitat modifications, on special-status plant species. While actions would be implemented before operations to reduce the potential for impacts on special-status plants and their habitat, project operations would entail disturbance and potential degradation of special-status plant habitat through inspection and maintenance activities, potentially contributing to reduced survival of special-status plants. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Impact BIO#32: Intermittent Disturbance or Degradation of Habitat for Special-Status Wildlife during Operations

HSR operations would include inspection and maintenance activities along the HSR right-of-way. The Authority has incorporated BIO-IAMF#4 into project specifications to address disturbance or degradation of habitat for special-status wildlife associated with such activities.

Right-of-way maintenance activities would include minor grading, clearing, and excavation needed to maintain adequate drainage or repair infrastructure; vegetation management, including

application of herbicide to invasive weeds growing within the right-of-way; and vehicle traffic along maintenance roads. Because much of the right-of-way would already have been subjected to extensive ground disturbance and construction activities and converted to HSR track and systems, the areas within the right-of-way would provide limited habitat for most special-status wildlife. Nevertheless, these activities may further degrade habitat areas inside the right-of-way that were avoided during construction, as well as habitat outside of but within 250 feet of the right-of-way (i.e., core habitat study area). Minor ground disturbance within the right-of-way may result in minor direct (filling, sedimentation, inadvertent release of oils and chemicals from parked vehicles or equipment) or indirect (hydrological interruption, introduction of invasive species) impacts on special-status wildlife habitat in and adjacent to the right-of-way. If applied during high winds, herbicides could drift into and contaminate aquatic habitat features (e.g., ponds and wetlands). Such direct and indirect impacts would degrade special-status wildlife habitat in the habitat study area. Some habitat areas may be degraded to the extent that they no longer support the resources necessary for species survival and reproduction, and therefore cease to function as habitat for those species. Wind caused by train operations could occur, potentially affecting special-status insects flights, foraging, or dispersal. However, effects of induced wind during operations will be a matter of the wind speed generated. The Authority studied induced wind speed from train operations, and potential effects on pollination, in whitepapers in 2012 (Authority 2012b and 2012c), and found that wind speed is not likely to be excessive at the edge of the right-of-way, predicted to be less than 5 mph at a distance of 30 feet from a train going 220 mph. Consequently, wind speeds within proximity to trains are unlikely to substantially exceed normal wind speeds and are unlikely to affect flights, foraging, or dispersal.

Some special-status wildlife species may be able to access the right-of-way during operations, where they would be subject to train strike. Individual birds could be injured or killed through collision with HSR infrastructure such as traction power transmission facilities. Moreover, disturbance impacts (e.g., noise, visual stimuli) can alter movement patterns and degrade conditions that support special-status wildlife species. Because operations would potentially affect a wide array of wildlife taxa and because such impacts are primarily associated with wildlife moving across or near the project footprint, these impacts are collectively addressed in Section 3.7.7.7, Wildlife Movement.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because inspection and maintenance activities could have a substantial adverse effect, through habitat modification, on special-status wildlife species. While actions would be implemented before operations to reduce the potential for impacts on special-status wildlife and their habitat, inspection and maintenance activities would entail disturbance and potential degradation of special-status wildlife habitat, potentially resulting in some areas becoming inhospitable for special-status wildlife. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

3.7.7.3 Non-Special-Status Wildlife

No Project Impacts

The conditions describing the No Project Alternative are the same as those described in Section 3.7.6.2, Biological Conditions. The same planned development and transportation projects would generally result in increases in VMT, construction of new impervious surfaces, and conversion of land cover types to transportation uses, all of which would affect non-special-status wildlife.

Under the No Project Alternative, recent development trends are anticipated to continue, leading to impacts on biological and aquatic resources and wetlands. Future changes in land use or allowable density of development, as well as ground disturbance associated with future infrastructure improvements such as highway expansions to accommodate population growth, would have impacts on non-special-status wildlife similar to those that have resulted from past development, such as loss, degradation, and fragmentation of habitat and mortality of individuals and local populations.

Project Impacts

Construction Impacts

Impact BIO#33: Mortality of Non-Special-Status Terrestrial Wildlife

Construction of the HSR track and systems in all subsections would take place in habitat suitable to support non-special-status terrestrial wildlife species. Construction activities could result in mortality of individuals of such species.

The Authority has incorporated BIO-IAMF#1, BIO-IAMF#3, BIO-IAMF#5, BIO-IAMF#6, and BIO-IAMF#7 (described in Impact BIO#1 and Impact BIO#6) into project design to avoid and minimize impacts on non-special-status terrestrial wildlife. Biologists did not model habitat for non-special-status wildlife species because such habitat is ubiquitous throughout the RSA. Because of its greater reliance on embankment profiles, Alternative 2 would likely have a greater impact on non-special-status terrestrial wildlife than Alternatives 1, 3, and 4, which make greater use of aerial structures or existing at-grade Caltrain tracks that have a smaller footprint.

While pre-construction and construction actions to protect wildlife species are part of the project, these actions would not prevent the conversion and temporary disturbance of habitat suitable to support myriad non-special-status species in the project footprint, nor would they necessarily eliminate the risk of disturbance, injury, or mortality of individual animals. Construction-related ground disturbance (e.g., grading, excavation) and vehicle traffic may injure or kill wild animals by through vehicle strike or crushing of animals in subterranean burrows. Animals may become entrapped in excavated areas, pipes, or other equipment used for construction. Vegetation removal and structure modification or demolition activities could cause mortality of non-special-status birds and bats. Noise and vibration generated by construction activities may impair breeding, feeding, and sheltering behaviors.

CEQA Conclusion

The impact under CEQA would be less than significant for all four alternatives because, although construction activities could cause some mortality of non-special-status wildlife, mortality of non-special-status species is not a threshold of significance under CEQA; however, mandatory findings of significance pursuant to the CEQA Guidelines specify “substantially degrade the quality of the environment, reduce habitat of wildlife species, cause wildlife populations to drop below self-sustaining levels, threaten to eliminate a plant or animal community” as criteria for a finding of significance. In view of the relatively limited amount of disturbance and habitat loss in the context of the extensive range of common terrestrial species, there is no evidence that any of these criteria would be met, particularly in consideration of project actions that would avoid and minimize the potential impacts on non-special-status wildlife. Therefore, CEQA does not require mitigation.

Impact BIO#34: Removal or Degradation of Habitat for and Disturbance of Waterfowl and Shorebirds

Wetland and open-water habitat for waterfowl and shorebirds would be lost or disturbed as a result of HSR track and systems construction in all subsections. Disturbance of waterfowl and shorebirds would result from the noise, vibration, and visual disturbance associated with construction activities. The potential for impact would be greatest in the GEA and UPR IBAs.

The Authority has incorporated BIO-IAMF#1, BIO-IAMF#3, BIO-IAMF#5, BIO-IAMF#8, BIO-IAMF#9, and BIO-IAMF#10 (described in Impact BIO#1) into project design to avoid and minimize impacts on waterfowl and shorebirds. While no specific model was developed for waterfowl and shorebirds, their potential habitat (e.g., agriculture, grassland, wetland) was estimated within the IBA boundaries (except urban) to have potential to function as roosting or forage habitat. This is especially true in wet years when the wetted footprint within the IBA boundary is extensive.

The areal extent of direct permanent and temporary impacts (conversion and disturbance of habitat, disturbance of individuals) on habitat for waterfowl and shorebirds is shown in Table 3.7-16. Impacts in the GEA would be the same under all four alternatives because they would follow the same alignment in that area. Impacts in the UPR IBA would be slightly greater under Alternative 3 than under Alternatives 1, 2, and 4 because its alignment traverses more of the UPR IBA than the

other alternatives. The magnitude of permanent impacts, in descending order, would be 369.3 acres under Alternative 3; 365.7 acres under Alternatives 1 and 2; and 323.4 acres under Alternative 4. The extent of temporary impacts would be, in descending order, 107.9 acres under Alternatives 1 and 2, 84.8 acres under Alternative 4, and 76.1 acres under Alternative 3. The magnitude of indirect impacts (introduction of invasive nonnative plant species), while not quantified through mapping efforts, would be generally proportional to the quantity of direct impacts.

While pre-construction and construction actions to protect waterfowl and shorebirds and their habitat are part of the project, these actions would not prevent the conversion and temporary disturbance of such habitat in the project footprint, nor would they eliminate the risk of disturbance of these species. Construction activities would convert suitable foraging and breeding habitat to HSR track and systems and would entail infrastructure modifications and utility relocations, and could lead to the introduction and spread of invasive nonnative species. Disturbance associated with human activities and noise could drive birds from productive foraging and resting areas, resulting in an impaired energy budget and potentially in reduced reproductive success. Increased cover of invasive weeds (e.g., perennial pepperweed) in wetlands could reduce emergent wetland vegetation that provides cover for waterfowl and overgrow bare areas (e.g., seasonal wetland depressions that hold water in winter and become muddy in spring) that provide foraging habitat for shorebirds.

Table 3.7-16 Impacts on Habitat for Waterfowl and Shorebirds in Important Bird Areas by Project Alternative (acres)

Land Cover Type	Alt 1		Alt 2		Alt 3		Alt 4	
	Perm	Temp	Perm	Temp	Perm	Temp	Perm	Temp
Grasslands Ecological Area								
Agriculture[1]	38.8	20.0	38.8	20.0	38.8	20.0	38.8	20.0
Alkali marsh[2]	6.1	3.5	6.1	3.5	6.1	3.5	6.1	3.5
California annual grassland[3]	2.6	2.3	2.6	2.3	2.6	2.3	2.6	2.3
Constructed watercourse[4]	2.0	1.6	2.0	1.6	2.0	1.6	2.0	1.6
Freshwater marsh[2]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Freshwater pond	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Natural watercourse[4]	2.3	3.1	2.3	3.1	2.3	3.1	2.3	3.1
Subtotal	51.8	30.5	51.8	30.5	51.8	30.5	51.8	30.5
Upper Pajaro River/Soap Lake								
Agriculture	2.3	0.6	2.3	0.6	0.1	2.0	0.7	0.6
California annual grassland	10.5	5.3	10.5	5.3	18.8	10.0	7.7	5.2
Constructed basin[5]	12.7	1.3	12.7	1.3	0.0	0.0	0.0	0.0
Constructed watercourse	3.7	1.0	3.7	1.0	4.7	0.7	2.6	0.7
Freshwater marsh	2.2	0.0	2.2	0.0	11.0	0.2	2.2	0.0
Freshwater pond[5]	1.9	0.7	1.9	0.7	1.7	<0.1	1.9	0.7
Natural watercourse	0.3	1.3	0.3	1.3	0.5	0.0	0.4	0.7
Row crops[1]	271.7	63.8	271.7	63.8	270.7	32.6	249.3	45.2
Seasonal wetland[6]	8.6	3.4	8.6	3.4	10.0	0.1	6.8	1.2

Land Cover Type	Alt 1		Alt 2		Alt 3		Alt 4	
	Perm	Temp	Perm	Temp	Perm	Temp	Perm	Temp
Subtotal	313.9	77.4	313.9	77.4	317.5	45.6	271.6	54.3
Total	**365.7**	**107.9**	**365.7**	**107.9**	**369.3**	**76.1**	**323.4**	**84.8**

[1] Includes irrigated or flooded rice fields that provide food resources for wintering shorebirds (Hickey et al. 2003) and waterfowl (CVJV 2006) and nesting habitat for breeding shorebirds (Strum et al. 2017) and waterfowl (CVJV 2006).
[2] Includes managed seasonal and semi-permanent wetlands that provide food resources for wintering shorebirds (Hickey et al. 2003) and waterfowl (CVJV 2006) and managed semi-permanent wetlands that provide nesting habitat for breeding shorebirds (Strum et al. 2017) and waterfowl (CVJV 2006).
[3] May include "vernal pool rangelands" that provide foraging habitat for shorebirds (Hickey et al. 2003).
[4] Provides resting habitat for wintering and breeding waterfowl.
[5] Provides food resources (e.g., rooted aquatic plants for dabbling ducks) and resting habitat for wintering and breeding waterfowl.
[6] Provide foraging habitat for waterfowl and shorebirds.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the project would result in modification of habitat for and disturbance of waterfowl and shorebirds. Such impacts could interfere substantially with the movement of resident and migratory waterfowl and shorebirds. While actions would be implemented before and during construction to minimize the loss of suitable habitat, the project would result in loss and degradation of suitable habitat for these species as well as noise- and vibration-related disturbance beyond the project footprint. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Operations Impacts

Some non-special-status wildlife species may be able to access the right-of-way during operations, where they would be subject to train strike. Individual birds could be injured or killed through collision with HSR infrastructure such as traction power transmission facilities. Moreover, disturbance impacts (e.g., noise, visual stimuli) can alter movement patterns and degrade conditions that support non-special-status wildlife species. Because operations would potentially affect a wide array of wildlife taxa and because such effects are primarily associated with wildlife moving across or near the project footprint, these effects are collectively addressed in Section 3.7.7.7.

3.7.7.4 Special-Status Plant Communities

No Project Impacts

The conditions describing the No Project Alternative are the same as those described in Section 3.7.6.2. The same planned development and transportation projects would generally result in increases in VMT, construction of new impervious surfaces, and conversion of land cover types to transportation uses, all of which would affect special-status plant communities.

Under the No Project Alternative, recent development trends are anticipated to continue, leading to impacts on biological and aquatic resources and wetlands. Future changes in land use or allowable density of development, as well as ground disturbance associated with future infrastructure improvements such as highway expansions to accommodate population growth, would have impacts on special-status plant communities similar to those that have resulted from past development, such as loss, degradation, and fragmentation of habitat and mortality of individuals and local populations.

Project Impacts

Construction of the project alternatives would result in temporary and permanent changes to special-status plant communities. All aspects of construction and operations have the potential to cause impacts, either from direct removal associated with construction or from indirect impacts such as changes in hydrology or noxious weed infestations. Special-status plant communities that would be affected by the project alternatives are shown in Table 3.7-17.

Construction Impacts

Impact BIO#35: Permanent Conversion or Degradation of Special-Status Plant Communities

Construction of the HSR track and systems in all subsections would take place in habitat that supports special-status plant communities. Construction would result in the conversion and degradation of such communities.

The Authority has incorporated BIO-IAMF#1, BIO-IAMF#3, BIO-IAMF#5, BIO-IAMF#8, BIO-IAMF#9, BIO-IAMF#10, and BIO-IAMF#11 (described in Impact BIO#1) into project design to avoid and minimize impacts on special-status plant communities. Tunnels would be designed and constructed to avoid or minimize groundwater inflows during or around tunnels during construction (IAMF-HYD#5).

The areal extent of direct permanent and temporary impacts (conversion and disturbance of habitat, habitat fragmentation, hydrologic changes, and introduction of hazardous materials) on special-status plant communities is shown in Table 3.7-17. All four alternatives would have identical impacts on vernal pools because that community is only present in areas where the alignments are also identical; impacts on other communities would be similar across alternatives. Overall, the total magnitude of impacts on special-status plant communities would be substantially similar for all alternatives. The extent of permanent impacts would be, in descending order, 880.5 acres under Alternative 3; 872.9 acres under Alternative 2; 867.8 acres under Alternative 1; and 839.1 acres under Alternative 4. The extent of temporary impacts, in descending order, would be 4226.1 acres under Alternative 2; 401.6 acres under Alternative 1; 400.8 acres under Alternative 3; and 370.8 acres under Alternative 4.

Table 3.7-17 Impacts on Special-Status Plant Communities (acres)

Impacts	Alt 1		Alt 2		Alt 3		Alt 4	
	Perm	Temp	Perm	Temp	Perm	Temp	Perm	Temp
Alkali marsh	6.2	3.5	6.2	3.5	6.2	3.5	6.2	3.5
Alkali scrub wetland	0.5	0.4	0.5	0.4	0.5	0.4	0.5	0.4
Alkali vernal pool[1]	27.1	0.0	27.1	0.0	27.1	0.0	27.1	0.0
California annual grassland[2]	772.8	365.6	778.0	388.4	773.8	370.2	749.4	342.5
California sycamore woodland	9.4	3.2	9.4	3.2	9.4	3.2	9.4	3.2
Freshwater marsh	2.3	0.0	2.3	0.1	11.1	0.2	2.3	0.0
Mixed chaparral	15.8	3.8	15.8	3.8	15.8	3.7	15.8	3.8
Mixed riparian	15.2	11.1	15.2	12.4	17.3	13.0	11.9	9.0
Palustrine forested wetland	7.4	8.8	7.2	8.7	6.8	4.8	7.4	5.5
Seasonal wetland	10.7	5.2	10.8	5.6	12.1	1.8	8.7	2.9
Vernal pools[3]	0.4	0.0	0.4	0.0	0.4	0.0	0.4	0.0
Total	**867.8**	**401.6**	**872.9**	**426.1**	**880.5**	**400.8**	**839.1**	**370.8**

[1] The alkali vernal pool type includes areas mapped as vernal pool complexes. Acreage provided is an estimate of the wetted vernal pool area within vernal pool complexes, consisting of 45% wetted area and 55% upland area.
[2] Annual grassland is included because it may contain inclusions of serpentine bunchgrass grasslands.
[3] Temporary impacts = 0 because all vernal pool impacts are considered permanent.

As discussed in Impact BIO#1, construction of Tunnels 1 and 2 could have temporary indirect impacts on the hydrology of groundwater-dependent surface water features, including land cover types that qualify as special-status plant communities (e.g., California sycamore woodland) or that could contain unmapped occurrences of a special-status plant community (i.e., freshwater marsh, palustrine forested wetland, and seasonal wetland; see Table 3.7-8). In addition, groundwater-depletion could affect deep-rooted oak trees outside of riparian zones, such as valley oaks in areas with relatively shallow groundwater tables. Any reductions in groundwater supply to such features could result in the desiccation of vegetation and eventual degradation of the affected community.

While pre-construction and construction actions to protect special-status plant communities are part of the project, these actions would not prevent the permanent conversion or temporary disturbance of such communities in and near the project footprint. Work to construct Tunnels 1 and 2 would affect the greatest area of special-status plant communities because of existing stands of California sycamore woodland, valley oak woodland, and purple needlegrass grassland, all of which would be permanently lost. Construction activities would also result in the temporary disturbance of special-status communities at these and other locations and reduced habitat value for some period of time after construction is completed.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the project would result in loss or degradation of sensitive communities identified by the CDFW. While actions would be implemented before and during construction to minimize such impacts, the project would result in loss and degradation of special-status plant communities. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Operations Impacts

Impact BIO#36: Intermittent Disturbance or Degradation of Special-Status Plant Communities during Operations

Project operations would include inspection and maintenance activities along the HSR right-of-way. The Authority has incorporated BIO-IAMF#4 into project specifications to address disturbance or degradation of special-status plant communities associated with such activities. Right-of-way maintenance activities would include minor grading, clearing, and excavation needed to maintain adequate drainage or repair infrastructure; vegetation management, including potential trimming of trees within special-status communities (e.g., riparian) growing adjacent to the right-of-way and application of herbicide to invasive weeds within the right-of-way; and vehicle traffic along maintenance roads. Permanently affected stands of special-status plant communities in the project footprint would have been eliminated during construction, and therefore would not be affected further. However, special-status plant communities inside the right-of-way that were avoided during construction and outside but within 100 feet of the right-of-way (i.e., special-status plant study area) could potentially be affected by these activities. Minor ground disturbance within the right-of-way may result in minor direct (filling, sedimentation, inadvertent release of oils and chemicals from parked vehicles or equipment) or indirect (hydrological interruption, introduction of invasive species) effects on special-status plant communities in and adjacent to the right-of-way. Occasional trimming of riparian tree branches overhanging the right-of-way is not expected to substantially degrade special-status plant communities because the branches of such trees are typically fast growing. If applied during high winds, herbicides could drift onto and cause mortality of plants growing in special-status plant communities. Dust generated by maintenance vehicles could settle on the leaves of plants in nearby special-status communities, increasing the rate of water loss (i.e., transpiration). Such effects would degrade special-status plant communities within the special-status plant study area.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because operations could have a substantial adverse effect on sensitive communities identified by the CDFW. While actions would be implemented before operations to reduce the potential for impacts on special-status

plant communities, project operations would entail disturbance and potential degradation of special-status plant communities through inspection and maintenance activities. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

3.7.7.5 Aquatic Resources

No Project Impacts

The conditions describing the No Project Alternative are the same as those described in Section 3.7.6.2. The same planned development and transportation projects would generally result in increases in VMT, construction of new impervious surfaces, and conversion of land cover types to transportation uses, all of which would affect aquatic resources.

Under the No Project Alternative, recent development trends are anticipated to continue, leading to impacts on biological and aquatic resources and wetlands. Future changes in land use or allowable density of development, as well as ground disturbance associated with future infrastructure improvements such as highway expansions to accommodate population growth, would have impacts on aquatic resources similar to those that have resulted from past development, such as loss, degradation, and fragmentation of habitat and mortality of individuals and local populations.

Project Impacts

Construction of the project alternatives would result in temporary and permanent impacts on aquatic resources. The project alternatives would result in direct and indirect impacts on waters of the state regulated by the SWRCB, and federally protected wetlands and other waters of the U.S. as well as riparian areas not considered jurisdictional under Section 404 of the CWA but regulated under Cal. Fish and Game Code Section 1600 et seq. Additionally, the project alternatives would result in direct and indirect impacts on some aquatic resources regulated as waters of the state, regulated under Section 404 of the CWA, and regulated under Cal. Fish and Game Code Section 1600 et. seq. (e.g., natural watercourses).

Construction Impacts

Impact BIO#37: Permanent Conversion or Degradation of Aquatic Resources Considered Jurisdictional under Section 404 of the Federal Clean Water Act or Regulated by the State

Construction of the HSR track and systems in all subsections would take place in areas that support aquatic resources considered jurisdictional under Section 404 of the CWA, and areas regulated by the SWRCB, including state and federally protected wetlands. Construction would result in the conversion and degradation of such aquatic resources through direct removal, filling, and hydrological interruption.

The Authority has incorporated BIO-IAMF#1, BIO-IAMF#3, BIO-IAMF#5, BIO-IAMF#8, BIO-IAMF#9, and BIO-IAMF#10 (described in Impact BIO#1) into project design to avoid and minimize impacts on aquatic resources. Tunnels would be designed and constructed to avoid or minimize groundwater inflows into tunnels during construction that may affect surface water resources overlying the tunnel alignment (IAMF-HYD#5), including aquatic resources considered jurisdictional under Section 404 of the CWA.

The areal extent of direct permanent and temporary impacts (Section 3.7.53, *Methods for Impact Analysis*) on aquatic resources considered jurisdictional under Section 404 of the CWA and as waters of the state is shown in Table 3.7-18. All four alternatives would have identical impacts on vernal pools because that community is only present in areas where the alignments are also identical; impacts on other communities would be similar across alternatives. Overall, the total magnitude of permanent impacts on jurisdictional aquatic resources by alternative would be, in descending order, 110.8 acres under Alternative 3; 108.0 acres under Alternative 2; 100.5 acres under Alternative 1; and 96.5 acres under Alternative 4. The extent of temporary impacts would be, in descending order, 89.4 acres under Alternative 2; 87.5 acres under Alternative 1; 80.7 acres under Alternative 3; and 78.3 acres under Alternative 4.

As discussed in Impact BIO#1, construction of Tunnels 1 and 2 could have temporary indirect impacts on the hydrology of groundwater-dependent surface waters, including aquatic resources considered jurisdictional under Section 404 of the CWA. Any reductions in groundwater supply to such features could temporarily reduce their habitat value and function.

While pre-construction and construction actions to protect aquatic resources are part of the project, these actions would not prevent the permanent conversion or degradation of aquatic resources in the project footprint. Work to construct embankment sections in the San Joaquin Valley Subsection and work in the Morgan Hill and Gilroy Subsection (primarily in the Soap Lake floodplain) would affect the greatest area of aquatic resources because of the extent of managed and natural wetland resources in those areas. Construction activities would result in the temporary disturbance of aquatic resources during construction and reduced value for some period of time after construction is completed as aquatic resources are restored and recover.

CEQA Conclusion

The impact under CEQA would be significant for all alternatives because the project would have a substantial adverse effect on state- and federally protected wetlands, through direct removal, filling, hydrological interruption, and other indirect means. While actions would be implemented before and during construction to minimize such impacts, the project would result in the loss and degradation of aquatic resources. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Table 3.7-18 Impacts on Aquatic Resources Considered Jurisdictional Under Section 404 of the Clean Water Act and Regulated as Waters of the State by Alternative (acres)

Impacts	Alt 1		Alt 2		Alt 3		Alt 4	
	Perm	Temp	Perm	Temp	Perm	Temp	Perm	Temp
Wetlands								
Alkali marsh	6.2	3.5	6.2	3.5	6.2	3.5	6.2	3.5
Alkali scrub wetland	0.5	0.4	0.5	0.4	0.5	0.4	0.5	0.4
Alkali vernal pool[1]	27.1	0.0	27.1	0.0	27.1	0.0	27.1	0.0
Freshwater marsh	2.3	<0.1	2.3	0.1	11.1	0.2	2.3	<0.1
Mixed riparian–natural watercourse[2]	3.6	1.3	3.6	1.2	3.6	1.3	3.6	1.2
Palustrine forested wetland	1.6	5.5	1.5	5.6	1.1	1.7	1.9	2.4
Palustrine forested wetland–natural watercourse[2]	5.8	3.4	5.7	3.2	5.7	3.0	5.5	3.2
Seasonal wetland	10.7	5.2	10.8	5.6	12.1	1.8	8.7	2.9
Vernal pools	0.4	0.0	0.4	0.0	0.4	0.0	0.4	0.0
Subtotal wetlands	**58.2**	**19.3**	**58.1**	**19.6**	**67.8**	**11.9**	**56.2**	**13.6**
Nonwetlands								
Constructed basin	2.1	38.9	7.2	38.9	2.1	38.9	2.1	38.6
Constructed watercourse	21.9	13.4	24.4	14.3	22.7	13.1	20.0	13.0
Freshwater pond	4.5	0.9	4.5	0.9	4.3	0.2	4.5	0.9
Natural watercourse[2]	13.8	15.1	13.8	15.8	13.9	16.6	13.8	12.2
Reservoir	<0.1	0.1	<0.1	0.1	<0.1	0.1	0.0	0.0

Impacts	Alt 1		Alt 2		Alt 3		Alt 4	
	Perm	Temp	Perm	Temp	Perm	Temp	Perm	Temp
Subtotal nonwetlands	**42.3**	**68.3**	**49.9**	**69.9**	**43.0**	**68.8**	**40.4**	**64.7**
Total Section 404 aquatic resources	**100.5**	**87.5**	**108.0**	**89.4**	**110.8**	**80.7**	**96.5**	**78.3**

[1] The alkali vernal pool type includes areas mapped as vernal pool complexes. Acreage provided is an estimate of the wetted vernal pool area within vernal pool complexes, consisting of 45% wetted area and 55% upland area.
[2] Areas of riparian vegetation were classified as wetlands when they are located within natural watercourses (i.e., below the limits of the ordinary high water mark).

Impact BIO#38: Permanent Conversion or Degradation of Resources Regulated under California Fish and Game Code Section 1600 et seq.

Construction of the HSR track and systems in all subsections would take place in areas that support aquatic and other related resources regulated under Cal. Fish and Game Code Section 1600 et seq., including riparian habitats. Construction would result in the conversion and degradation of such aquatic and other related resources through direct removal and degradation.

The Authority has incorporated BIO-IAMF#1, BIO-IAMF#3, BIO-IAMF#5, BIO-IAMF#6, BIO-IAMF#7, BIO-IAMF#8, BIO-IAMF#9, BIO-IAMF#10, and BIO-IAMF#11 (described in Impact BIO#1 and Impact BIO#6) into project design to avoid and minimize impacts on fish and wildlife resources protected under Section 1600 et seq. Tunnels would be designed and constructed to avoid or groundwater inflows into tunnels during construction that may affect fish and wildlife resources dependent on rivers, streams or lakes overlying the tunnel alignment (IAMF-HYD#5), which are regulated under California Fish and Game Code Section 1600 et seq.

The areal extent of direct permanent and temporary impacts (direct removal or degradation) on aquatic and other related resources regulated under Cal. Fish and Game Code Section 1600 et seq. is shown in Table 3.7-19. Overall, the total magnitude of permanent and temporary impacts on aquatic and other related resources regulated under Cal. Fish and Game Code Section 1600 et seq. by alternative would be, in descending order, 94.7 acres and 98.4 acres, respectively, under Alternative 2; 87.2 acres and 94.1 acres under Alternative 1; 76.7 acres and 90.0 acres under Alternative 3; and 69.1 acres and 82.4 acres under Alternative 4. Indirect impacts (modification of hydrology, introduction of invasive nonnative species) were not quantified for this analysis, but would be roughly proportional to direct impacts.

Table 3.7-19 Impacts on Aquatic and Other Related Resources Regulated under California Fish and Game Code Section 1600 et seq. by Alternative (acres)

Aquatic and Related Resources	Alt 1		Alt 2		Alt 3		Alt 4	
	Perm	Temp	Perm	Temp	Perm	Temp	Perm	Temp
Riparian								
California sycamore woodland	9.4	3.2	9.4	3.2	9.4	3.2	9.4	3.2
Mixed riparian	15.2	11.1	15.2	12.4	17.3	13.0	11.9	9.0
Palustrine forested wetland	7.4	8.8	7.2	8.7	6.8	4.8	7.4	5.5
Subtotal riparian	**32.0**	**23.1**	**31.8**	**24.3**	**33.5**	**21.0**	**28.7**	**17.7**
Streams/Lakes/Rivers								
Constructed basin	15.0	41.6	20.2	43.1	2.3	39.1	2.1	38.6
Constructed watercourse	21.9	13.4	24.4	14.3	22.7	13.1	20.0	13.0
Freshwater pond	4.5	0.9	4.5	0.9	4.3	0.2	4.5	0.9

Aquatic and Related Resources	Alt 1		Alt 2		Alt 3		Alt 4	
	Perm	Temp	Perm	Temp	Perm	Temp	Perm	Temp
Natural watercourse	13.8	15.1	13.8	15.8	13.9	16.6	13.8	12.2
Reservoir	<0.1	0.1	<0.1	0.1	<0.1	0.1	0.0	0.0
Subtotal streams/lakes/rivers	**55.2**	**71.0**	**62.9**	**74.1**	**43.2**	**69.0**	**40.4**	**64.7**
Total Section 1600 resources	**87.2**	**94.1**	**94.7**	**98.4**	**76.7**	**90.0**	**69.1**	**82.4**

As discussed in Impact BIO#1, construction of Tunnels 1 and 2 could have temporary indirect impacts on the hydrology of groundwater-dependent surface waters, including rivers, streams and lakes regulated under Cal. Fish and Game Code Section 1600 et seq. Any reductions in groundwater supply to such features could temporarily reduce their habitat value and function.

While pre-construction and construction actions to protect aquatic and other related resources are part of the project, these actions would not prevent the permanent conversion or degradation of aquatic or other related resources in the project footprint. Work to construct the Pacheco Pass and the San Joaquin Valley Subsections would affect the greatest area of riparian habitats (California sycamore woodland and mixed riparian, respectively) because of the extent of those habitats in those subsections. Construction activities would result in the temporary disturbance of aquatic and other related resources during construction and reduced value for some period after construction is completed as aquatic and other related resources are restored and recover.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the project would have substantial adverse effects, through conversion or degradation of habitat, on fish and wildlife resources protected under Cal. Fish and Game Code § 1600 et seq.). While actions would be implemented before and during construction to minimize such impacts, the project could still result in substantial adverse effects to fish and wildlife resources. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Operations Impacts

Impact BIO#39: Intermittent Disturbance or Degradation of Aquatic and Other Related Resources during Operations

Project operations would include inspection and maintenance activities along the HSR right-of-way. The Authority has incorporated BIO-IAMF#4 in project specifications to address disturbance or degradation of aquatic and other related resources associated with such activities. Right-of-way maintenance activities would include minor grading, clearing, and excavation needed to maintain adequate drainage or repair infrastructure; vegetation management, including potential trimming of riparian trees growing adjacent to the right-of-way and application of herbicide to invasive weeds within the right-of-way; and vehicle traffic along maintenance roads. Permanently affected aquatic and other related features in the project footprint would have been eliminated during construction, and therefore would not be affected further. Aquatic resources inside the project footprint that were avoided during construction (e.g., natural watercourses spanned by viaduct) and outside but adjacent to the project footprint would remain and could potentially be affected by these activities. In addition, construction would result in the creation of new aquatic resources (e.g., constructed basins and watercourses for drainage) in some portions of the project footprint, and these features could also be affected. Minor ground disturbance within the right-of-way may result in minor direct (filling, sedimentation, inadvertent release of oils and chemicals from parked vehicles or equipment) or indirect (hydrological interruption, introduction of invasive species) impacts on aquatic resources in and adjacent to the right-of-way. Occasional trimming of riparian tree branches overhanging the right-of-way is not expected to substantially degrade riparian aquatic resources because the branches of such trees are typically fast growing.

If applied during high winds, herbicides could drift into aquatic resources in and beyond the right-of-way, degrading water quality and causing mortality of wetland vegetation. Dust generated by maintenance vehicles could settle on the leaves of wetland plants in and adjacent to the right-of-way, increasing the rate of water loss (i.e., transpiration). Such impacts would degrade aquatic resources remaining in the right-of-way after construction as well as those outside but within 250 feet (i.e., aquatic resource study area) of the right-of-way.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because operations along the project extent could have a substantial adverse effect on protected wetlands and other aquatic and riparian resources through direct removal, filling, hydrological interruption, or other means. While actions would be implemented before operations to reduce the potential for impacts on aquatic and other related resources, project operations would entail disturbance and potential degradation of aquatic and other related resources through inspection and maintenance. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

3.7.7.6 Protected Trees

No Project Impacts

The conditions describing the No Project Alternative are the same as those described in Section 3.7.6.2. The same planned development and transportation projects would generally result in increases in VMT, construction of new impervious surfaces, and conversion of land cover types to transportation uses, all of which would affect protected trees.

Under the No Project Alternative, recent development trends are anticipated to continue, leading to impacts on biological and aquatic resources and wetlands. Future changes in land use or allowable density of development, as well as ground disturbance associated with future infrastructure improvements such as highway expansions to accommodate population growth, would have impacts on protected trees similar to those that have resulted from past development, such as loss, degradation, and fragmentation of habitat and mortality of individuals and local populations.

Project Impacts

Construction of the project alternatives would result in the removal of trees protected under local ordinances. Protected trees are those that are identified in local ordinances or in local planning documents that have policies toward protection. The land cover types that could support protected trees are shown in Table 3.7-20, along with the areal extent of impacts on those types by project alternative.

Table 3.7-20 Impacts on Land Cover Types Likely to Support Protected Trees by Alternative (acres)

Land Cover Type	Alt 1		Alt 2		Alt 3		Alt 4	
	Perm	Temp	Perm	Temp	Perm	Temp	Perm	Temp
California sycamore woodland	9.4	3.2	9.4	3.2	9.4	3.2	9.4	3.2
Coast oak woodland	348.6	61.9	349.1	62.5	349.2	65.1	348.6	62.0
Mixed chaparral	15.8	3.8	15.8	3.8	15.8	3.7	15.8	3.8
Ornamental woodland	4.3	13.1	1.8	20.2	4.6	20.6	0.1	0.7
Palustrine forested wetland	7.4	8.8	7.2	8.7	6.8	4.8	7.4	5.5
Urban landscaping	12.5	21.1	11.4	17.3	12.3	21.4	2.5	1.1
Total	**398.0**	**111.9**	**394.7**	**115.7**	**398.1**	**118.8**	**383.8**	**76.3**

Construction Impacts

Impact BIO#40: Removal or Mortality of Trees Protected under Municipal Tree Policies or Ordinances

Ground disturbance and vegetation removal activities associated with project construction could result in removal or trimming of protected trees. Direct impacts on protected trees would be permanent if such trees are removed during construction; impacts would be considered temporary if trees are partially removed (trimmed). The primary direct permanent impact would be the removal of protected trees for HSR track and systems. The primary direct temporary impact would be minor trimming or root disruption during construction. Potential indirect impacts include injury or mortality of protected trees due to reduced soil aeration and water availability from changes in topography and hydrology. All four project alternatives would affect a similar areal extent of land cover types potentially supporting protected trees. Impacts are likeliest to occur in the developed portions of the San Jose Diridon Station, Monterey Corridor, and Morgan Hill and Gilroy Subsections that are subject to municipal tree policies or ordinances.

The Authority has incorporated BIO-IAMF#1, BIO-IAMF#3, BIO-IAMF#5, and BIO-IAMF#8 (described in Impact BIO#1) into project design to avoid and minimize impacts on protected trees. The areal extent of permanent and temporary direct impacts (removal and trimming of protected trees) on land cover types suitable to support protected trees would be nearly the same under all four alternatives. The magnitude of permanent impacts by alternative would be, in descending order, 398.1 acres under Alternative 3, 398.0 acres under Alternative 1, 394.7 acres under Alternative 2, and 383.8 acres under Alternative 4. The extent of temporary impacts would be 118.8 acres under Alternative 3, 115.7 acres under Alternative 2, 111.9 acres under Alternative 1, and 76.3 acres under Alternative 4. The magnitude of indirect impacts, while not quantified through the mapping effort, would be generally proportional to the quantity of direct impacts.

While pre-construction and construction actions to preserve protected trees are part of the project, these actions would not entirely preclude impacts on protected trees. Some trees would be removed and others would be trimmed to facilitate project construction. Reduced soil aeration and water availability for protected trees' root systems could occur both inside and outside the project footprint and could reduce the long-term viability of protected trees. Natural land cover types that support protected trees adjacent to the project footprint could be invaded by nonnative plants that become established during construction or that spread from existing stands as a result of soil disturbance.

In addition to direct effects, there is also the potential for indirect effects on protected oak trees along the tunnel alignments due to potential groundwater depletion during tunnel construction. This would only occur where tree roots are particularly deep and groundwater is relatively shallow (such that tree roots can reach groundwater). As discussed in Section 3.8, despite implementation of HYD-IAMF#5, the project could still lower groundwater levels in discrete portions of the tunnel alignment (depletion is not expected along the entire length of the tunnel alignments due to limited groundwater resources along most of the tunnel alignment). Groundwater levels in these discrete areas could be lowered for up to several years after construction until they recover with infiltration of precipitation. Oak trees in these discrete areas could be affected if the groundwater-lowering extends below their roots and the trees were to become dependent on precipitation only until the aquifer recovers. This could result in impaired tree health or mortality.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because project construction would conflict with local policies or ordinances protecting designated trees. Construction would require the removal of some protected trees and the trimming of others. While actions would be implemented before and during construction to reduce loss of or damage to protected trees, the project would result in removal and trimming of a large number of protected trees due to the large areal extent of land cover types supporting them. In addition, potential groundwater depletion in discrete portions of the tunnel alignments may occur during tunnel construction, which may affect oak trees in areas of relatively shallow groundwater. Mitigation measures to address this impact

are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Operations Impacts

Impact BIO#41: Disturbance of Trees Protected under Municipal Tree Ordinances during Operations

Operations would not result in permanent impacts (i.e., removal) on protected trees under any of the alternatives, but ongoing vegetation management within the electrical safety zone could result in temporary impacts (i.e., occasional trimming). The Authority would require that all workers attend WEAP training about sensitive biological resources, including protected trees (BIO-IAMF#4). The project tunnels will be designed to be watertight and thus no operational effects due to groundwater flows are expected during operations.

CEQA Conclusion

The impact under CEQA would be less than significant for all four alternatives because project operations would not remove any protected trees. Any protected trees within the footprint of HSR tracks, facilities, or infrastructure would already have been removed during construction. Intermittent operations impacts on protected trees would occur when such trees are trimmed during vegetation management activities within the right-of-way. Nonprotected trees may grow into protected size classes during the operational period and need to be trimmed. These impacts would not conflict with local tree preservation policies or ordinances because they would not involve the permanent removal of protected trees. Therefore, CEQA does not require mitigation.

3.7.7.7 Wildlife Movement

In addition to addressing impacts on known or mapped wildlife corridors, this analysis more broadly addresses impacts on wildlife movement throughout the project extent. Similarly, although the primary focus of the analysis concerns wildlife movement, some of the nonphysical impact mechanisms that can interfere with movement (e.g., noise, visual disturbance, lighting) pertain equally to disturbance of resident individuals or populations (e.g., breeding, nesting, and foraging waterbirds). Because mapped corridors and other undeveloped areas are more hospitable to wildlife, such areas are likelier than more developed areas to support wildlife movement as well as resident individuals and species. Accordingly, this analysis addresses these impacts for both resident and transient wildlife.

No Project Impacts

The conditions describing the No Project Alternative are the same as those described in Section 3.7.6.2. The same planned development and transportation projects would generally result in increases in VMT, construction of new impervious surfaces, and conversion of land cover types to transportation uses, all of which would affect wildlife movement.

Under the No Project Alternative, recent development trends are anticipated to continue, leading to impacts on biological and aquatic resources and wetlands. Future changes in land use or allowable density of development, as well as ground disturbance associated with future infrastructure improvements such as highway expansions to accommodate population growth, would have impacts on wildlife movement similar to those that have resulted from past development, such as impediments to wildlife movement along established corridors.

Project Impacts

Construction and operations of the project would result in permanent and temporary impacts on wildlife movement and corridors. Impacts on wildlife corridors were analyzed in detail and are presented in the WCA (Appendix C of the Biological and Aquatic Resources Technical Report

[Authority 2020a]). In summary, the following construction and operations impacts on wildlife corridors are identified and discussed in the WCA:

- Project components that have the potential to temporarily affect wildlife movement during construction:
  - Fences and other physical barriers
  - Noise and vibration
  - Visual disturbance from construction equipment or personnel
  - Nighttime lighting
  - Dewatering (aquatic species only)
- Project components that have the potential to permanently affect wildlife movement as a result of construction include at-grade or embankment portions of the rail (because they are fenced or substantially above the existing ground elevation) as well as rail facilities adjacent to the rail (that are also permanently fenced).
- Operations and infrequent facilities maintenance have the potential to result in permanent, intermittent disturbance of wildlife movement through the following mechanisms:
  - Noise disturbance
  - Visual disturbance
  - Train lights and nighttime lighting on permanent facilities
  - Train strike
  - Electric line strike and electrocution
  - Entrapment

Construction Impacts

Impact BIO#42: Temporary Disruption of Wildlife Movement

Construction of the HSR track and systems in all subsections would temporarily affect wildlife movement in several ways. Construction fencing and dewatering would create temporary barriers to movement, precluding the normal movement of animals. Noise, vibration and visual disturbance from construction vehicles and pile driving may alter or delay movement of individuals as they attempt to avoid the construction area. Nighttime construction or security lighting could cause animals to delay or alter movement patterns because they may avoid lit areas.

The Authority has incorporated BIO-IAMF#1, BIO-IAMF#3, BIO-IAMF#5, and BIO-IAMF#8 (described in Impact BIO#1) into project design to avoid and minimize impacts on wildlife movement. In addition, during construction, the contractor would minimize noise disturbance of wildlife by implementing such measures as construction of noise barriers, careful routing of truck traffic, construction of walled enclosures, scheduling noisy operations into the same period, and phased construction (NV-IAMF#1). Although the extent and location of construction activities would be broadly similar among the project alternatives, the severity of impacts of the alternatives would be, in descending order, Alternative 3, Alternative 1, Alternative 2, and Alternative 4 for the following reasons:

- Alternatives 1, 2, and 4 would cross less land that is protected to conserve wildlife movement in the Soap Lake floodplain than Alternative 3.
- Alternatives 1, 2, and 4 would cross less of the Santa Cruz Mountains to Diablo Range modeled linkage (Penrod et al. 2013) than Alternative 3.
- Alternatives 1, 2, and 4 would follow a highly developed transportation corridor in downtown Gilroy rather than crossing the undeveloped agricultural areas east of Gilroy where Alternative 3 would be constructed. These agricultural areas support wildlife movement.

- Alternatives 1 and 3 would bypass downtown Morgan Hill, fragmenting agricultural lands and requiring construction and infrastructure closer to Coyote Creek, a known wildlife movement corridor.
- Alternative 4 would be make use of the existing Union Pacific Railroad (UPRR) right-of-way and would require less area for construction on undeveloped land.

While pre-construction and construction actions to minimize impacts on wildlife movement are part of the project, these actions would not entirely preclude impediments to wildlife movement through and across the project extent. Temporary construction fencing and dewatering activities would impede terrestrial and aquatic wildlife movement. Construction noise, vibration, visual disturbance, and light could cause individuals from following normal movement pathways.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because project construction would interfere substantially with established native wildlife corridors. While actions would be implemented before and during construction to reduce such interference, project construction would impede wildlife movement through and across the project footprint. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Impact BIO#43: Permanent Impacts on Wildlife Movement

Construction of the project would permanently affect regional and local wildlife movement patterns by creating new barriers to local and regional wildlife movement and fragmenting habitat. While project design would provide for wildlife movement across the alignment in Coyote Valley, the Soap Lake floodplain, most of Pacheco Pass, and the Central Valley, barriers to movement would remain on the west slope of Pacheco Pass where the rail alignment parallel to Pacheco Creek would be placed on a series of continuous cut-and-fill slopes. Barriers to movement and habitat fragmentation reduce resource availability and isolate breeding groups; both conditions can ultimately lead to reduced reproductive success and inbreeding depression. Terrestrial species are most vulnerable to permanent movement impacts. Birds and bats are able to move over patches of unsuitable habitat.

The relative permanent impacts of the project alternatives on wildlife movement would result from the following characteristics:

- Alternatives 1 and 3 would be on viaduct through the Monterey Corridor and Morgan Hill and Gilroy Subsections, posing a relatively small contribution to the cumulative barriers to movement already existing in the region.
- Alternatives 1, 2, and 4 would cross through downtown Gilroy, focusing construction and other local development in the downtown region, where development (rather than agriculture) is already the primary land cover type.
- Alternatives 1, 2, and 4 would minimize impacts on protected lands in the Soap Lake floodplain.
- Alternatives 1, 2, and 4 would minimize impacts on the Santa Cruz to Gabilan Range modeled wildlife corridor (Penrod et al. 2013) through the UPR (also known as Soap Lake floodplain).
- Alternative 3 would cross undeveloped agricultural lands and protected lands east of downtown Gilroy, resulting in more severe impacts on wildlife movement than Alternatives 1, 2, and 4 in the Morgan Hill and Gilroy Subsection.

Alternative 2 would have the greatest impact on terrestrial wildlife movement because the alignment profile would be at grade or on embankment and fenced continuously through Coyote Valley, an important wildlife linkage mapped by Penrod et al. (2013) in the Morgan Hill and Gilroy Subsection. (Alternative 4 would also be at grade through Coyote Valley; however, breaks in the fencing to allow traffic to cross the alignment would also maintain wildlife permeability of existing railroad grade crossings). Alternative 3 would result in more extensive in-water impacts on

aquatic species movement than Alternatives 1, 2, and 4 because of more extensive impacts in Llagas Creek.

While all alternatives would include wildlife undercrossings in locations known to be important for wildlife movement in Coyote Valley, eastern Pacheco Pass, and the Central Valley, these actions would not entirely preclude interference with existing wildlife movement across the alignment. This is particularly true in the locations between wildlife undercrossings of fenced at-grade and embankment portions of the rail where permeability would be further reduced below existing constrained conditions.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the project would interfere substantially with established and potential wildlife corridors. While actions would be implemented before construction to reduce such interference, the presence of HSR facilities would impede wildlife movement through and across the project footprint. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Operations Impacts

Operations are those activities that would take place after the construction phase and during the operational phase of the HSR system. In addition to train operations, these impacts are all those resulting from activities involving stations, parking structures and lots, support facilities, and columns supporting elevated structures. Examples of impact mechanisms that may result from project operations include disturbances from the operating rail line, maintenance activities (including occasional cleaning, inspection, and removal of vegetation and litter from wildlife crossing structures), noise from passing trains, lighting, vibration, and electrocution. Operations impacts are permanent in that they would continue through the life of the rail line; however, the impacts would be intermittent, occurring only periodically.

Behavioral changes could result when the presence of the rail line causes animals to alter or cease their movements in response to rail operations. Behavioral changes can be triggered by noise, vibration, artificial light, or increased activity (e.g., increased human presence at stations or in parking lots, maintenance activities). Behavioral changes may also result when the presence of HSR facilities introduces a resource that can be used by birds and bats. Examples of specific operations impacts include disturbance from noise and vibration, habitat avoidance, habitat loss, and habitat fragmentation.

Impact BIO#44: Intermittent Noise Disturbance of Wildlife Using Corridors during Operations

All four project alternatives would result in noise from O&M. Because of the frequency and speed of trains, noise created by train operations has the potential to affect wildlife movement. Maintenance activities are expected to be dispersed over time and location and are not expected to be of an intensity or duration to result in substantial impacts on wildlife movement.

Terrestrial Species

The response of terrestrial wildlife to noise depends on the timing, intensity, and frequency of the sound, as well as the species' tolerance to noise. In general, species' response to noise may result in behavioral changes (e.g., fleeing or hiding), interference with auditory cues (e.g., interference with mate attraction), or physiological responses (e.g., stress), each of which can result in broader impacts on movement, foraging efficiency, reproductive success, and survival (Francis and Barber 2013).

Impacts of operational noise are considered permanent and direct, though intermittent. Noise generated by train operation falls into three distinct sound categories based on source location, strength, frequency content, directivity, and speed:

- Propulsion or machinery noise
- Mechanical noise resulting from wheel-rail interactions or guideway vibrations

- Aerodynamic noise resulting from airflow moving past the train, including the pantograph (FRA 2012).

The FRA guidance manual *High-Speed Ground Transportation Noise and Vibration Impact Assessment* (FRA 2012) sets forth an interim criterion for evaluating potential impacts on wildlife. The FRA interim criterion is a sound exposure level of 100 A-weighted decibels (dBA) from a single train passby (FRA 2012). Sound exposure level refers to noise exposure from a single noise event and is the primary descriptor of HSR vehicle noise emissions.

Screening distances (i.e., the distance at which noise from the train is at or below the FRA interim criterion for wildlife noise exposure) to determine the impacts on wildlife were calculated (according to guidance set forth in the FRA guidance manual) in the *San Jose to Merced Project Section: Noise and Vibration Technical Report* (Authority 2019c). Animals within the screening distance are likely to experience physiological or behavioral effects. The projections were calculated for a very high-speed electric multiple unit train traveling at a typical speed of 150 miles per hour (mph) and a maximum speed of 220 mph. To provide conservative noise estimates, no shielding by intervening structures was assumed to be present.

The analysis detailed in the WCA (Authority 2020a: Appendix C) determined that only terrestrial wildlife within the screening distance from the HSR centerline (e.g., within 70 feet of an at-grade section with a train traveling at 220 mph) would experience noise effects. The level of impact caused by a particular alternative would be dependent on the potential for wildlife to occur in its vicinity. In general, wildlife has greater potential to occur in areas surrounded by natural or agricultural land cover types than in urban or developed areas.

Aerial Species

As discussed in the WCA, project-related noise added to ambient noise may affect avian and bat species through several mechanisms: permanent hearing damage, temporary hearing damage, arousal, and masking (the mechanism of introduced noise interfering with birds' and bats' ability to hear sounds that are necessary for normal behavioral functions, such as courtship, territorial interaction, detection of predators, echolocation [bats only], and movement associated with foraging and migration) (Authority 2020a: Appendix C). The WCA determined that for birds and bats, three aerial species focal groups—waterfowl, shorebirds, and wading birds (collectively waterbirds)—were vulnerable to noise and were present in populations and concentrations substantial enough to be adversely affected. In the regional RSA, these focal groups are known to congregate in two primary locations: the UPR and GEA IBAs (National Audubon Society 2017a, 2017b). Numerous sensitive species are known to nest, forage, and congregate in large numbers (e.g., sandhill crane in the GEA) at these locations.

The WCA established quantitative noise thresholds for each of the mechanisms:

- Permanent hearing damage: 140 dBA
- Temporary hearing damage: above 93 but less than 140 dBA
- Masking: 84 dBA
- Arousal: 77 dBA

To determine the areal extent of each noise impact, a GIS-based sound model was intersected with all land cover types (except urban or developed types) within the GEA and UPR IBAs.[3] Table 3.7-21 summarizes the acreage impacts for each noise mechanism.

[3] Unlike the GEA IBA, which is purposely flooded to artificially extend the footprint and duration of the managed wetland footprint, the UPR IBA relies on natural rain events for flooding. The UPR IBA boundary more closely resembles the flooding footprint of the 100-year floodplain; consequently, the UPR IBA very rarely floods to its full extent. Because flooding is typically confined to the Soap Lake 10-year floodplain boundary, this is the areal extent that is most vulnerable to noise effects and the noise analysis is accordingly confined to this boundary.

Table 3.7-21 Extent of Noise Impacts by Mechanism

Noise Impact	Impacts on Waterbird Habitat (acres)[1]			
	UPR IBA, Alts 1 and 2	UPR IBA, Alt 3	UPR IBA, Alt 4	GEA IBA, All Alts
Permanent hearing damage (> 140 dBA)	0	0	0	0
Temporary hearing damage (93–140 dBA)	61	85	61	33
Masking (>84 dBA)[2]	197	293	197	188
Arousal (>77 dBA)[3]	817	1,190	829	984

dBA = A-weighted decibel
GEA = Grasslands Ecological Area
IBA = Important Bird Area
UPR = Upper Pajaro River
[1] Waterbird habitat (flooded habitat for waterfowl, shorebirds and wading birds) impacts were conservatively estimated by intersecting the noise impact contours with all land cover types within the GEA IBA except urban. This method is based on the assumption that most of the land within the GEA is flooded by the Grassland Water District in the fall and remains flooded through winter.
[2] Approximate value interpolated between 81 and 93 dBA modeled values.
[3] Approximate value interpolated between 69 and 81 dBA modeled values.

All alternatives would have the same alignment and footprint in the Grasslands IBA. Alternatives 1, 2, and 4 would have the same footprint and alignment in the UPR IBA (i.e., the Soap Lake 10-year floodplain). Because Alternative 3 has a slightly longer extent in the Soap Lake 10-year floodplain, it has potential for a greater impact on waterbirds.

There is also the potential for noise to impact bird overflights; this could affect migratory birds in any part of the alignment in the Grasslands and UPR IBAs, which are within the Pacific Flyway, a major migratory route for many bird species. Noise effect thresholds would be as stated above, except that, since areas at high elevation above ground have very low background noise levels, the masking threshold drops to 34 dBA in the absence of ambient noise sources. Birds flying at distances of less than 50 feet above a train moving at a speed of 220 mph would potentially be at risk of temporary hearing damage; it is however unlikely that birds engaged in migratory flight would be present at such a low altitude, except near times of take-off and landing. Birds in flight are fully active and aware, thus arousal is not a potential impact. Birds in flight do commonly communicate through flight calls, thus masking effects from train passage could disturb such communications. Birds flying at distances of less than 14,500 feet from a train moving at 220 mph would be subject to masking. The effect would be minimized by two considerations; first, the threshold for masking effects is conservatively set at 34 dBA; any background noise the bird might hear, such as the sound of rushing wind, would effectively raise that threshold. Second, masking would only occur during the time that the bird was within 14,500 feet of the moving train. For a bird flying at 13,500 feet above the train, that duration is about 35 seconds, increasing to 100 seconds for a bird 500 feet above the train.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the project would interfere substantially with established wildlife movement corridors. Specifically, noise created by train operations would cause direct intermittent impacts on large congregations of wintering waterbirds in the GEA IBA and on birds in the UPR IBA by interrupting normal movement patterns associated with foraging and causing birds to fly away from approaching trains or avoid habitat along the railway. The loss in food energy gain from these disturbances could have population-level impacts because food availability for wintering birds is a key factor limiting their size (CVJV 2006). Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Impact BIO#45: Intermittent Vibration Disturbance of Wildlife Using Corridors during Operations

Ground vibration is an oscillatory motion of the soil. Operations-related vibration can affect wildlife movement by altering behavior, potentially interfering with access to food sources, exposing animals to predation, or disrupting normal movements. Separating the effects of noise and vibration, which almost always occur in concert, is difficult, and published studies often do not clearly draw this distinction.

The intensity of vibration perceived by wildlife differs depending on the source, distance from the source, the substrate through which the vibration travels, and the animal's ability to perceive vibration. In addition, the potential for vibration to disturb wildlife movement is greater in locations where the rail alignment passes close to or through large patches of undeveloped lands where wildlife is more likely to be present and where background noise and vibration from traffic are minimal. Such areas include Coyote Valley, the Soap Lake floodplain, portions of Pacheco Pass, and the GEA.

The main source of operations-related vibration would be train passage. This vibration would take place throughout the project extent whenever trains pass. For most areas along the project extent, vibration from train passage has low potential to affect wildlife movement for one or more of the following reasons:

- Background noise and vibration levels associated with existing human activity are already quite high.
- The duration of vibration is brief; a train would take approximately 2 seconds to pass any given point, or 3 seconds if vibration impacts are assumed to extend up to 150 feet in front of and behind the train. At a maximum of 176 trains per day that amounts to a total exposure of about 9 minutes per day, or 0.6 percent of the time.
- Train passages would occur primarily during the day, while most activity by vulnerable wildlife receptors (discussed below) is nocturnal.

Vibration effects are most likely to be perceived by species such as reptiles and amphibians, some of which—specifically snakes—are the most vibration-sensitive wildlife species known. However, because the affected species are reasonably common and the impacts would be brief and primarily diurnal (snakes are chiefly nocturnal predators), these vibration impacts are unlikely to cause substantial or long-lasting impacts.

Amphibians are also highly sensitive to vibration, using ground vibration for communication, especially in the process of mate selection; thus, vibration generated by project operations at the time of amphibian breeding has the potential to affect the success of amphibian breeding activities and thereby to affect their population status.

Burrowing rodents, notably kangaroo rats, are potentially sensitive to vibration influences on behavior and on the risk of vibration-caused burrow collapse. Studies involving intensive seismic exploration (Cypher et al. 2016), which generates extensive ground vibrations, did not find evidence of burrow collapse; however, minimization measures, including avoiding kangaroo rat burrows by a buffer distance of at least 10 meters (33 feet), may have avoided such effects. In the context of proposed operations, these findings suggest that exclusion fencing would limit impacts on kangaroo rats, by excluding species' use of habitat within a distance of up to 13 meters (42 feet) from the tracks.

Because vibration is likely to have greater impacts when the alignment profile is at grade, Alternatives 2 and 4 are more likely to result in an impact on wildlife movement than Alternatives 1 and 3. Alternative 3 is likely to cause a greater impact on wildlife movement than Alternative 1 because a longer portion of Alternative 3 overlaps with the Santa Cruz Mountains to Diablo Range wildlife linkage as mapped by Penrod et al. (2013). More of Alternative 3 also overlaps with lands conserved to protect movement corridors.

CEQA Conclusion

The impact under CEQA would be less than significant for all four alternatives. While reptiles, amphibians, and burrowing rodents may perceive ground vibrations caused by passing trains, such vibrations have low potential to affect wildlife movement because they would be of short duration and would occur primarily during the day when most vibration-sensitive wildlife species are inactive. Therefore, CEQA does not require mitigation.

Impact BIO#46: Intermittent Visual Disturbance of Wildlife Using Corridors during Operations

The presence of a moving train on the landscape has the potential to produce a variety of behavioral responses in birds, including heightened alertness (a stress response that can have adverse bioenergetics and other physiological consequences) and flight (a similar but stronger response that may also expose birds to predation). The WCA (Authority 2020a: Appendix C) determined that raptors and waterbirds were vulnerable to visual stimuli within the GEA IBA and Soap Lake 10-year floodplain. The literature identifies two distances at which response to visual stimuli occurs for waterfowl: flight initiation distance (average 269 feet) and minimum approach distance (average 404 feet) (Livezey et al. 2016). The flight initiation distance is assumed to have potential for the greatest impact and was applied as a threshold to determine acres of affected habitat. Alternatives 1, 2, and 4 would affect 173 acres of habitat (i.e., habitat within the 269-foot flight initiation distance) in the Soap Lake 10-year floodplain, and Alternative 3 would affect 244 acres.[4] All four alternatives would affect 524 acres in the GEA IBA.

For raptors, the flight initiation distance from motor vehicles is 262 feet on average (Livezey et al. 2016). If a raptor nest is within this distance of the rail alignment, there is potential for train operations to cause nest abandonment. Alternative 3 has greater potential for visual disturbance of nesting raptors because it would traverse a considerable distance of agricultural lands east of Gilroy, characterized by both nesting habitat and suitable foraging habitat (agriculture and grasslands), in contrast with Alternatives 1, 2, and 4, which would pass through urbanized downtown Gilroy.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the project would interfere substantially with established wildlife movement corridors. Specifically, visual disturbance created by train operations would cause direct intermittent impacts on large congregations of wintering waterbirds (e.g., sandhill crane) in the GEA and UPR IBAs by interrupting normal movement patterns associated with foraging and causing birds to fly away from approaching trains or avoid habitat along the railway. The loss in food energy gain from these disturbances could have population-level impacts because food availability for wintering birds is a key factor limiting their size (CVJV 2006). Passing trains could also cause raptors nesting within 269 feet of the alignment to abandon their nests, reducing reproductive success of affected pairs and viability of local populations. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Impact BIO#47: Intermittent and Permanent Lighting Disturbance of Wildlife Using Corridors during Operations

Terrestrial Species

Nighttime lighting has the potential to affect wildlife movement, in large part because a preponderance of wildlife movement occurs at night (Beier 2006; FHWA 2011). Operational light sources include passing trains and associated rail infrastructure, such as the maintenance of way facility (MOWF) and stations. Nighttime lighting is not expected to affect wildlife movement in urban or developed settings where train and facility lighting would not significantly increase baseline light levels, particularly where these locations do not overlap with known movement

[4] The waterfowl and shorebird habitat is assumed to be all land cover types except urban within the GEA IBA and the Soap Lake 10-year floodplain because all areas have potential to be flooded and provide habitat during fall and winter.

corridors. Conversely, nighttime lighting impacts are expected to be greatest in natural settings, where baseline light levels are low, and in locations where wildlife is known to move. In addition, light impacts from trains are expected to be greatest where the rail is at grade. However, the impacts on movement from train light are likely to be less than those from noise and vibration because noise and vibration travel farther from the centerline than light (which is directed in front of the train).

Because the project alignment and profile are the same for the Pacheco Pass and San Joaquin Valley Subsections, differences between alternatives would be confined to the San Jose Diridon Station Approach, Monterey Corridor, and Morgan Hill and Gilroy Subsections. Although Alternatives 2 and 4 would use the longest extent of at-grade profile, they would follow Monterey Road and an existing rail line, where train light is not expected to markedly increase light levels over baseline conditions. Because Alternative 3 would include at-grade portions in the agricultural area east of Gilroy and would cross more of the Santa Cruz Mountains to Diablo Range wildlife linkage (as modeled by Penrod et al. 2013), it would have the greatest potential to affect wildlife movement as a result of train light. In addition, the East Gilroy MOWF and East Gilroy Station under Alternative 3 would be in an agricultural setting that has lower baseline levels of light than the South Gilroy MOWF and Downtown Gilroy Station under Alternatives 1, 2, and 4.

Aerial Species

Operations activities have the potential to generate light. HSR facilities with security lighting and train headlights produce light that could result in altered movement or foraging patterns in aerial species, particularly in birds. As discussed in the WCA (Authority 2020a: Appendix C), few quantitative studies are available to determine the distance at which this impact may occur; however, published analyses confirm some potential for impact. For example, hunting owls may perch on OCS structures and become disoriented by the headlight of the approaching train, resulting in train strike (Santos et al. 2017). Also, Longcore and Rich (2004) note that birds may become “trapped” by a cone of light, unwilling to exit into darkness. This behavior may elevate train strike risk for birds lit by the headlight of an approaching train.

Security lighting on HSR facilities would be permanent, but such features are not expected to result in a substantial impact on birds because the impacts would be localized and stationary and because most bird species are diurnal.

CEQA Conclusion

The impact under CEQA would be less than significant for all four alternatives. While artificial light from passing trains and HSR track and systems may result in altered movement or foraging patterns of terrestrial and aerial wildlife species, particularly in non-urban areas, such effects would be localized. Therefore, CEQA does not require mitigation.

Impact BIO#48: Mortality Resulting from Train Strike during Operations

Terrestrial Species

Although the entire track alignment would be fenced with an 8-foot chain-link fence, except under Alternative 4 where there are breaks in the fencing for road crossings, it is possible that terrestrial species could enter the alignment and be struck by a moving train. The terrestrial wildlife species most likely to enter the alignment are small species such as mice and ground squirrels. Digging species (e.g., ground squirrels) are of particular concern because once a hole is dug under the fence, other species (e.g., badger, San Joaquin kit fox) may take advantage of it and enter the right-of-way. Also, animals are known to jump (e.g., deer, elk), climb (e.g., mountain lion), or push fences (e.g., elk).

Because terrestrial species are not expected to gain access to elevated sections, it is only at-grade sections that present risk of train strike. Alternatives 2 and 4 would be at grade through most of the Monterey Corridor and Morgan Hill and Gilroy Subsections, but because Alternative 4 has fence breaks at road crossings in this region it presents a greater potential for train strike than Alternatives 1, 2, and 3. Alternative 1 is likely to have the least effect of train strike because Alternative 2 has a long at-grade segment in the Morgan Hill and Gilroy Subsection and Alternative 3 includes a relatively long at-grade segment through the agricultural lands east of

Gilroy. Fencing design criteria to limit terrestrial species from gaining access onto the trackway are described in Chapter 7 of the WCA (Authority 2020a: Appendix C).

Aerial Species

Train operations pose the risk of injury and mortality to aerial species by striking birds or bats flying in the path of passing trains. The WCA (Authority 2020a: Appendix C) determined that all aerial species, including bats, would be vulnerable to train strike. Raptors and carrion feeders are vulnerable because of their potential to forage on carrion on or near the tracks. Blackbirds and other perching birds are vulnerable because they may perch on train infrastructure and be struck when attempting to fly away from passing trains. Aerial foragers and raptors are vulnerable while foraging close to the ground. Waterfowl, shorebirds, and wading birds are vulnerable to strike where their primary habitat is close to the rail because of their long, low take-off trajectories. Finally, bats may roost in train infrastructure such as viaducts or tunnel entrances, increasing the potential for train strike.

Nevertheless, quantifying the severity of the impact is difficult. For special-status species with low reproductive rates such as the California condor, Swainson's hawk, sandhill crane, and golden eagle, the loss of one individual would be a substantial impact. For more common species, the injury or mortality of a small portion of the local or regional population is not likely to be a substantial impact.

Within the GEA IBA specifically, waterfowl, shorebirds, and wading birds are known to congregate in relatively large numbers, and intermittent strike of these special-status species could affect the abundance and local or regional populations of these species over time. While condor numbers are very low in the region, and there is no evidence of nesting, train strike has potential to affect the distribution and abundance of local or regional populations of the species. CDFW tracking data confirm condor flights over the proposed rail alignment in western Pacheco Pass near Casa de Fruta; consequently, there is potential for individuals to be struck by the train while attempting to forage on carrion on or near the alignment.

The comparative risk for train strike between alternatives is primarily determined by rail profiles in the Morgan Hill and Gilroy Subsection. Portions of the alignment in urban areas of San Jose are not likely to pose a risk of train strike to special-status aerial species, and the Pacheco Pass and San Joaquin Valley Subsections are identical across alternatives. Alternative 3 poses a greater risk of train strike than Alternatives 1, 2, and 4 because it passes closer to Coyote Creek where riparian species—perching species and raptors in particular—are more likely to occur. Because bats are known to roost closer to water sources, they too may have greater potential to occur in this region. Also, Alternative 3 crosses a greater extent of the 10-year floodplain in the Soap Lake region.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the project would interfere substantially with established native wildlife movement corridors. Project operations could cause direct mortality and injury of terrestrial and aerial wildlife trying to cross the alignment during operations. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Impact BIO#49: Injury and Mortality Resulting from Power Line Strike during Operations

Collisions with power lines, OCS, traction power station strain gantry, or other traction power facilities, or wireless communications facilities pose the risk of injury and mortality to aerial species. The WCA (Authority 2020a: Appendix C) concluded that all aerial species except bats would be vulnerable to collision with power lines. No studies have been found addressing the risk of electric line strike in bats, but it is presumed to be low because bats possess excellent echolocation abilities that should allow them to detect and evade wires.

Prior to construction, the Authority would design the OCS and other structures (e.g., fencing) to be bird- and raptor-safe in accordance with applicable Avian Power Line Interaction Committee (APLIC) recommendations (APLIC 2006, 2012) (BIO-IAMF#12). Design modifications would include installation of line marking devices on existing or new power lines in and near the project

footprint. Such modifications would help to minimize collisions between birds that fly away from approaching trains and power lines. These modifications, in concert with the distance between OCS lines and grounds, would also minimize the risk of electrocution. As discussed for train strike, HSR infrastructure could influence behavior by introducing features and substrates that could attract aerial species to the guideway, thus putting them at risk of electric line strike. Most raptors possess keen vision and high flight maneuverability that likely helps to reduce risks of electric line strike, but they could still be vulnerable during times of limited visibility. Carrion-feeding birds, if foraging along the guideway, could be at increased risk of electric line strike. BIO-IAMF#12 would require that the OCS, fencing, and power lines be designed to be bird and raptor safe in accordance with APLIC guidance.

Because all four project alternatives would use the same electric line design attributes, potential differences in electric line strike risk, like those associated with train strike, are primarily determined by geography—the location of the proposed alignment—and, for certain focal groups, by track profile. For example, burrowing owls at San Jose International Airport may be at greater risk of electric line strike under Alternatives 1 and 4 than under Alternatives 2 and 3 because the former would use an embankment or at-grade profile near the burrowing owl population, while the others would use viaduct. Owls and other low-flying birds are more likely to fly beneath the viaduct and its OCS system than to attempt to fly through it, but they would fly over the embankment, risking electric line strike. Additionally, locations known to support large concentrations of waterfowl, shorebirds, and wading birds, such as the GEA IBA, would present a higher risk of injuries or fatalities from power line strike than other locations.

Because the alternatives are the same in the Pacheco Pass and the San Joaquin Valley subsections, the differences between alternatives are primarily isolated to the relatively undeveloped parts of the rail alignment where birds might congregate such as in or around Coyote Creek or the UPR IBA. In the Coyote Creek area, Alternatives 2 and 4 would follow Coyote Creek for about 30 percent less distance than Alternatives 1 and 3. Because of the shorter distance of high-quality habitat that they would pass through, Alternatives 2 and 4 would likely pose less risk of electric line strike to raptors and perching birds that are more likely to use the riparian area than Alternatives 1 and 3.

The UPR IBA is important for all focal groups, and because of its abundant aquatic habitats it is particularly important to waterbirds. Alternatives 1, 2, and 4 would traverse 8.3 miles of the UPR IBA, while Alternative 3 would traverse 3.9 miles. However, because Alternative 3 would pass through more of the Soap Lake 10-year floodplain, the area of most intensive waterbird use, it may pose a risk of train strike comparable to that of Alternatives 1, 2, and 4.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because new power lines associated with project infrastructure could cause injury and mortality of birds in the GEA and UPR IBAs and carrion-feeding birds such as California condor. Project features would require that power lines be designed in accordance with bird-safe APLIC guidance. While useful for some aspects of the project (e.g., lines between traction power facilities and existing PG&E power lines), this guidance is primarily intended for power lines owned and operated by large-scale electrical utilities and does not address smaller design features of linear transportation infrastructure. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Impact BIO#50: Mortality Resulting from Entrapment in OCS Poles during Operations

European studies (Malo et al. 2016) have identified mortality associated with perching birds that fall into tubular steel OCS poles. This potential impact would be avoided by designing OCS poles to prevent this possibility, either by avoiding use of tubular metal poles or by capping the openings of such poles, as described in Chapter 7 of the WCA (Authority 2020a: Appendix C). This design feature would reduce the risk of aerial species mortality at OCS poles to a negligible level, and the difference between alternatives would be indistinguishable.

CEQA Conclusion

This impact would be less than significant under all alternatives because the minor design modification of capping tubular OCS poles would eliminate this risk. Therefore, CEQA does not require mitigation.

3.7.7.8 Conservation Areas

No Project Impacts

The conditions describing the No Project Alternative are the same as those described in Section 3.7.6.2. The same planned development and transportation projects would generally result in increases in VMT, construction of new impervious surfaces, and conversion of land cover types to transportation uses, all of which could affect conservation areas.

Under the No Project Alternative, recent development trends are anticipated to continue, leading to impacts on biological and aquatic resources and wetlands. Future changes in land use or allowable density of development, as well as ground disturbance associated with future infrastructure improvements such as highway expansions to accommodate population growth, would have impacts on conservation areas similar to those that have resulted from past development, such as habitat loss, fragmentation, and degradation, caused by the encroachment of new development into areas near or adjacent to conservation areas.

Project Impacts

Construction and operations of the project would result in permanent and temporary impacts on conservation areas, including public lands (refuges and ecological reserves), conservation easements, and mitigation banks. All aspects of construction and operations have the potential to cause impacts, either from direct removal of habitat or from indirect impacts such as the introduction of invasive species. The impact mechanisms for biological and aquatic resources described in the above sections would occur in conservation areas that support these resources. In addition, permanent and temporary impacts in conservation areas would affect existing land management activities and infrastructure intended to conserve these resources on affected lands.

Construction Impacts

Impact BIO#51: Permanent Conversion or Degradation of Conservation Areas

Construction of the HSR track and systems in all subsections except the Monterey Corridor Subsection would have direct and indirect impacts on conservation areas. Construction activities would permanently convert or fragment and temporarily disturb conservation lands in the project footprint. Construction activities also have potential to alter management and affect existing infrastructure on conservation lands.

The Authority has incorporated BIO-IAMF#1, BIO-IAMF#3, BIO-IAMF#5, BIO-IAMF#8, BIO-IAMF#9, BIO-IAMF#10, and BIO-IAMF#11 (described in Impact BIO#1) into project design to avoid and minimize impacts on conservation areas. Tunnels would be designed and constructed to avoid or minimize groundwater inflows into tunnels during construction that may affect surface water resources overlying the tunnel alignment (IAMF-HYD#5), including those within conservation areas.

The areal extent of conversion and disturbance of conservation areas as a result of construction would be greatest under Alternative 3 and least under Alternative 1 (Table 3.7-22). The magnitude of permanent impacts by alternative would be, in descending order, 480.8 acres under Alternative 3; 432.2 acres under Alternative 2; 426.8 acres under Alternative 4; and 426.7 acres under Alternative 1. The extent of temporary impacts, in descending order, would be 159.2 acres under Alternative 3; 152.5 acres under Alternative 2; 145.7 acres under Alternative 1; and 139.8 acres under Alternative 4. The preponderance of direct impacts would be on the Soap Lake Properties, the Pacheco Creek Preserve, and the Romero Ranch Conservation Easement in the Morgan Hill and Gilroy and Pacheco Pass Subsections, respectively. Impacts on the Pacheco Creek Preserve and Romero Ranch Conservation Easement would be identical for all alternatives. Alternative 3 would affect substantially more of the Soap Lake Properties than the other three alternatives, which are similar. Only Alternatives 2 and 3 would permanently affect the Silacci Conservation Area, although Alternative 1 would have a minimal temporary impact.

Table 3.7-22 Direct Impacts on Conservation Areas by Project Alternative (acres)

Conservation Area Name	Owner/Manager/Easement Holder	Alt 1		Alt 2		Alt 3		Alt 4	
		Perm	Temp	Perm	Temp	Perm	Temp	Perm	Temp
Fisher Creek Conservation Easement	Silicon Valley Land Conservancy	0.0	0.2	0.0	0.2	0.0	0.2	0.0	0.1
Mud Slough Conservation Easement	California Department of Fish and Wildlife	4.2	1.7	4.2	1.7	4.2	1.7	4.2	1.7
Romero Ranch Conservation Easement	The Nature Conservancy	352.1	112.7	352.1	112.7	352.1	112.7	352.1	112.7
Coyote Creek Parkway	City of Santa Clara Parks & Recreation	2.4	9.6	3.4	11.2	2.4	9.6	0.3	3.5
Guadalupe River Park and Gardens	City of San Jose	0.0	0.3	0.0	0.3	0.0	0.3	0.0	0.0
Pacheco Creek Reserve	Santa Clara Valley Habitat Agency	23.2	4.2	23.2	4.2	23.2	4.2	23.2	4.2
Pajaro River Agricultural Preserve	Santa Clara County Open Space Authority	1.7	0.0	1.7	0.0	1.7	0.0	1.7	0.0
Pajaro River Mitigation Bank	Wildlands, Inc.	0.0	0.0	0.0	0.0	6.2	3.7	0.0	0.0
Soap Lake Properties	The Nature Conservancy	43.1	16.8	43.1	16.8	82.4	21.8	45.3	17.6
Silveira	City of Santa Clara Parks & Recreation	0.0	0.0	2.7	5.0	0.0	0.0	0.0	0.0
Tulare Hill Land Bank	City of Santa Clara Parks & Recreation	0.0	0.0	1.8	0.2	0.0	0.0	0.0	0.0
Silacci	Santa Clara County Open Space Authority	0.0	0.2	0.0	0.2	8.6	5.0	0.0	0.0
Total Acres Affected		**426.7**	**145.7**	**432.2**	**152.5**	**480.8**	**159.2**	**426.8**	**139.8**
Number of Conservation Areas Affected		**9**		**11**		**10**		**7**	

Sources: GreenInfo Network 2016a, 2016b
Temp = temporary
Perm = permanent

As discussed in Impact BIO#1, construction of Tunnel 2 could have temporary indirect impacts on the hydrology of groundwater-dependent surface water features, including those within the Pacheco Creek Reserve (Pacheco Creek and associated riparian vegetation), Cottonwood Creek Wildlife Area (ponds, streams, and wetlands), and Romero Ranch Conservation Easement (ponds, streams, and wetlands). Any reductions in groundwater supply to such features could temporarily reduce their habitat value and function.

While pre-construction and construction actions to protect conservation areas are part of the project, these actions would not prevent the conversion and temporary disturbance of such areas in the project footprint, nor would they completely eliminate the risk of long-term degradation of such lands outside the project footprint. Construction could result in the fragmentation or modification of a conservation area such that its purpose is no longer viable (e.g., an easement established to preserve a wildlife corridor may become ineffective if it is fragmented or bisected by HSR track and systems). Accidental discharge of hazardous substances (e.g., oil, gasoline) could degrade habitat that supports sensitive species. The introduction of invasive nonnative plants could alter the species composition of conservation lands, rendering them less able to support the sensitive communities.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the affected conservation areas contain land cover types that provide habitat for special-status species, support special-status plant communities (including riparian habitat) or aquatic resources, support wildlife movement corridors, or any combination of these. Consequently, impacts on conservation areas could have a substantial adverse effect on special-status species, riparian habitat, special-status plant communities, state and federally protected aquatic resources, and wildlife movement corridors. While actions would be implemented before and during construction to reduce the loss or degradation of conservation lands, the project would result in loss and degradation of such lands, as well as noise- and vibration-related disturbance and the possible spread of invasive nonnative plant species beyond the project footprint that could adversely affect sensitive resources. Mitigation measures to reduce this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Operations Impacts

Impact BIO#52: Introduction of Invasive Species or Contaminants into Conservation Areas during Operations

Project operations could have indirect impacts on conservation areas in all subsections. Direct impacts on conservation areas are not expected from operations. The primary operations activities affecting conservation areas would be routine inspections and maintenance of the HSR right-of-way. Where these activities would occur within the HSR right-of way, they have the potential to introduce contaminants from spills and to introduce invasive nonnative species to adjacent lands. These impacts could degrade habitat for special-status species, special-status plant communities, aquatic resources, and wildlife corridors, reducing the long-term viability of a conservation area. The Authority has incorporated BIO-IAMF#4 in project specifications to address introduction of invasive species or contaminants associated with such activities.

All project alternatives would be similar in their potential to cause these impacts. However, Alternative 3 would result in the most permanent impacts (Table 3.7-22) and, by extrapolation, the most indirect impacts during the operational period. Effects of project operations on special-status species, non-special-status species, special-status plant communities, aquatic resources, protected trees, and wildlife movement would also occur in conservation areas where such resources are present. These effects are described in the preceding impact discussions.

CEQA Conclusion

The impact under CEQA would be less than significant for all four alternatives because operations activities would be conducted in areas that have already been subjected to extensive

ground disturbance and construction activities. Moreover, these activities would be intermittent and widely dispersed spatially. Therefore, CEQA does not require mitigation.

3.7.7.9 Habitat Conservation Plans

No Project Impacts

The conditions describing the No Project Alternative are the same as those described in Section 3.7.6.2. The same planned development and transportation projects would generally result in increases in VMT, construction of new impervious surfaces, and conversion of land cover types to transportation uses, all of which could affect the viability of existing HCPs.

Under the No Project Alternative, recent development trends are anticipated to continue, leading to impacts on biological and aquatic resources and wetlands. Future changes in land use or allowable density of development, as well as ground disturbance associated with future infrastructure improvements such as highway expansions to accommodate population growth, would have impacts on HCP areas similar to those that have resulted from past development, such as habitat loss, fragmentation, and degradation, caused by the encroachment of new development into areas near or adjacent to such areas.

Project Impacts

Construction of the project could conflict with three HCPs: the SCVHP, the Greenprint, and the *Coyote Valley Landscape Linkage* report. The SCVHP is an adopted HCP and NCCP prepared pursuant to Section 10 of the FESA and the NCCPA. Its provisions are expressed through an organizing hierarchy of biological goals, biological objectives, and two primary types of actions: acquisition actions, which address the acquisition of conservation areas; and management actions, which address the management of conservation areas. Each biological goal is implemented through the pursuit of one or more biological objectives, and some biological objectives require an acquisition or management action. Therefore, a conflict could occur if construction and operation of any project alternative would result in a failure to achieve any acquisition or management action specified under the SCVHP, and if such a failure would thereby preclude achieving a biological goal or objective of the SCVHP. Table I-1 in Appendix I of the Biological and Aquatic Resources Technical Report (Authority 2020a) summarizes potential conflicts with regard to each action in the SCVHP.

The Greenprint is an approved local plan for conserving habitats. Its provisions are expressed through an organizing hierarchy of goals and strategies. Each biological goal is implemented through the pursuit of one or more strategies. Therefore, a conflict could occur if construction or operation of any project alternative would result in a failure to implement any strategy specified under the Greenprint. Table I-2 in Appendix I of the Biological and Aquatic Resources Technical Report (Authority 2020a) summarizes potential conflicts with regard to each strategy in the Greenprint.

The *Coyote Valley Landscape Linkage* report is an approved local plan for identifying, protecting, and restoring areas essential for wildlife movement in Coyote Valley. Several land purchases consistent with the goals of the report have been made or are in process and wildlife crossing modifications are in the planning stage. Therefore, a conflict could occur if construction or operation of any project alternative would prevent any land purchases or impair wildlife crossing modifications associated with the report.

Construction Impacts

Impact BIO#53: Conflict with Santa Clara Valley Habitat Plan

As shown in Table I-1 in Appendix I of the Biological and Aquatic Resources Technical Report (Authority 2020a), the project has potential to conflict with three actions required by the SCVHP. No other potential conflicts with the SCVHP are anticipated. The three potential conflicts would be the same under all four project alternatives:

- Action LAND-L4 requires the acquisition and enhancement of natural and semi-natural landscapes between the Santa Teresa Hills and Metcalf Canyon to the south that will contribute to providing connectivity between the Santa Cruz Mountains and Diablo Range to promote the movement of covered and other native species at many spatial scales.
- Action LAND-WP7 requires the acquisition of habitat near Santa Teresa Hills and Tulare Hill to provide connectivity between populations in the Diablo Range and the Santa Cruz foothills.
- Action LAND-R3 requires the acquisition in fee title of or obtaining conservation easements on lands that protect at least 40 acres of existing California sycamore woodland (i.e., sycamore alluvial woodland) to preserve this rare land cover type in the SCVHP Plan Area. The biological objective that includes this action (Objective 9.2) further specifies that acquired stands should be at least 10 acres in size and contiguous.

The project would affect connectivity between the Diablo Range and the Santa Cruz foothills, creating a potential conflict with Actions LAND-L4 and LAND-WP7 of the SCVHP. Impacts on connectivity between the Diablo Range and the Santa Cruz Mountains are discussed in more detail in the WCA (Authority 2020a: Appendix C).

There are two potential conflicts with Action LAND-R3 of the SCVHP: impacts on the Pacheco Creek Reserve, a property owned and managed by the SCVHA; and a lack of available acres of California sycamore woodland to meet the combined preservation and restoration needs of the SCVHA and the Authority. The SCVHA acquired the 55.4-acre Pacheco Creek Reserve in 2017 because the property would address goals and objectives of the SCVHP, including Action Land-R3 (under Objective 9.2 in the SCVHP) (SCVHA 2019), which commits to the acquisition of at least 40 acres of large (at least 10 acres), contiguous stands of California sycamore woodland (County of Santa Clara et al. 2012). The reserve includes an 8.2-acre contiguous stand of sycamore alluvial woodlands, of which the project would affect 2.7 acres (0.4 acre permanent, 2.3 acres temporary). An impact on an existing reserve owned and managed by the SCVHA for the purposes of meeting the requirements under the SCVHP would be a potential conflict.

California sycamore alluvial woodland is a rare natural community type. Consequently, opportunities to preserve and restore or enhance sycamore alluvial woodland may be limited, posing a potential conflict between the Authority and the SCVHA. The SCVHP will need to preserve 54 acres of sycamore alluvial woodland if all impacts described in the SCVHP are incurred (County of Santa Clara et al. 2012). Because the Pacheco Creek Reserve includes 8.2 acres of sycamore alluvial woodland,[5] the remaining need is 45.9 acres. However, because the project would permanently affect 0.4 acre, the remaining acquisition needed to achieve the goal and objectives of the SCVHP (if all impacts are incurred) is 45.5 acres.

The Authority would need to acquire 37.2 acres of California sycamore woodland to mitigate project impacts. Therefore, the combined acquisition need for the project and the HCP is 82.7 acres. Based on mapping by H.T. Harvey (SFEI and H. T. Harvey 2017) and the Authority (2016), it is estimated that there are 2,544 acres of available (unprotected) lands with opportunity for California sycamore woodland preservation and enhancement, 1,814 acres of which are in the Pajaro River HUC-8 watershed (where the impact would occur) and 730 acres of which are in the nearby Coyote Creek HUC-8 watershed. The combined mitigation need for the SCVHP and HSR of 82.7 acres totals 3.3 percent of the estimated available lands. Consequently, meeting the combined mitigation needs for the SCVHP and HSR is feasible and there is no conflict between the SCVHA and the Authority in terms of the limited availability of California sycamore woodland for preservation.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the project would result in impacts within the Pacheco Creek Reserve—an area protected in partial fulfillment of

[5] The Pacheco Creek Reserve also includes areas identified by SEFI and H.T. Harvey & Associates (2017) as suitable for restoration of sycamore alluvial woodland, thus potentially contributing to the future restoration goals (i.e., 10-acre contiguous stands) of the SCVHA.

Action LAND-R3 of the SCVHP, resulting in a potential conflict. Project construction would affect riparian habitat within Pacheco Creek Reserve, including a patch of California sycamore woodland. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Impact BIO#54: Conflict with Santa Clara Valley Greenprint

As shown in Table I-2 in Appendix I of the Biological and Aquatic Resources Technical Report (Authority 2020a), the analysis of potential conflicts from construction of the project identified one potential conflict related to Strategy 3 in the Greenprint. Strategy 3 includes the goal of protecting and maintaining connections between large open-space parcels to provide large habitat blocks, critical linkages, and climate resilience.

In addition, the Greenprint identifies 10 conservation focus areas: Baylands, Upper Penitencia Creek/East Foothills, Upper Alameda Creek, Coyote Ridge, Coyote Valley, Upper Coyote Creek, Southern Santa Cruz Mountains, Sargent Hills, UPR, and Pacheco Creek. Of these areas, only the Coyote Valley, UPR, and Coyote Creek have any potential to be affected by the project (all alternatives). The Greenprint sets forth no quantitative goals or strategies designated for any of these areas; rather, "the Valley Greenprint will be implemented through a series of strategic implementation plans that will identify specific high-priority initiatives and actions" (SCVOSA 2014). Strategic implementation plans for these three areas have not yet been prepared. Accordingly, there is no potential conflict with the Greenprint with regard to impacts on conservation focus areas.

Certain land parcels—the contiguous Bloomfield North and Bloomfield South easements—have already been protected by the SCVOSA and accordingly constitute functional elements in implementation of the Greenprint. Alternative 3 would bisect both parcels with a guideway on viaduct and part of the footprint for the existing Gilroy Station. These parcels, however, have been protected consistent with the agricultural lands protection goal of the Greenprint, rather than with its habitat conservation goals. Therefore, impacts on these parcels are not evaluated.

The project would not prevent the successful implementation of any Greenprint strategy and would not preclude implementation of the Greenprint in any of the conservation focus areas that would be affected by the project, nor would the impacts on conservation parcels result in a substantial impact on Greenprint implementation. Accordingly, it follows that the project alternatives would not conflict with implementation of the Greenprint.

CEQA Conclusion

The impact under CEQA would be less than significant for all four alternatives because, while the Greenprint sets forth goals calling for maintaining and protecting connectivity for wildlife movement, it has not established specific or quantitative targets. An identified area—the contiguous Bloomfield North and Bloomfield South parcels—has been protected under agricultural conservation easements rather than conservation plan protections. Accordingly, in the absence of quantitative targets, the project would not conflict with quantitative targets. Because project mitigation measures are designed to maintain connectivity for wildlife to the extent feasible, the project is not inconsistent with the Greenprint. Therefore, CEQA does not require mitigation.

Impact BIO#55: Conflict with Coyote Valley Linkage

As shown in Table I-3 in Appendix I of the Biological and Aquatic Resources Technical Report (Authority 2020a), the construction of the project alternatives would result in potential conflicts with recommended wildlife crossing modifications proposed under the Coyote Valley Linkage. The Coyote Valley Linkage identified 24 wildlife crossing modifications, of which 11 would be potentially affected by the project alternatives (Table 3.7-23).

Table 3.7-23 Summary of Potential Conflicts with Wildlife Crossing Modifications Described in the Coyote Valley Linkage

Recommended Crossing Modification	Summary of Potential Impacts
Metcalf Bridge is a restoration opportunity to convert the entire roadway to a wildlife crossing by vegetating one or more lanes.	Under Alternatives 1 and 3, the alignment would be on viaduct in this location. Monterey Road would be shifted east by approximately 40 feet. An overpass in this location would have to be raised to span the elevated track and provide the necessary clearance over the OCS (27 feet). In addition, the span would have to be longer to cross the additional width created by the HSR footprint. Alternative 2 would be at grade, resulting in the need for the UPRR to be shifted west by approximately 50–75 feet (depending on the exact location); Alternative 4 is also at grade, but would not result in the need for a shift because the HSR footprint occurs within the UPRR right-of-way. An overpass in this location would have to be raised to span HSR with the necessary clearance over the OCS (27 feet). In addition, the span would have to be longer to cross the additional width created by the HSR footprint. While implementation of HSR may result in a wildlife overpass that is incrementally longer under Alternatives 1, 2, and 3, all alternatives include a new wildlife underpass under HSR, UPRR, and Monterey Road near Tulare Swale, just south of Metcalf Canyon Road, and enhancements to the Fisher Creek undercrossing.
Monterey Road would involve the replacement of portions of the existing median barrier with a barrier that is more permeable to wildlife.	Alternatives 1 and 3 would replace the existing impermeable barrier with one that includes 5-foot-wide breaks approximately every 0.3 mile to allow wildlife movement across Monterey Road. Alternative 2 would be on embankment along the Monterey Road corridor and would be continuously fenced; the fencing would not be permeable to wildlife that currently moves through openings in the existing Monterey Road barrier at certain roadway intersections. Alternative 4 would be at grade, predominantly within the existing UPRR right-of-way along the Monterey Road corridor, and would be continuously fenced except where there are breaks at at-grade roadway crossings. Under all alternatives, a new wildlife underpass under HSR, UPRR, and Monterey Road would be created near Tulare Swale, just south of Metcalf Canyon Road, and enhancements would be made to the Fisher Creek culvert. Under Alternatives 1 and 2, new underpasses under HSR, UPRR, and Monterey Road would be created at the following Monterey Road intersections: Emado Road, Laguna Avenue/Fisher Road, Richmond Avenue, Fox Lane, Paquita Espana Court, Kalana Avenue, and Live Oak Avenue.
Fisher Creek and Monterey Road culvert is a restoration opportunity to remove riprap and reengineer to make the culvert more permeable to wildlife.	Under Alternatives 1 and 3, the Fisher Creek culvert under Monterey Road would be lengthened by approximately 35–40 feet but the culverts under UPRR, HSR and Monterey Road would be increased in width and height resulting in an increase in openness (width x height / length); an increase in openness is considered an improvement for wildlife movement. The greater the openness, the greater the potential for use by larger animals such as mountain lions and deer. Under Alternative 2, a culvert would be placed between the existing structures under UPRR and Monterey Road, extending the length of the proposed culvert by approximately 50–75 feet. Under Alternative 4, the Fisher Creek culvert would not be modified. Under Alternatives 2 and 4, the Fisher Creek culvert would be increased in height and width to improve openness from existing conditions.
Metcalf (#1) would be an overpass approximately 175 feet long.	See summary above for Metcalf Bridge.

Recommended Crossing Modification	Summary of Potential Impacts
Tulare Swale (#3) would be an underpass approximately 175–200 feet long.	As described above, a new undercrossing comprised of three culverts, each between 8 and 11 feet high, 30–40 feet wide and 175–200 feet long, would be constructed as part of HSR under all four alternatives.
Fisher Creek (#4) would entail modifications to an existing underpass to reduce seasonal flooding.	Under all alternatives, existing and new Fisher Creek culverts would maintain the existing hydrologic condition. The project would increase the engineering complexity and cost of modifications to the existing underpass to improve conveyance of seasonal flood flows.
Blanchard (#5) would entail an underpass approximately 125 feet long.	Under Alternatives 1 and 3, an underpass in this location would have to be extended by approximately 35–40 feet and avoid placement directly under a viaduct footing; under Alternative 2, an underpass in this location would have to be lengthened by approximately 50–75 feet. Alternative 4 would not require any changes to the design or dimensions of an underpass at Blanchard Road. An increase in the undercrossing length under Alternatives 1, 2, or 3 would result in additional engineering complexity and cost. After evaluation of feasibility and functionality of a wildlife undercrossing in this location under Alternatives 2 and 4, one was not proposed at Blanchard Road. Emado Road was deemed a more appropriate location.
Emado (#6) would entail an underpass approximately 175 feet long.	Under Alternatives 1 and 3, an underpass in this location would have to be extended by approximately 35–40 feet and avoid placement directly under a viaduct footing; under Alternative 2, an underpass in this location would have to be lengthened by approximately 50–75 feet. Alternative 4 would not require any changes to the design or dimensions of an underpass at Emado Road. Under Alternatives 2 and 4, a wildlife undercrossing 15 feet high and 40 feet wide would be constructed in the vicinity of Emado Road.
Bailey (#7) would entail an overpass (or an underpass; see below for an evaluation of the underpass) (no detail on length provided in the Coyote Valley Linkage).	Under Alternatives 1 and 3, the alignment would be on viaduct in this location. Monterey Road would be shifted east by approximately 40 feet. An overpass for wildlife in this location would have to be raised to span the elevated track and provide the necessary clearance over the OCS (27 feet) under Alternatives 1 and 3. In addition, the span would have to be longer to cross the additional width created by the HSR footprint. Alternative 2 would be at grade, resulting in the need for the UPRR to be shifted west by approximately 50–75 feet (depending on the exact location); Alternative 4 would be at grade within the UPRR right-of-way and would not require a shift. An overpass in this location under Alternatives 2 and 4 would have to be raised to span HSR with the necessary clearance over the OCS (27 feet). In addition, the span would have to be longer to cross the additional width created by the HSR footprints of Alternatives 1, 2, and 3.
Bailey (#7) would entail an underpass (or an overpass; see above for an evaluation of the overpass) (no detail on length provided in the Coyote Valley Linkage).	Under Alternatives 1 and 3, an underpass in this location would have to be extended by approximately 35–40 feet to avoid placement directly under a viaduct footing; under Alternative 2, an underpass in this location would have to be lengthened by approximately 50–75 feet. Alternative 4 would not require lengthening. A wildlife undercrossing is not proposed at Bailey Road, but undercrossings are proposed north and south of Bailey Road at Emado and Laguna Avenues, respectively.

Recommended Crossing Modification	Summary of Potential Impacts
Laguna (#8) would entail an underpass less than 200 feet in length.	Under Alternatives 1 and 3, an underpass in this location would have to be extended by approximately 35–40 feet and avoid placement directly under a viaduct footing; under Alternative 2, an underpass in this location would have to be lengthened by approximately 50–75 feet. No lengthening would be needed under Alternative 4. Under Alternatives 2 and 4, a wildlife undercrossing 15 feet high and 40 feet just south of Laguna Avenue (Fisher Road) is part of the proposed project.

HSR = high-speed rail
ROW = right-of-wayOCS = overhead contact system
UPRR = Union Pacific Railroad

Impacts on the wildlife crossing modifications proposed under the Coyote Valley Linkage vary with alternative as shown in Table 3.7-23. In locations where a specific length is proposed, the project alternatives would necessitate increasing the length of the crossings. Generally, Alternative 2 would increase the lengths more than Alternatives 1, 3, or 4. Additionally, all project alternatives would increase the complexity and cost of implementing the crossing modifications.

CEQA Conclusion

The impact under CEQA would be significant for all four alternatives because the project would conflict directly with the provisions of an adopted HCP. The project alternatives could potentially conflict with wildlife crossing locations recommended by the Coyote Valley Linkage to various degrees, but the project would effectively implement most of the study recommendations. Mitigation measures to address this impact are identified in Section 3.7.10, CEQA Significance Conclusions. Section 3.7.8, Mitigation Measures, describes these measures in detail.

Operations Impacts

Project operations are not expected to have any conflicts with the SCVHP, Coyote Valley Linkage, or the Greenprint. Therefore, the project alternatives would not have any impacts on an approved HCP.

3.7.8 Mitigation Measures

The mitigation measures described in this section would be implemented to address impacts on biological and aquatic resources. Terms and conditions of permits issued by the USFWS, CDFW, USACE, and SWRCB would also be implemented. Table 3.7-24 shows the application of the mitigation measures by alternative. The majority of the mitigation measures described in this section do not involve ground disturbance or other activities and thus are not likely to result in any secondary impacts. Several measures—those which would involve ground disturbance—could result in secondary impacts; these are discussed where appropriate in this section.

Table 3.7-24 Mitigation Measures for Impacts on Biological and Aquatic Resources by Alternative

Mitigation Measure	Alternative 1	Alternative 2	Alternative 3	Alternative 4
BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan	X	X	X	X
BIO-MM#2: Prepare and Implement a Weed Control Plan	X	X	X	X
BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones	X	X	X	X
BIO-MM#4: Conduct Monitoring of Construction Activities	X	X	X	X

Mitigation Measure	Alternative 1	Alternative 2	Alternative 3	Alternative 4
BIO-MM#5: Limit Vehicle Traffic and Construction Site Speeds	X	X	X	X
BIO-MM#6: Establish and Implement a Compliance Reporting Program	X	X	X	X
BIO-MM#7: Conduct Botanical Surveys for Special-Status Plant Species and Special-Status Plant Communities	X	X	X	X
BIO-MM#8: Prepare and Implement Plan for Salvage, Relocation, and/or Propagation of Special-Status Plant Species	X	X	X	X
BIO-MM#9: Prepare and Implement a Groundwater Adaptive Management and Monitoring Plan	X	X	X	X
BIO-MM#10: Prepare and Implement a Compensatory Mitigation Plan for Species and Species Habitat	X	X	X	X
BIO-MM#11: Implement Measures to Minimize Impacts during Off-Site Habitat Restoration, or Enhancement, or Creation on Mitigation Sites	X	X	X	X
BIO-MM#12: Provide Compensatory Mitigation for Impacts on Listed Plant Species	X	X	X	X
BIO-MM#13: Implement Work Stoppage	X	X	X	X
BIO-MM#14: Avoid Direct Impacts on Bay Checkerspot Butterfly Host Plants	X	X	X	X
BIO-MM#15: Prepare and Implement Bay Checkerspot Butterfly Protection Plan	X	X	X	X
BIO-MM#16: Provide Compensatory Mitigation for Impacts on Bay Checkerspot Butterfly Habitat	X	X	X	X
BIO-MM#17: Conduct Pre-Construction Surveys for Vernal Pool Wildlife Species	X	X	X	X
BIO-MM#18: Implement Seasonal Vernal Pool Work Restriction	X	X	X	X
BIO-MM#19: Implement and Monitor Vernal Pool Avoidance and Minimization Measures within Temporary Impact Areas	X	X	X	X
BIO-MM#20: Provide Compensatory Mitigation for Impacts on Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp Habitat	X	X	X	X
BIO-MM#21: Implement Avoidance Measures for Elderberry Shrubs outside Permanent Impact Areas	X	X	X	X
BIO-MM#22: Provide Compensatory Mitigation for Impacts on Valley Elderberry Longhorn Beetle Habitat	X	X	X	X
BIO-MM#23: Conduct Surveys and Implement Avoidance Measures for Crotch Bumble Bee	X	X	X	X

Mitigation Measure	Alternative 1	Alternative 2	Alternative 3	Alternative 4
BIO-MM#24: Provide Compensatory Mitigation for Impacts on Crotch Bumble Bee	X	X	X	X
BIO-MM#25: Prepare Plan for Dewatering and Water Diversions	X	X	X	X
BIO-MM#26: Prepare and Implement a Cofferdam Fish Rescue Plan	X	X	X	X
BIO-MM#27: Prepare and Implement an Underwater Sound Control Plan	X	X	X	X
BIO-MM#28: Provide Compensatory Mitigation for Impacts on Steelhead Habitat	X	X	X	X
BIO-MM#29: Conduct Pre-Construction Surveys for California Tiger Salamander	X	X	X	X
BIO-MM#30: Implement Avoidance and Minimization Measures for California Tiger Salamander	X	X	X	X
BIO-MM#31: Provide Compensatory Mitigation for Impacts on California Tiger Salamander Habitat	X	X	X	X
BIO-MM#32: Conduct Pre-Construction Surveys and Implement Avoidance and Minimization Measures for California Red-Legged Frog	X	X	X	X
BIO-MM#33: Provide Compensatory Mitigation for Impacts on California Red-Legged Frog Habitat	X	X	X	X
BIO-MM#34: Conduct Pre-Construction Surveys and Implement Avoidance and Minimization Measures for Foothill Yellow-Legged Frog	X	X	X	X
BIO-MM#35: Provide Compensatory Mitigation for Impacts on Foothill Yellow-Legged Frog Habitat	X	X	X	X
BIO-MM#36: Conduct Pre-Construction Surveys for Special-Status Reptiles and Amphibians	X	X	X	X
BIO-MM#37: Implement Avoidance and Minimization Measures for Special-Status Reptiles and Amphibians	X	X	X	X
BIO-MM#38: Conduct Surveys for Blunt-Nosed Leopard Lizard	X	X	X	X
BIO-MM#39: Implement Avoidance Measures for Blunt-Nosed Leopard Lizard	X	X	X	X
BIO-MM#40: Provide Compensatory Mitigation for Impacts on Blunt-Nosed Leopard Lizard Habitat	X	X	X	X
BIO-MM#41: Conduct Pre-Construction Surveys and Implement Avoidance and Minimization Measures for Giant Garter Snake	X	X	X	X
BIO-MM#42: Provide Compensatory Mitigation for Impacts on Giant Garter Snake Habitat	X	X	X	X

Mitigation Measure	Alternative 1	Alternative 2	Alternative 3	Alternative 4
BIO-MM#43: Conduct Pre-Construction Surveys and Delineate Active Nest Buffers for Breeding Birds	X	X	X	X
BIO-MM#44: Implement Avoidance and Minimization Measures for Mountain Plover and Sandhill Crane	X	X	X	X
BIO-MM#45: Conduct Surveys for Burrowing Owl	X	X	X	X
BIO-MM#46: Implement Avoidance and Minimization Measures for Burrowing Owl	X	X	X	X
BIO-MM#47: Provide Compensatory Mitigation for Loss of Active Burrowing Owl Burrows and Habitat	X	X	X	X
BIO-MM#48: Conduct Pre-Construction Surveys for Eagles	X	X	X	X
BIO-MM#49: Implement Avoidance Measures for Active Eagle Nests	X	X	X	X
BIO-MM#50: Provide Compensatory Mitigation for Loss of Eagle Nests	X	X	X	X
BIO-MM#51: Implement Avoidance Measures for California Condor	X	X	X	X
BIO-MM#52: Conduct Pre-Construction Surveys and Monitoring for Raptors	X	X	X	X
BIO-MM#53: Conduct Surveys for Swainson's Hawk Nests	X	X	X	X
BIO-MM#54: Implement Avoidance and Minimization Measures for Swainson's Hawk Nests	X	X	X	X
BIO-MM#55: Provide Compensatory Mitigation for Loss of Swainson's Hawk Nesting Trees and Habitat	X	X	X	X
BIO-MM#56: Conduct Surveys and Implement Avoidance Measures for Active Tricolored Blackbird Nest Colonies	X	X	X	X
BIO-MM#57: Provide Compensatory Mitigation for Impacts on Tricolored Blackbird Habitat	X	X	X	X
BIO-MM#58: Provide Compensatory Mitigation for Impacts on Waterfowl, Shorebird, and Sandhill Crane Habitat	X	X	X	X
BIO-MM#59: Conduct Pre-Construction Surveys for San Joaquin Kit Fox	X	X	X	X
BIO-MM#60: Implement San Joaquin Kit Fox Avoidance and Minimization Measures	X	X	X	X
BIO-MM#61: Provide Compensatory Mitigation for Impacts on San Joaquin Kit Fox Habitat	X	X	X	X

Mitigation Measure	Alternative 1	Alternative 2	Alternative 3	Alternative 4
BIO-MM#62: Implement Avoidance and Minimization Measures for Fresno Kangaroo Rat	X	X	X	X
BIO-MM#63: Provide Compensatory Mitigation for Impacts on Fresno Kangaroo Rat Habitat	X	X	X	X
BIO-MM#64: Conduct Pre-Construction Surveys for American Badger Den Sites and Implement Avoidance and Minimization Measures	X	X	X	X
BIO-MM#65: Conduct Pre-Construction Surveys for Ringtail and Ringtail Den Sites and Implement Avoidance Measures	X	X	X	X
BIO-MM#66: Conduct Pre-Construction Surveys for Dusky-Footed Woodrat and Implement Avoidance Measures	X	X	X	X
BIO-MM#67: Conduct Pre-Construction Surveys for Special-Status Bat Species	X	X	X	X
BIO-MM#68: Implement Bat Avoidance and Relocation Measures	X	X	X	X
BIO-MM#69: Implement Bat Exclusion and Deterrence Measures	X	X	X	X
BIO-MM#70: Prepare and Implement an Annual Vegetation Control Plan	X	X	X	X
BIO-MM#71: Restore Temporary Riparian Impacts	X	X	X	X
BIO-MM#72: Provide Compensatory Mitigation for Permanent Impacts on Riparian Habitat	X	X	X	X
BIO-MM#73: Restore Aquatic Resources Subject to Temporary Impacts	X	X	X	X
BIO-MM#74: Prepare and Implement a Compensatory Mitigation Plan for Impacts on Aquatic Resources	X	X	X	X
BIO-MM#75: Implement Transplantation and Compensatory Mitigation for Protected Trees	X	X	X	X
BIO-MM#76: Minimize Impacts on Wildlife Movement during Construction	X	X	X	X
BIO-MM#77: Design Wildlife Crossings to Facilitate Wildlife Movement	X	X	X	X
BIO-MM#78: Establish Wildlife Crossings at Embankment in West Slope of Pacheco Pass	X	X	X	X
BIO-MM#79: Provide Wildlife Movement between the Santa Cruz Mountains and Diablo Range	X	X	X	X
BIO-MM#80: Minimize Permanent Intermittent Noise, Visual, and Train Strike Impacts on Wildlife Movement	X	X	X	X

Mitigation Measure	Alternative 1	Alternative 2	Alternative 3	Alternative 4
BIO-MM#81: Minimize Permanent Intermittent Impacts on Terrestrial Species Wildlife Movement	X	X	X	X
BIO-MM#82: Minimize Permanent Intermittent Impacts on Aerial Species Wildlife Movement	X	X	X	X
BIO-MM#83: Implement Removal of Carrion that May Attract Condors and Eagles	X	X	X	X
BIO-MM#84: Provide Compensatory Mitigation for Impacts on Conservation Easements	X	X	X	X
BIO-MM#85: Provide Compensatory Mitigation for Impacts on California Sycamore Woodland at the Pacheco Creek Reserve	X	X	X	X

BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan

Prior to any ground-disturbing activity, the Project Biologist would prepare a restoration and revegetation plan (RRP) to address temporary impacts resulting from ground-disturbing activities within areas that potentially support special-status species, wetlands, and/or other aquatic resources. Restoration activities may include, but not be limited to: grading landform contours to approximate pre-disturbance conditions, stockpiling and spreading topsoil, removing invasive plant species, revegetating disturbed areas with native plant species, and using certified weed-free straw and mulch. The Authority would implement the RRP in all temporarily disturbed areas outside of the permanent right-of-way that potentially support special-status species, wetlands, and/or other aquatic resources.

Consistent with Section 1415 of the Fixing America's Surface Transportation Act (FAST Act) restoration activities would provide habitat for native pollinators through plantings of native forbs and grasses. The Project Biologist would obtain a locally sourced native seed mix. The restoration success criteria would include limits on invasive species, as defined by the California Invasive Plant Council, to an increase no greater than 10 percent compared to the pre-disturbance condition, or to a level determined through a comparison with an appropriate reference site consisting of similar natural communities and management regimes. The RRP would outline at a minimum:

- Procedures for documenting pre-construction conditions for restoration purposes.
- Sources of plant materials and methods of propagation.
- Specification of parameters for maintenance and monitoring of re-established habitats, including weed control measures, frequency of field checks, and monitoring reports for temporary disturbance areas.
- Specification of success criteria for re-established plant communities.
- Specification of the remedial measures to be taken if success criteria are not met.
- Methods and requirements for monitoring restoration/replacement efforts, which may involve a combination of qualitative and/or quantitative data gathering.
- Maintenance, monitoring, and reporting schedules, including an annual report due to the Authority by January 31st of the following year.

The RRP would be submitted to the Authority and regulatory agencies, as defined in the conditions of regulatory authorizations, for review and approval.

BIO-MM#2: Prepare and Implement a Weed Control Plan

Prior to any ground-disturbing activity during the construction phase, the Project Biologist would develop a weed control plan (WCP), subject to review and approval by the Authority. The purpose of the WCP is to establish approaches to minimize and avoid the spread of invasive weeds during ground-disturbing activities during construction and O&M.

The WCP would include, at a minimum, the following:

- A requirement to delineate environmentally sensitive areas (ESA) in the field prior to weed control activities.
- A schedule for weed surveys to be conducted in coordination with the BRMP.
- Success criteria for invasive weed control. The success criteria would be linked to the BRMP standards for on-site work during ground-disturbing activities. In particular, the criteria would establish limits on the introduction and spread of invasive species, as defined by the California Invasive Plant Council, to less than or equal to the pre-disturbance conditions in the area temporarily affected by ground-disturbing activities. If invasive species cover is found to exceed pre-disturbance conditions by greater than 10 percent or is 10 percent greater than levels at a similar, nearby reference site, a control effort would be implemented. If the target, or other success criteria identified in the WCP, has not been met by the end of the WCP monitoring and implementation period, the Authority would continue the monitoring and control efforts, and remedial actions would be identified and implemented until the success criteria are met.
- Provisions for consistency between the WCP and the RRP, including verification that the RRP includes measures to minimize the risk of the spread and/or establishment of invasive species and reflects the same revegetation performance standards as the WCP.
- Identification of weed control treatments, including permitted herbicides and manual and mechanical removal methods.
- Timeframes for weed control treatment for each plant species.
- Identification of fire prevention measures.

BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones

Prior to any ground-disturbing activity in a work area, the Project Biologist would use flagging to mark ESAs that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures. The Project Biologist would also direct the installation of wildlife exclusion fencing (WEF) by the contractor to prevent special-status wildlife species from entering work areas. The WEF would be installed below grade (e.g., 6–10 inches below grade) and would have exit doors to allow animals that may be inside an enclosed area to leave the area. The Project Biologist would also direct the installation of construction exclusionary fencing (exclusionary fencing) at the boundary of the work area, as appropriate, to avoid and minimize impacts on special-status species or aquatic resources outside of the work area during the construction period. The Project Biologist would delineate the ESAs, WEF, and exclusionary fencing based on the results of habitat mapping or modeling and any pre-construction surveys, and in coordination with the Authority. The Project Biologist would regularly inspect and maintain the ESA, WEF, and exclusionary fencing.

The ESA, WEF, and exclusionary fencing locations would be identified and depicted on an exclusion fencing exhibit. The purpose of the ESAs and WEF would be explained at WEAP training and the locations of the ESA and WEF areas would be noted during worker tailgate sessions.

BIO-MM#4: Conduct Monitoring of Construction Activities

During any initial ground-disturbing activity, the Project Biologist would be present in the work area to verify compliance with avoidance and minimization measures, to establish ESAs, and to direct the installation of WEF and construction exclusion fencing by the contractor.

BIO-MM#5: Limit Vehicle Traffic and Construction Site Speeds

Prior to any ground-disturbing activities, the Project Biologist would check that appropriate measures have been instituted to restrict project vehicle traffic within the project footprint to established roads, construction areas, and other permissible areas. The Project Biologist would establish vehicle speed limits of no more than 15 mph for unimproved access roads and for temporary and permanent construction areas within the project footprint. The Project Biologist would also direct that access routes be flagged and marked and that measures be adopted to prevent off-road vehicle traffic.

BIO-MM#6: Establish and Implement a Compliance Reporting Program

The Project Biologist would prepare monthly and annual reports documenting compliance with all IAMFs, mitigation measures, and requirements set forth in regulatory agency authorizations. The Authority would review and approve all compliance reports prior to submittal to the regulatory agencies. Reports would be prepared in compliance with the content requirements outlined in the regulatory agency authorizations.

Pre-activity survey reports would be submitted within 15 days of completing the surveys and would include:

- Location(s) of where pre-activity surveys were completed, including latitude and longitude, Assessor Parcel Number, and HST parcel number.
- Written description of the surveyed area. A figure of each surveyed location would be provided that depicts the surveyed area and survey buffers over an aerial image.
- Date, time, and weather conditions observed at each location.
- Personnel who conducted the pre-activity surveys.
- Verification of the accuracy of the Authority's habitat mapping at each location, provided in writing and on a figure.
- Observations made during the survey, including the type and locations (written and GIS) of any sensitive resources detected.
- Identification of relevant measures from the BRMP to be implemented as a result of the survey observations.

Daily compliance reports would be submitted to the Authority via the Environmental Mitigation Management and Assessment system (EMMA) within 24 hours of each monitoring day. Noncompliance events would be reported to the Authority the day of the occurrence. Daily compliance reports would include:

- Date, time, and weather conditions observed at each location where monitoring occurred.
- Personnel who conducted compliance monitoring.
- Project activities monitored, including construction equipment in use.
- Compliance conditions implemented successfully.
- Noncompliance events observed.

Daily compliance reports would also be included in the monthly compliance reports, which would be submitted to the Authority by the 10th of each month and would include:

- Summary of construction activities and locations during the reporting month, including any noncompliance events and their resolution, work stoppages, and take of threatened or endangered species.
- Summary of anticipated project activities and work areas for the upcoming month.

- Tracking of impacts on suitable habitats for each threatened and endangered species identified in USFWS and CDFW authorizations, including:
  - An accounting of the number of acres of habitats for which we provide compensatory mitigation that has been disturbed during the reporting month, and
  - An accounting of the cumulative total number of acres of threatened and endangered species habitat that has been disturbed during the project period.
- Up-to-date GIS layers, associated metadata, and photodocumentation used to track acreages disturbed.
- Copies of all pre-activity survey reports, daily compliance reports, and noncompliance/work stoppage reports for the reporting month.

Annual reports would be submitted to the Authority by the 20th of January and would include:

- Summary of all monthly compliance reports for the reporting year.
- A general description of the status of the project, including projected completion dates.
- All available information about project-related incidental take of threatened and endangered species.
- Information about other project impacts on the threatened and endangered species.
- A summary of findings from pre-construction surveys (e.g., number of times a threatened or endangered species or a den, burrow, or nest was encountered, location, if avoidance was achieved, if not, what other measures were implemented).
- Written description of disturbances to threatened and endangered species habitat within work areas, both for the preceding 12 months and in total since issuance of regulatory authorizations by USFWS and CDFW, and updated maps of all land disturbances and updated maps of identified habitat features suitable for threatened and endangered species within the project area.

In addition to the compliance reporting requirements outlined above, the following items would be provided for compliance documentation purposes:

- If agency personnel visit the project footprint in accordance with BIO-IAMF#2, the Project Biologist would prepare a memorandum within one day of the visit that memorializes the issues raised during the field meeting. This memorandum would be submitted to the Authority via EMMA. Any issues regarding regulatory compliance raised by agency personnel would be reported to the Authority and the contractor.
- Compliance reporting would be submitted to the Authority via EMMA in accordance with the report schedule. The Project Biologist would prepare and submit compliance reports that document the following:
  - Implementation and performance of the RRP described in BIO-MM#1
  - Summary of progress made regarding the implementation of the WCP described in BIO-MM#2
  - Compliance with BIO-MM#3
  - Compliance with BIO-IAMF#6
  - Compliance with BIO-IAMF#7
  - Compliance with BIO-IAMF#8
  - Compliance with BIO-IAMF#10
  - Compliance with BIO-MM#5

  - Compliance with BIO-IAMF#12
  - Compliance with BIO-IAMF#9
  - BMP field manual implementation and any recommended changes to construction site housekeeping practices outlined in BIO-IAMF#11
- Work stoppages and measures taken under BIO-MM#13 would be documented in a memorandum prepared by the Project Biologist and submitted to the Authority within 2 business days of the work stoppage.

BIO-MM#7: Conduct Botanical Field Surveys for Special-Status Plant Species and Special-Status Plant Communities

Prior to any ground-disturbing activity, the Project Biologist would conduct presence/absence botanical field surveys for special-status plant species and special-status plant communities within a work area consistent with *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities* (CDFW 2018c) and *Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Plants* (USFWS 2000) in all potentially suitable habitats. The Project Biologist would flag and record in GIS the locations of any observed special-status plant species and special-status plant communities.

BIO-MM#8: Prepare and Implement Plan for Salvage, Relocation, and/or Propagation of Special-Status Plant Species

Where relocation or propagation of special-status plant species is required by authorizations issued under FESA and/or CESA, the Project Biologist would collect seeds and plant materials and stockpile and segregate the top 4 inches of topsoil from locations within the work area prior to any ground-disturbing activities where special-status plant species were observed during surveys conducted under BIO-MM#1. Special-status plant species are those listed as threatened, endangered, or candidate under FESA; threatened, endangered, or candidate for listing under CESA; state-designated “Rare” species; and CRPR 1B and 2 species that were observed during surveys for use on off-site locations. Restoration locations would be chosen based on the *Policy on Mitigation Guidelines Regarding Impacts to Rare, Threatened, and Endangered Plants* (CNPS 1998). Suitable sites that may receive salvaged material include Authority mitigation sites, refuges, reserves, federal or state lands, and public/private mitigation banks.

The Project Biologist would prepare a plant species salvage plan to address monitoring, salvage, relocation and/or seed banking of special-status plant species. The plan would include provisions that address the techniques, locations, and procedures required for the collection, storage, and relocation of seed or plant material; collection, stockpiling, and redistribution of topsoil and associated seed. The plan would also include requirements related to outcomes such as the percent absolute cover of invasive species rated as “high” by the California Invasive Plant Council to be equal to or less than documented baseline conditions as well as maintenance, monitoring, implementation, adaptive management and the annual reporting. The plan would reflect conditions required under regulatory authorizations issued for federal or state-listed species. The Project Biologist would submit the plan to the Authority for review and approval.

BIO-MM#9: Prepare and Implement a Groundwater Adaptive Management and Monitoring Plan

To avoid, minimize and mitigate for potential impacts on wetlands, creeks, ponds, springs, riparian vegetation, special-status plant and wildlife species and protected trees, the Authority would prepare and implement a groundwater adaptive management and monitoring plan (GAMMP) prior to, during, and after tunnel construction to implement the requirements described under HYD-MM#1 and as described below concerning biological resources. Prior to construction, the GAMMP would be submitted to the USFWS, CDFW, SWRCB, and Regional Water Quality Control Board (RWQCB) for review (and approval where applicable).

The purpose of the GAMMP relative to biological resources is to monitor groundwater-dependent biological resources within the tunnel groundwater study area to detect and remediate adverse

effects on habitat function in a timely manner. Implementation of the GAMMP would provide information and data to identify hydrological, hydrogeological, and biological effects that may arise during HSR construction, if any, and trigger actions to offset any such impacts.

The GAMMP would include the following components, at a minimum, to avoid or minimize and address impacts on habitat for special-status species, aquatic resources, and protected trees:

- **Baseline inventory**—As allowed by private property owners, the Authority would establish baseline hydrologic conditions within the groundwater resource study area (approximately 1 mile north and south of the tunnel alignment) through baseline data collection. Baseline surveys would characterize potential aquatic resources, including but not limited to mapping of wetland and riparian vegetation; hydroperiod (the duration of inundation); flow rates; area of feature; pond depth; the potential for special-status plant and animal species (e.g., California tiger salamander, California red-legged frog, foothill yellow-legged frog, western pond turtle, least Bell's vireo, tricolored blackbird, and yellow-headed blackbird) and steelhead to occur; and potential groundwater dependent protected trees (e.g. oaks).[6]
- **Groundwater modeling**—The Authority would model groundwater hydrologic conditions and potential tunnel infiltration to further identify specific areas of probable effect on the water table, facilitate selection of appropriate monitoring locations, and prepare for the potential need to provide supplemental water infrastructure in advance of tunneling.
- **Pre-tunneling supplemental water infrastructure provision**—To maintain baseline water supply, the Authority would install water storage tanks or water lines in advance of tunneling on or near properties with wetlands, creeks, ponds, and springs subject to landowner approval. Water infrastructure may also be provided for upland protected trees susceptible to groundwater lowering in areas of predicted groundwater effects, but direct watering of protected trees may be utilized instead.
- **Construction monitoring**—The Authority would designate monitoring locations and methodologies for monitoring water levels, vegetation cover, special-status species habitat, and protected trees most likely to be affected by tunnel construction as indicated by hydrologic modeling. The Authority would monitor representative locations during periods when effects are most likely to occur. If effects (e.g., lowering water levels resulting in reduced habitat) are observed, the Authority would implement contingency plans that expand monitoring beyond the representative locations and increase monitoring frequency to capture the extent of potential effects on groundwater-dependent biological resources.
- **Supplemental water**—The Authority would prepare contingency plans to provide supplemental water as necessary to support riparian/aquatic vegetation, wildlife breeding cycles, aquatic wildlife, or protected tree health within the area of predicted effects determined through modeling or monitoring to be potentially affected by groundwater lowering. Seasonal variation as documented during the preconstruction baseline monitoring would be considered in establishing the amount of supplemental water. For all features, supplemental water would provide minimum flows and periods of inundation to match baseline conditions. The periods of supplemental water, in general, would likely be in periods of baseflow, which occurs in late spring, summer, and early fall outside of rain periods. For breeding habitats, the Authority would, at a minimum, supplement breeding habitat where necessary to maintain adequate depths for completion of the reproduction cycle (defined as the time by which juveniles are viable and mobile such that they can feasibly leave the breeding location). However, where breeding habitat is perennial or long-seasonal, then supplemental water would be provided as necessary to maintain the entire wetted period as determined through baseline monitoring. For nonbreeding movement and foraging habitat in creeks and streams, water would be provided to maintain seasonal flow similar to baseline

[6] The baseline inventory will be used to estimate groundwater levels below ground surface. Once the groundwater levels are identified, the area of potential effect to oaks can be identified (defined as areas with groundwater levels within 70 feet of the surface), and oaks within the area of potential groundwater effect can then be identified.

conditions. Water would be provided as needed to sustain habitat conditions up to the point of baseline conditions until the qualified biologist determines it is appropriate to cease its provision. If supplemental water is provided from wells, the effects on water supply and habitat features would be managed to avoid and minimize potential disruption by the selection of well location, depth, flow rate, and the use of alternative supplies.

- **Contingency plan for supplemental water in areas outside of predicted area of effect**—The Authority would establish contingency procedures to provide supplemental water to wetlands, creeks, ponds, and springs to support riparian/aquatic vegetation, wildlife breeding cycles, and aquatic wildlife as well as supplemental water to protected trees outside the area of predicted effects, if warranted by monitoring.
- **Temporary relocation**—The Authority would relocate aquatic species (e.g., California tiger salamander, California red-legged frog, foothill yellow-legged frog, western pond turtle) where unavoidable drying of aquatic breeding habitat would occur before salamanders and frogs have been able to metamorphose and maintaining the habitat with supplemental water is not feasible. The Authority would relocate these species, as allowed by USFWS and CDFW. If holding facilities are used, the Authority would return affected wildlife to affected aquatic areas after recovery of baseline hydrologic conditions.
- **Post-construction monitoring**—After construction, the Authority would monitor water levels and aquatic resource conditions of affected features twice annually (spring and summer) and affected protected trees for at least 5 years or as determined through consultation with USFWS and CDFW. As long as groundwater levels are demonstrated to be recovering, monitoring would continue until baseline conditions return or 5 years, whichever is longer. In the event that supplementary water is not successful at restoring aquatic resources and/or protected trees to baseline conditions in the post-construction period and off-site compensation is triggered, then monitoring may be waived for certain features if it is determined that there is no further utility for monitoring the specific feature. Once the Authority determines that conditions have returned to baseline conditions, monitoring would no longer be required.
- **Post-construction riparian or wetland restoration**—The Authority would restore any lost riparian or wetland vegetation that is not recovering on its own within 1 year of construction and is determined to be the result of tunnel construction through comparison to baseline conditions. Subject to landowner approval, such restoration would occur on site, or at a suitable location nearby if not feasible on site. The Authority would implement restoration of riparian or wetland restoration, as applicable, as defined in Mitigation Measures BIO-MM#71 and BIO-MM#73.
- **Post-construction compensation**—If the Authority determines through direct monitoring or data interpretation that substantial disruption (i.e., loss of 0.5 acre or greater) to habitat supporting special-status species has likely occurred during or after construction and that habitat restoration efforts did not achieve success criteria or that restoration was determined unfeasible, the Authority would compensate for this loss of habitat. In addition, if affected protected trees demonstrate substantial impairment to health or mortality after 5 years of monitoring, the Authority would compensate for affected protected trees with replacement on at least a 1:1 basis. The Authority would implement the compensation of suitable habitat, as applicable, as defined in Mitigation Measures BIO-MM#10, BIO-MM#12, BIO-MM#28, BIO-MM#31, BIO-MM#33, BIO-MM#35, BIO-MM#57, BIO-MM#72, BIO-MM#74 and BIO-MM#75.

BIO-MM#10: Prepare and Implement a Compensatory Mitigation Plan for Species and Species Habitat

The Authority would prepare a compensatory mitigation plan (CMP) that sets out the compensatory mitigation that would be provided to offset permanent and temporary impacts on federal and state-listed species and their habitat, fish and wildlife resources regulated under Section 1600 et seq. of the Cal. Fish and Game Code, and special-status species. Mitigation implemented under this measure would be consistent with and would help advance mitigation commitments at the program level, including mitigation intended to address impacts in the GEA.

The CMP would include the following:

- A description of the species and habitat types for which compensatory mitigation is being provided.
- A description of the methods used to identify and evaluate mitigation options. Mitigation options would include one or more of the following:
  - Purchase of mitigation credits from an agency-approved mitigation bank.
  - Protection of habitat through acquisition of fee-title or conservation easement and funding for long-term management of the habitat. Title to lands acquired in fee would be transferred to CDFW and conservation easements would be held by an entity approved in writing by the applicable regulatory agency. In circumstances where the Authority protects habitat through a conservation easement, the terms of the conservation easement would be subject to approval of the applicable regulatory agencies, and the conservation easement would identify applicable regulatory agencies as third-party beneficiaries with a right of access to the easement areas.
  - Payment to an existing in-lieu fee program.
- A summary of the estimated direct permanent and temporary impacts on species and species habitat.
- A description of the process that would be used to confirm impacts. Actual impacts on species and habitat could differ from estimates. Should this occur, adjustments would be made to the compensatory mitigation that would be provided. Adjustments to impact estimates and compensatory mitigation would occur in the following circumstances:
  - Impacts on species (typically measured as habitat loss) are reduced or increased as a result of changes in project design
  - Pre-construction site assessments indicate that habitat features are absent (e.g., because of errors in land cover mapping or land cover conversion)
  - The habitat is determined to be unoccupied based on negative species surveys
  - Impacts initially categorized as permanent qualify as temporary impacts
- An overview of the strategy for mitigating effects on species. The overview would include the ratios set forth in the species and habitat specific compensatory mitigation measures to be applied to determine mitigation levels and the resulting mitigation totals.
- A description of habitat restoration or enhancement projects, if any as provided by the habitat restoration mitigation measure, that would contribute to compensatory mitigation commitments.
- A description of the success criteria that would be used to evaluate the performance of habitat restoration or enhancement projects, and a description of the types of monitoring that would be used to verify that such criteria have been met.
- A description of the management actions that would be used to maintain the habitat on the mitigation sites, and the funding mechanisms for long-term management.
- A description of adaptive management approaches, if applicable, that would be used in the management of species habitat.
- A description of financial assurances that would be provided to demonstrate that the funding to implement mitigation is assured.

Impacts from Implementing Mitigation Measure BIO-MM#10

Some of the activities and actions that would be implemented under BIO-MM#10, especially those involving ground disturbance, could result in impacts similar to those described in Section

3.7.7. Specifically, direct and indirect impacts on special-status plant and wildlife species (e.g., California tiger salamander, red-legged frog, and foothill yellow-legged frog), special-status plant communities, and aquatic resources could occur where such resources are present on the mitigation sites. BIO-MM#11, which requires a site assessment and appropriate regulatory authorizations, would be implemented at compensatory mitigation sites to reduce or avoid impacts on these resources.

Restoration and enhancement of aquatic resources may result in the permanent conversion of grassland to wetland or riparian habitat. While such activities would be beneficial for special-status vernal pool or riparian species (for example), they would result in a small but measurable loss of upland habitat that could support denning, foraging, or movement by San Joaquin kit fox; nesting and foraging by burrowing owl, short-eared owl, grasshopper sparrow, and northern harrier; and foraging by golden eagle and white-tailed kite.

The CMP would be designed, implemented, and monitored consistent with the terms and conditions of the USACE Section 404 Permit, SWRCB Section 401 water quality certification, Cal. Fish and Game Code Section 1600 et seq. streambed alteration agreement, and FESA and CESA as they apply to their jurisdiction and resources on-site. Potential impacts on site-specific hydrology and the downstream resources would be evaluated as a result of implementation of the restoration-related activity. Site-specific BMPs and a stormwater pollution prevention plan would be implemented as appropriate.

Environmental impacts on other resource categories (beyond biological resources) could result from implementing restoration activities at mitigation sites. These impacts would result from transportation to and from the mitigation sites and from ground-disturbing activities on these sites to create habitat. Table 3.7-25 shows discussions of the different resource categories and the potential for impacts from the off-site restoration activities.

Table 3.7-25 Potential Nonbiological Impacts of Compensatory Mitigation Implementation

Resource Type	Potential for Impacts
Transportation	No. During initial restoration of habitat areas, earthmoving equipment and other construction vehicles would be transported to the sites. These relatively few trips would not be anticipated to cause traffic congestion near or en route to and from the sites. After restoration, there would be intermittent transportation to and from the mitigation sites. These largely single-vehicle trips would be intermittent and would not be anticipated to cause traffic congestion near or en route to and from the sites.
Air Quality and Global Climate Change	Yes, for criteria pollutant emissions. Construction vehicle exhaust and vehicle trips during management activities would contribute to diesel particulate emissions. Earthmoving, grading, and vegetation removal activities on the mitigation sites would result in fugitive dust during construction. Habitat restoration and revegetation would be undertaken on off-site mitigation sites in rural areas, and potential receptors sensitive to localized air impacts are anticipated to be distant. The establishment and management of these mitigation sites do not involve any materials or activities that may subject receptors to objectionable odors. Vehicle trips and the use of mowers and other machinery associated with the establishment and management of the mitigation sites would contribute to greenhouse gas emissions. However, these activities would be short term during construction and intermittent afterward.
Noise and Vibration	No. Restoration activities may result in noise and vibration impacts from vehicles, heavy equipment, mowers, and other small machinery. These activities would occur in a limited capacity and for a short duration in comparison with the overall construction noise associated with the project as a whole. As these sites are located in a rural environment, sensitive receptors are generally distant; consequently, human receptors would not be exposed to the generation of noise levels in excess of established standards or local noise ordinances

Resource Type	Potential for Impacts
Electromagnetic Fields and Electromagnetic Interference	No. No large electrical equipment would be installed or removed and no ongoing radio or electrical transmissions would be required at the mitigation sites. Therefore, no electromagnetic fields would be generated that could cause electromagnetic interference.
Public Utilities and Energy	No. No existing energy infrastructure would be affected or required for the mitigation sites. The removal of existing irrigation systems, removal of agricultural plantings, and removal of any existing structures on the mitigation sites would generate small quantities of solid waste. These quantities are expected to be relatively small in the context of the total solid waste generated for construction of the alternatives, and local landfills have adequate capacity to accept any waste materials that would be hauled from the sites. At mitigation sites where irrigation infrastructure is currently in place, the existing irrigation water supply may be temporarily used. Water supply uses may include regular watering of native plantings to facilitate vegetation establishment and growth. Once success criteria have been met, the irrigation system would be removed and the watering efforts would cease. During this period, water use is not expected to exceed current water use patterns required for the existing agricultural uses. After establishment, these sites would not require irrigation water; consequently, the elimination of irrigation would increase the amount of water available for downstream uses. No irrigation facility would be removed or added that would affect existing water supply for downstream water customers. Mitigation sites would not require construction or expansion of wastewater treatment facilities or stormwater drainage facilities.
Hydrology and Water Resources	No. Restoration activities at mitigation sites could result in channel/basin excavation, wetland and upland habitat enhancement and revegetation (hydroseed/plantings), channel enhancement and stabilization (installation of large woody debris, excavation of pools), and installation of erosion measures. Construction best management practices would be used to minimize or avoid discharge of sediment from construction activities to waterways. Activities at mitigation sites would not include actions that would deplete groundwater supplies or interfere with groundwater recharge, such as creating an increase in impervious surfaces. Temporary construction activities associated with mitigation measures would not alter drainage patterns to a degree that would result in flooding or exceed the capacity of stormwater drainage facilities.
Geology, Soils, Seismicity, and Paleontological Resources	No. Restoration of the mitigation sites would not expose people or structures to potential impacts from the ruptures of an earthquake, strong seismic ground shaking, seismic-related ground failure, or landslides because no structures are proposed as part of the mitigation. Excavation and vegetation removal could result in soil erosion. However, erosion control measures would be implemented that would prevent impacts from soil erosion and landslides. No structures are proposed that could be affected by unstable soils, lateral spreading, subsidence, liquefaction, or collapse. Ground-disturbing activities associated with the restoration of mitigation sites could result in impacts on known and previously unknown paleontological deposits. Project features include effective measures to engage a paleontological resource specialist for direct monitoring during construction and provisions to halt construction if paleontological resources are found. These measures would avoid and reduce the potential loss of valuable paleontological resources.

Resource Type	Potential for Impacts
Hazardous Materials and Wastes	No. The establishment and management of off-site mitigation lands, including agricultural infrastructure removal, operation of heavy equipment, and use of herbicides, could result in a temporary increase in the transportation, use, and storage of hazardous materials. Demolition of existing structures is unlikely; however, if needed, such activities may result in a temporary increase in waste disposal. However, structures likely to be removed would be small, such as agricultural infrastructure involving wood, wire, metal, piping, and concrete materials, and are not anticipated to contain large amounts of hazardous materials. Facilities and construction sites that use, store, generate, or dispose of hazardous materials or wastes and hazardous material/waste transporters are required through stringent regulations to maintain plans for warning, notification, evacuation, and site security. Routine transport, use, storage, and disposal of hazardous materials are governed by numerous laws, regulations, and ordinances, thereby reducing the risk of accidental spills or releases.
Safety and Security	No. These mitigation sites would not be open to the public and there would be no safety and security issues related to their establishment and management.
Socioeconomics and Communities	No. Use of these off-site mitigation sites would not divide an established community or displace housing or businesses. These sites do not presently contain public facilities that would require relocation and they would not affect the economy through changes in property tax or sales tax revenues. If these sites are presently in agricultural production, their removal from production may result in minor changes to the agricultural economy and job base.
Land Use and Development	No. These mitigation sites would not conflict with any applicable land use plans, policies, or regulations. As these sites are presently agricultural or range land, their protection from development to use for biological resource mitigation would not create new incompatible land uses.
Agricultural Farmland	Yes. The partial or complete conversion of these mitigation sites to biological habitat could result in the loss of existing farmland or ranchland, including designated Important Farmland. In the event that Important Farmland is converted for mitigating impacts on biological resources, the Authority would implement AG-MM#1: Conserve Important Farmland, to mitigate for the converted agricultural farmland. It is not anticipated that there would be any required changes to Williamson Act contracts because the preservation of the land through the use conservation easements and acquisition of the property would not threaten or violate the terms of most of the Williamson Act contracts.
Parks, Recreation, and Open Space	No. No impacts on parks and recreation would occur because these mitigation sites would not preclude the use of parks or recreation areas, acquire any current public open-space areas, create a barrier to the access of any park or recreation area, result in acquisition of a recreation resource, increase the use of existing neighborhood and regional parks, or result in the alteration of existing recreational facilities.
Aesthetics and Visual Quality	No. No structures are needed or proposed for the mitigation sites and no lighting would be used. Therefore, none of the mitigation activities would block views or be sources of nighttime glare or light.
Cultural Resources	Yes, for archaeological resources, if such resources were demolished or altered. Ground-disturbing activities associated with the restoration of mitigation sites could result in impacts on known and previously unknown archaeological deposits. Such resources may be eligible for listing in the CRHR or the NRHP. The eligibility of historic architectural resources on these mitigation sites has not yet been evaluated and would take place prior to construction. Existing structures including agricultural outbuildings and irrigation infrastructure could be found to be eligible for listing the CRHR or the NRHP. Existing project features and legal requirements would prevent the destruction or unauthorized alteration of any such architectural resources.

CRHR = California Register of Historical Resources
NRHP = National Register of Historic Places

In conclusion, there are no new unique impacts associated with the establishment and management of compensatory mitigation lands that have not already been evaluated and addressed in other sections of this Draft EIR/EIS.

BIO-MM#11: Implement Measures to Minimize Impacts during Off-Site Habitat Restoration, or Enhancement, or Creation on Mitigation Sites

Prior to ground-disturbing activities associated with habitat restoration, enhancement, and/or creation actions at a mitigation site, the Authority would conduct a site assessment of the work area to identify biological and aquatic resources, including plant communities, land cover types, and the distribution of special-status plants and wildlife.

Based on the results of the site assessment, the Authority would obtain any necessary regulatory authorizations prior to conducting habitat restoration, enhancement and/or creation activities, including authorization under the FESA or CESA, Cal. Fish and Game Code Section 1600 et seq., the CWA, and the Porter-Cologne Act.

Restoration, enhancement, and/or creation of aquatic resources may result in the permanent conversion of grassland to wetland or riparian habitat. While such activities would be beneficial for vernal pool, riparian, and aquatic-breeding species, they would result in a small but measurable loss of upland habitat for other species (e.g., foraging habitat for tricolored blackbird, non-breeding habitat for California tiger salamander and California red-legged frog). Permanent impacts on grassland habitat from aquatic resource restoration, enhancement, and creation would be mitigated at a minimum ratio of 1:1 (acres preserved, enhanced, or restored: acres affected).

BIO-MM#12: Provide Compensatory Mitigation for Impacts on Listed Plant Species

The Authority would provide compensatory mitigation for direct impacts on federally and state-listed plant species based on the number of acres of occupied plant habitat directly affected. Such mitigation would include the following measures:

- Compensatory mitigation would be provided at a 1:1 ratio to offset direct impacts on occupied federally listed plant species habitat, unless a higher ratio is required pursuant to regulatory authorizations issued under FESA.
- Compensatory mitigation would be provided at a 1:1 ratio to offset direct impacts on occupied state-listed plant species habitat, unless a higher ratio is required pursuant to regulatory authorizations issued under CESA.

Compensatory mitigation would be provided using one or more of the methods described in BIO-MM#10.

Impacts from Implementing Mitigation Measure BIO-MM#12

As addressed in the discussion of BIO-MM#10, compensatory mitigation could involve some secondary impacts; however, these impacts would be beneficial and the measures set forth in BIO-MM#11 would be implemented to minimize any adverse impacts.

BIO-MM#13: Implement Work Stoppage

In the event that any special-status wildlife species is found in a work area, the Project Biologist would have the authority to halt work to prevent the death or injury to the species. Any such work stoppage would be limited to the area necessary to protect the species and work may be resumed once the Project Biologist determines that the individuals of the species have moved out of harm's way or the Project Biologist has relocated them out of the work area in accordance with authorizations issued under FESA and CESA.

Any such work stoppages and the measures taken to facilitate the removal of the species, if any, would be documented in a memorandum prepared by the Project Biologist and submitted to the Authority within 2 business days of the work stoppage.

BIO-MM#14: Avoid Direct Impacts on Bay Checkerspot Butterfly Host Plants
Prior to construction, the Project Biologist would survey for Bay checkerspot larval host plants—dwarf plantain and purple owl's-clover—within suitable habitat. If host plants are found, the Project Biologist would conduct surveys for adult butterflies during the peak of the flight period to determine presence/absence. Where adult butterflies are present, construction personnel would avoid host plants outside permanent impact areas.

BIO-MM#15: Prepare and Implement Bay Checkerspot Butterfly Protection Plan
Prior to final design, the Authority would incorporate features to minimize impacts on Bay checkerspot butterfly dispersal consistent with regulatory authorizations issued under the FESA. Actions may include:

- Plant shrubs or trees along the east side of the viaduct, the predominant direction from which dispersing butterflies are likely to originate. Trees and shrubs would provide a more natural transition over the viaduct.
- Place lighting under the viaduct in strategic locations to minimize shadows.
- Create vegetated "stepping stones" to attract butterflies under the viaduct and along a path that is the shortest distance between the Coyote Ridge core population and the Tulare Hill sub-population.

If monitoring indicates that dispersal is affected by viaduct shadows, the Authority would develop a translocation project to facilitate Bay checkerspot butterfly dispersal between the core and sub-population. The project may include:

- Conservation of land near the alignment to improve survival conditions for dispersing butterflies.
- A monitoring and adaptive management process that would detail how the performance criteria of "no net change in dispersal" would be defined and maintained.

BIO-MM#16: Provide Compensatory Mitigation for Impacts on Bay Checkerspot Butterfly Habitat
The Authority, in accordance with authorizations issued under the FESA, would determine the compensatory mitigation required to offset impacts on habitat, including critical habitat, for Bay checkerspot butterfly. Compensatory mitigation could include one or more of the following:

- Purchase of credits from an agency-approved conservation bank
- Acquisition in fee title of USFWS-approved property
- Purchase or establishment of a conservation easement with an endowment for long-term management of the property-specific conservation values
- An in-lieu fee contribution determined through negotiation and consultation with the USFWS
- Contribution to SCVHA habitat protection, restoration, or management efforts

Mitigation for Bay checkerspot butterfly would first prioritize measures within the San Martin critical habitat unit and, to the extent feasible, that contribute to regional conservation efforts (i.e., habitat protection efforts underway by the SCVHA). The second priority would be to implement measures in another critical habitat unit. If mitigation within designated critical habitat is not feasible, the Authority would implement mitigation outside critical habitat that provides an equivalent contribution to Bay checkerspot butterfly recovery.

The compensatory mitigation areas and methods selected would include appropriate measures to guide management of habitats (e.g., grazing, weed control), monitor populations, and identify methods to establish or reestablish populations, if necessary.

- Habitat restoration and management would be needed on many Bay checkerspot habitat areas. Appropriate grazing management should verify that habitats are neither overgrazed nor overgrown. Weeding, biological control, mowing, herbicides, and fire should also be considered as possible tools to control nonnative plant species.

- Monitoring of populations would serve to identify, on an ongoing basis, populations that are in trouble and in need of recovery efforts, as well as populations that are healthy and suitable as sources of individuals for reintroduction efforts.

Several factors are important in deciding which habitat areas to protect: (1) habitat size and quality, including habitat diversity; (2) location in relation to other habitat patches and to core populations; (3) presence, current or historic, of Bay checkerspots; and (4) ease and cost of protection. Habitat protection should include buffer zones as necessary. Bay checkerspot habitat areas considered for mitigation can be ranked in approximate order of priority as follows:

- Core habitat areas

  a) Kirby (3,900 acres)
  b) Metcalf (1,100 acres)
  c) San Felipe (780 acres)
  d) Silver Creek Hills (1,000 acres)

- Potential core areas—Santa Teresa Hills (1,100 acres)
- Larger, good-quality habitat areas near core populations

  a) Tulare Hill (300 acres)
  b) North of Llagas Avenue (420 acres),
  c) West hills of Santa Clara Valley (74 acres)

- Stepping stones—Tulare Hill, Santa Teresa Hills, Redwood City
- Other current or historic localities or suitable habitat areas, generally larger than 1 hectare (2.5 acres), within the historic range of the butterfly, identified for their habitat value, function as dispersal corridors, proximity to other habitat, or other biological value.

The Authority would submit a memorandum to the USFWS to document compliance with this measure.

Impacts from Implementing Mitigation Measure BIO-MM#16
As addressed in the discussion of BIO-MM#10, compensatory mitigation could involve some secondary impacts; however, these impacts would be beneficial and the measures set forth in BIO-MM#11 would be implemented to minimize any adverse impacts.

BIO-MM#17: Conduct Pre-Construction Surveys for Vernal Pool Wildlife Species
Prior to any ground-disturbing activities, the Project Biologist would conduct an aquatic habitat assessment and survey for vernal pool wildlife species in seasonal wetlands and vernal pools that overlap with the work area or with occur within both the work area and the area extending 250 feet from the outer boundary of the work area where access is available, consistent with the USFWS *Survey Guidelines for the Listed Large Brachiopods* (USFWS 2015) vernal pool survey protocols. The Project Biologist would visit these areas after the first rain event of the season to determine whether seasonal wetlands and vernal pools have been inundated. A seasonal wetland/vernal pool would be considered to be inundated when it holds more than 3 cm of standing water 24 hours after a rain event. Approximately 2 weeks after the pools have been determined to be inundated, the Project Biologist would conduct surveys in appropriate seasonal wetland and vernal pool habitats. The Project Biologist would submit a report to the Authority within 30 days of completing the work.

BIO-MM#18: Implement Seasonal Vernal Pool Work Restriction
To the extent feasible, ground-disturbing activities would not occur within 250 feet of vernal pools or seasonal wetlands during the rainy season (October 15 to April 15). In the event ground-disturbing activities are to occur within the 250-foot buffer area during the rainy season, such activities should, to the extent feasible, be undertaken when the aquatic features are not inundated. For any work occurring within 250 feet of vernal pools during the rainy season, the contractor (under the direction of the Project Biologist) would install erosion control measures in

those areas where construction activities need to be completed and ESA fencing between the work area and vernal pools.

BIO-MM#19: Implement and Monitor Vernal Pool Avoidance and Minimization Measures within Temporary Impact Areas

To the extent feasible, impacts on vernal pools in work areas outside of the permanent right-of-way would be avoided. The Project Biologist would install and maintain exclusionary fencing to prevent impacts on vernal pools from construction activities. When avoidance of impacts on vernal pools is not feasible, the construction activity would be scheduled to occur in the dry season, where feasible. Prior to the initiation of a ground-disturbing activity during the dry season, the Project Biologist would collect a representative sampling of soils from the affected vernal pools to obtain viable plant seeds and vernal pool branchiopod cysts. After collecting the soil, the Project Biologist may also put rinsed gravel in the vernal pools and cover with geotextile fabric to minimize damage to the soils and protect the pools' contours, as provided by regulatory authorizations issued under the FESA.

The soils containing seeds and cysts may later be returned to the affected pool after work has been completed or incorporated into other vernal pools, as provided by regulatory authorizations under the FESA.

BIO-MM#20: Provide Compensatory Mitigation for Impacts on Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp Habitat

The Authority would provide compensatory mitigation for direct and indirect impacts, including both temporary and permanent impacts, on vernal pool branchiopod habitat at a 1:1 ratio, unless a higher ratio is required by the FESA. Compensatory mitigation would be provided using one or more of the methods described in BIO-MM#10.

Impacts from Implementing Mitigation Measure BIO-MM#20

As addressed in the discussion of BIO-MM#10, compensatory mitigation could involve some secondary impacts; however, these impacts would be beneficial and the measures set forth in BIO-MM#11 would be implemented to minimize any adverse impacts.

BIO-MM#21: Implement Avoidance Measures for Elderberry Shrubs outside Permanent Impact Areas

To avoid direct impacts on elderberry shrubs potentially occupied by valley elderberry longhorn beetle that are inside the project footprint but outside permanent impact areas (and where feasible), a biologist with demonstrated experience identifying elderberry shrubs would survey areas modeled as potentially suitable riparian habitat within the project footprint for elderberry no less than 30 days before ground disturbance or vegetation removal. The biologist would mark all elderberry shrubs with bright-colored flagging and record geospatial information using a handheld GPS or mobile device (i.e., smartphone or tablet). Elderberry shrubs outside permanent and temporary impact areas would be included on grading plans, and contractors would comply with the following avoidance and minimization measures from the USFWS' *Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle* (USFWS 2017b):

- All areas to be avoided during construction activities would be fenced, flagged, or both as close to construction limits as feasible.
- Activities that may damage or kill an elderberry shrub (e.g., trenching, paving) may need an avoidance area of at least 20 feet from the drip line, depending on the type of activity.
- A qualified biologist would provide training for all contractors, work crews, and any on-site personnel on the status of the valley elderberry longhorn beetle, its host plant and habitat, the need to avoid damaging elderberry shrubs, and the possible penalties for noncompliance.
- A qualified biologist would monitor the work area at project-appropriate intervals to verify that all avoidance and minimization measures are implemented.

- To the extent feasible, all activities that could occur within 65 feet of an elderberry shrub would be conducted outside the flight season of the valley elderberry longhorn beetle (March–July).
- Trimming of elderberry shrubs would occur between November and February and would avoid the removal of any branches or stems that are 1 inch or more in diameter.
- Herbicides would not be used within the drip line of elderberry shrubs. All chemicals would be applied using a backpack sprayer or similar direct application method.
- Mechanical weed removal within the drip line of elderberry shrubs would be limited to the season when adults are not active (August–February) and would avoid damaging elderberry shrubs.

BIO-MM#22: Provide Compensatory Mitigation for Impacts on Valley Elderberry Longhorn Beetle Habitat

The Authority would provide compensatory mitigation for impacts on valley elderberry longhorn beetle habitat, including through transplantation and replacement of elderberry shrubs and maintenance of replacement shrubs, consistent with the USFWS' *Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle* (USFWS 2017b), as follows:

- Suitable riparian habitat would be replaced at a minimum of 3:1 (acres of mitigation to acres of impact).
- Suitable nonriparian habitat would be replaced at a minimum of 1:1 (acres of mitigation to acres of impact).
- Individual elderberry shrubs in riparian areas would be replaced through a purchase of two credits at a USFWS-approved bank for each shrub that would be trimmed or removed regardless of the presence of exit holes.
- Individual elderberry shrubs in nonriparian areas would be replaced through a purchase of one credit at a USFWS-approved bank for each shrub that would be trimmed if exit holes have been found in any shrub in or within 165 feet of the work area.
- If an elderberry shrub is to be completely removed by the activity, the entire shrub would be transplanted to a USFWS-approved location in addition to the specified credit purchase.

For transplanted elderberry plants, a survival rate of at least 60 percent of the elderberry plants and 60 percent of the associated native plants must be maintained throughout the 10-year monitoring period. If survival rates drop below 60 percent during the monitoring period, failed plantings would be replaced and maintained until the 60 percent survival rate is achieved.

Impacts from Implementing Mitigation Measure BIO-MM#22

As addressed in the discussion of BIO-MM#10, compensatory mitigation could involve some secondary impacts; however, these impacts would be beneficial and the measures set forth in BIO-MM#11 would be implemented to minimize any adverse impacts.

BIO-MM#23: Conduct Surveys and Implement Avoidance Measures for Crotch Bumble Bee

Surveys for Crotch bumble bee habitat (as identified by species habitat suitability modeling) in the project footprint would be conducted by qualified biologists within 1 year prior to the start of construction. Surveys would be conducted during four evenly spaced sampling periods during the flight season (March through September) (Thorp et al. 1983). For each sampling event, the biologist(s) would survey suitable habitat using nonlethal netting methods for 1 person-hour per 3 acres of the highest quality habitat or until 150 bumble bees are sighted, whichever comes first. If initial sampling of a given habitat area indicates that the habitat is of low quality or nonexistent, no further sampling of that area would be required. General guidelines and best practices for bumble bee surveys would follow USFWS' *Survey Protocols for the Rusty Patched Bumble Bee* (*Bombus affinis*) (USFWS 2019), which are consistent with other bumble bee survey protocols used by The Xerces Society (Hatfield et al. 2017; Washington Department of Fish and Wildlife et al. 2019).

If surveys identify occupied Crotch bumble bee habitat within the project footprint, the project biologist would then conduct additional pre-construction surveys of such habitat for active bee nest colonies and associated floral resources (i.e., flowering vegetation on which bees from the colony are observed foraging) no more than 30 days prior to any ground disturbance between March and September. The purpose of this pre-construction survey would be to identify active nest colonies and associated floral resources outside of permanent impact areas that could be avoided by construction personnel. The project biologist would establish, monitor, and maintain no-work buffers around nest colonies and floral resources identified during surveys. The size and configuration of the no-work buffer would be based on best professional judgment of the project biologist. At a minimum, the buffer would provide at least 20 feet of clearance around nest entrances and maintain disturbance-free airspace between the nest and nearby floral resources. Construction activities would not occur within the no-work buffers until the colony is no longer active (i.e., no bees are seen flying in or out of the nest for three consecutive days indicating the colony has completed its nesting season and the next season's queens have dispersed from the colony).

BIO-MM#24: Provide Compensatory Mitigation for Impacts on Crotch Bumble Bee

The Authority would provide compensatory mitigation for impacts on occupied habitat for Crotch bumble bee. Impacts on occupied habitat (confirmed through surveys as described in BIO-MM#23) would be compensated for at a ratio of 3:1, unless a higher ratio is required pursuant to an authorization issued under CESA, through the purchase of CDFW-approved bank credits or through preservation of habitat in perpetuity, including suitable habitat currently preserved by the Authority.

BIO-MM#25: Prepare Plan for Dewatering and Water Diversions

Prior to initiating any construction activity that occurs within open or flowing water, or streamside activities, the Authority would prepare a dewatering plan, which would be subject to the review and approval by the applicable regulatory agencies. The plan would incorporate measures to minimize turbidity and siltation. The Project Biologist would monitor the dewatering and/or water diversion sites, including collection of water quality data, as applicable. Prior to the dewatering or diverting of water from a site, the Project Biologist would conduct pre-activity surveys to determine the presence or absence of special-status species within the affected waterbody. In the event that special-status species are detected during pre-activity surveys, the Project Biologist would relocate the species (unless the species is fully protected under state law), consistent with any regulatory authorizations applicable to the species.

BIO-MM#26: Prepare and Implement a Cofferdam Fish Rescue Plan

If cofferdam construction or stream dewatering is required, the Authority or a contractor on behalf of the Authority would develop a fish rescue plan. The fish rescue plan would outline the methods for removing and relocating fish to adjacent waterways and would be implemented by a qualified fisheries biologist with a CDFW Scientific Collecting Permit. The plan would also include methods for minimizing the risk of stress and mortality from capture and handling and adverse impacts on listed fish species (if present) associated with fish stranding. The USFWS, NMFS, and CDFW would be notified at least 48 hours prior to the start of fish rescue efforts, and a report of the species, number, and size of fish collected would be submitted to the CDFW, USFWS, and NMFS within 30 days of the fish rescue. The area to be dewatered would first be seined and then electrofished to remove remaining fish. The agency-approved biologist must have appropriate training and experience in electrofishing techniques and all electrofishing must be conducted according to the NMFS's *Guidelines for Electrofishing Waters Containing Salmonids Listed under the Endangered Species Act* (NMFS 2000). A fisheries biologist would be on-site during initial dewatering to confirm compliance with the fish rescue plan. In streams bearing anadromous fish, in-water construction would avoid migration periods, and dewatering (installation of cofferdams) would begin no earlier than June 1 and would be completed (i.e., cofferdams removed) by October 15.

If a cofferdam is required, the Authority would implement the following measures, unless other methods are approved by NMFS:

- Construct cofferdams 30–50 feet upstream and downstream of the construction location

- Minimize the cofferdam footprint to the minimum extent possible
- Pump water from the upstream location to the downstream location through a flexible corrugated pipe
- Match pumping volumes and velocities to upstream flows and maintain pumping volumes and velocities to match changes in upstream flows
- Install a T-pipe and riprap apron at the discharge location to disperse outflow and minimize erosion
- Construct cofferdams and riprap aprons over visqueen or similar material to facilitate cleanup and removal of materials
- Remove all construction materials, including sandbags and rock, and restore the area to pre-construction contours

The agency-approved biologist would continuously monitor the placement of cofferdams and dewatering of isolated areas for the purpose of removing and relocating any listed species that were not detected or could not be removed and relocated prior to construction. The agency-approved biologist would be present at the work site until all listed species have been removed and relocated.

BIO-MM#27: Prepare and Implement an Underwater Sound Control Plan

The Authority or a contractor on behalf of the Authority would develop an underwater sound control plan to avoid and minimize potential adverse impacts from in-water pile-driving activities on federally listed salmonid species. The underwater sound control plan would include the following:

- Measures to minimize underwater sound pressure levels to below the following thresholds for peak pressure and accumulated sound exposure levels:
  - Peak pressure = 206 decibels
  - Accumulated sound exposure levels = 183 decibels
- Underwater sound monitoring during pile-driving activities
- Oversight of all monitoring and construction activities by an agency-approved biological monitor to enforce full compliance with the underwater sound control plan
- Use of vibratory or non-impact methods (i.e., hydraulic) to drive sheet piling that results in sound pressures below threshold levels to the extent feasible
- Restrictions on pile driving to daytime hours

Initial drives would be low energy with reduced impact frequency, gradually increasing in energy and frequency until necessary full force and frequency are achieved

BIO-MM#28: Provide Compensatory Mitigation for Permanent Impacts on Steelhead Habitat and Essential Fish Habitat for Pacific Coast Salmon

The Authority would provide compensatory mitigation for permanent impacts on habitat for CCC and SCCC steelhead and designated freshwater EFH for Pacific Coast salmon that is commensurate with the type (spawning, rearing, migratory, or critical habitat) and amount of habitat lost as follows:

- Spawning aquatic and riparian habitat within critical habitat would be protected and restored or protected and enhanced at a minimum of 3:1 (protected:affected) unless different ratios are specified in authorizations issued under the FESA
- All rearing and migratory aquatic and riparian habitat within critical habitat would be protected and restored or protected and enhanced at a minimum of 2:1 (protected:affected) or as specified in authorizations issued under the FESA

- All other rearing and migratory aquatic and riparian habitat outside of critical habitat would be protected and restored or protected and enhanced at a minimum of 1:1 (protected:affected) or as specified in authorizations issued under the FESA

The Authority or a contractor on behalf of the Authority would purchase riparian and aquatic habitat credits at an NMFS-approved anadromous fish conservation bank, or through another NMFS-approved conservation option, for the areal extent of riparian and suitable aquatic habitat affected by the action. In the event the Authority chooses not to utilize existing mitigation banks, it would propose other approaches to the applicable regulatory agencies for consideration. Any such approaches would take into account the following:

- Habitat complexity such as floodplain backwaters (designed to limit stranding); refugia habitat such as deep pools, root wads, undercut banks or boulders; feeding and spawning habitat (riffles and runs); and connectivity with migratory habitat
- Riparian habitat conditions that are consistent with the existing flow regime and maintain and improve habitat characteristics (e.g., shade, formation and maintenance of refugia)
- Local and regional conservation goals
- Long-term access for monitoring and maintenance
- Upstream and downstream conditions

Conservation options developed to offset impacts to steelhead habitat and EFH would be considered in the development of the Compensatory Mitigation Plan (BIO-MM#10), Restoration and Revegetation Plan (BIO-MM#1) and Flood Protection Plan (HYD-IAMF#2).

Impacts from Implementing Mitigation Measure BIO-MM#28

As addressed in the discussion of BIO-MM#9, compensatory mitigation could involve some secondary impacts; however, these impacts would be beneficial and the measures set forth in BIO-MM#10 would be implemented to minimize any adverse impacts.

BIO-MM#29: Conduct Pre-Construction Surveys for California Tiger Salamander

Prior to any ground-disturbing activity scheduled to occur during the dry season (June 1–October 15), the Project Biologist would conduct a pre-construction survey of suitable upland habitat within the work area and extending out 100 feet from the boundary of the work area, where access is available, to determine whether California tiger salamanders are present. Such surveys would be conducted no earlier than 30 days prior to ground-disturbing activities in the work area. The Project Biologist may employ the use of conservation dogs (scent dogs) to augment focused species surveys using methods described in Wasser et al. (2004), Smith et al. (2006), and/ or Filazzola et al. (2017). The Project Biologist would coordinate with USFWS and CDFW before using conservation dogs.

In the event that ground-disturbing activities are scheduled to occur during the rainy season (October 15–June 1), in addition to upland surveys, the Project Biologist would survey potential breeding habitat in the work area for the presence of California tiger salamanders using methods from the *Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander* (CDFG and USFWS 2003) or other more recent guidelines, if available.

BIO-MM#30: Implement Avoidance and Minimization Measures for California Tiger Salamander

Prior to any ground-disturbing activity, the contractor, under the direction of the Project Biologist would install WEF along the boundary of the work area containing California tiger salamander suitable habitat or would implement similar measures as otherwise required pursuant to regulatory authorizations issued under the FESA or CESA. WEF must be trenched into the soil at least 4 inches in depth, with the soil compacted against both sides of the fence for its entire length to prevent tiger salamanders from passing under the fence, and must have must have intermittent exit points. During the dry season (June 1–October 15), the Project Biologist would inspect the WEF at least twice weekly on nonconsecutive days and on a daily basis between

October 15 and June 1 or following any rain event. WEF would be installed with turn-arounds at access points to direct California tiger salamander away from gaps in the fencing.

To the extent feasible, construction activities would not be conducted within 250 feet of areas identified as occupied California tiger salamander breeding habitat during the rainy season (October 15–June 1). However, construction activities may begin within such areas after April 15 if the breeding habitat is no longer inundated.

BIO-MM#31: Provide Compensatory Mitigation for Impacts on California Tiger Salamander Habitat

The Authority would provide compensatory mitigation to offset the loss of modeled California tiger salamander habitat. Compensatory mitigation would be provided for impacts on habitat occupied or presumed occupied by California tiger salamander at a ratio of 3:1, unless higher ratios are required through regulatory authorizations issued under the FESA or CESA. Compensatory mitigation would be provided using one or more of the methods described in BIO-MM#10.

Impacts from Implementing Mitigation Measure BIO-MM#31

As addressed in the discussion of BIO-MM#10, compensatory mitigation could involve some secondary impacts; however, these impacts would be beneficial and the measures set forth in BIO-MM#11 would be implemented to minimize any adverse impacts.

BIO-MM#32: Conduct Pre-Construction Surveys and Implement Avoidance and Minimization Measures for California Red-Legged Frog

Prior to any ground-disturbing activity scheduled to occur during the dry season (June 1–October 15), the Project Biologist would conduct a pre-construction survey of modeled suitable potential breeding habitat within the work area and extending out 100 feet from the boundary of the work area, where access is available, to determine whether California red-legged frogs are present using methods from the *Revised Guidance on Site Assessments and Field Surveys for The California Red-legged Frog* (USFWS 2005), or other more recent guidelines, if available. Such surveys would be conducted no earlier than 30 days prior to ground-disturbing activities in the work area. Appropriate avoidance and minimization measures, including moving individuals to nearby ponds, or other appropriate measures, would be implemented based on authorizations issued under the FESA.

BIO-MM#33: Provide Compensatory Mitigation for Impacts on California Red-Legged Frog Habitat

The Authority, in accordance with authorizations issued under the FESA, would compensate for impacts on habitat, including critical habitat, for California red-legged frog. Compensatory mitigation could include one or more of the following:

- Purchase of credits from an agency-approved conservation bank
- Acquisition in fee title of USFWS-approved property
- Purchase or establishment of a conservation easement with an endowment for long-term management of the property-specific conservation values
- An in-lieu fee contribution determined through negotiation and consultation with the USFWS

Compensatory mitigation for red-legged frog would prioritize lands that would contribute to the recovery of the species and, to the extent feasible, to regional conservation efforts. The recovery plan for the California red-legged frog (USFWS 2002) describes tasks that would contribute to the recovery of the California red-legged frog. To the extent feasible, the compensatory mitigation for California red-legged frog would incorporate one or more of the following conservation needs identified by the recovery plan for the core recovery areas:

- East San Francisco Bay Core Recovery Area: protect existing populations; control nonnative predators; study effects of grazing in riparian corridors, ponds, and uplands (e.g., on East Bay Regional Park District lands); reduce impacts associated with livestock grazing; protect habitat connectivity; minimize impacts of recreation and off-road vehicle use (e.g., Corral

Hollow watershed); avoid and reduce impacts of urbanization; protect habitat buffers from nearby urbanization (Recovery Task 1.16)

- Santa Clara Valley Core Recovery Area: protect existing populations and control nonnative predators (Recovery Task 1.17)

The first priority would be to implement compensatory mitigation within the Wilson Peak Critical Habitat Unit. The second priority would be to implement compensatory mitigation in another designated critical habitat unit. If mitigation within designated critical habitat is not feasible, the Authority would implement compensatory mitigation outside critical habitat that provides an equivalent contribution to California red-legged frog recovery. Compensatory mitigation would be provided for impacts on California red-legged frog breeding and refugia/foraging habitat at a ratio of 3:1 and 2:1, respectively.

Impacts from Implementing Mitigation Measure BIO-MM#33

As addressed in the discussion of BIO-MM#10, compensatory mitigation could involve some secondary impacts; however, these impacts would be beneficial and the measures set forth in BIO-MM#11 would be implemented to minimize any adverse impacts.

BIO-MM#34: Conduct Pre-Construction Surveys and Implement Avoidance and Minimization Measures for Foothill Yellow-Legged Frog

Prior to any ground-disturbing activity scheduled to occur during the dry season (June 1–October 15), the Project Biologist would survey potential breeding habitat (as identified by species modeling) in the project footprint for the presence of foothill yellow-legged frogs using methods from the *Draft Visual Encounter Survey Protocol for Rana boylii in Lotic Environments* (Peek et al. 2017), or other more recent guidelines, if available. Surveys would be conducted no more than 30 days before the start of ground-disturbing activities and would be spatially phased to precede construction activities. Appropriate avoidance and minimization measures, including moving individuals to nearby ponds or other appropriate measures, would be implemented with authorizations issued under the CESA.

BIO-MM#35: Provide Compensatory Mitigation for Impacts on Foothill Yellow-Legged Frog Habitat

The Authority, in keeping with the state incidental take permit, would provide compensatory mitigation for impacts on habitat for foothill yellow-legged frog. Impacts on occupied or presumed occupied aquatic habitat would be compensated for at a ratio of 3:1 for primary breeding and foraging habitat through the purchase of CDFW-approved bank credits or through preservation of occupied habitat in perpetuity.

Impacts from Implementing Mitigation Measure BIO-MM#35

As addressed in the discussion of BIO-MM#10, compensatory mitigation could involve some secondary impacts; however, these impacts would be beneficial and the measures set forth in BIO-MM#11 would be implemented to minimize any adverse impacts.

BIO-MM#36: Conduct Pre-Construction Surveys for Special-Status Reptiles and Amphibians

Prior to any ground-disturbing activities, the Project Biologist would conduct pre-construction surveys in suitable habitat to determine the presence or absence of special-status reptile and amphibian species within the work area. Surveys would be conducted no more than 30 days before the start of ground-disturbing activities in a work area. The results of the pre-construction survey would be used to guide the placement of ESAs or conduct species relocation.

BIO-MM#37: Implement Avoidance and Minimization Measures for Special-Status Reptiles and Amphibians

The Project Biologist would monitor all initial ground-disturbing activities that occur within suitable habitat for special-status reptiles and amphibians, and would conduct clearance surveys of suitable habitat in the work area on a daily basis. If a special-status reptile or amphibian is observed, the Project Biologist would identify actions, to the extent feasible, sufficient to avoid impacts on the species and to allow it to leave the area of its own volition. Such actions may include establishing a temporary ESA in the area where a special-status reptile or amphibian has

been observed and delineating a 50-foot no-work buffer around the ESA. In circumstances where a no-work buffer is not feasible the Project Biologist would relocate any of the species observed from the work area. For federally or state-listed species, relocations would be undertaken in accordance with regulatory authorizations issued under the FESA or CESA.

BIO-MM#38: Conduct Surveys for Blunt-Nosed Leopard Lizard

In accordance with authorizations issued under the FESA, a USFWS-approved biologist would conduct a habitat assessment of the project footprint within 1 year prior to the start of construction to identify all habitat suitable for blunt-nosed leopard lizard within the project footprint. Within 1 year of any ground-disturbing activity, the Project Biologist would conduct surveys for the blunt-nosed leopard lizard in suitable habitats (e.g., areas containing burrows) within the project footprint. These surveys would be conducted in accordance with the *Approved Survey Methodology for the Blunt-Nosed Leopard Lizard* (CDFW 2019), or other more recent guidelines, if available. The biologist(s) would also document burrows likely used by a lizard or with egg clutches, where feasible.

BIO-MM#39: Implement Avoidance Measures for Blunt-Nosed Leopard Lizard

For work areas where surveys confirm that blunt-nosed leopard lizards are absent, the Project Biologist may install WEF along the perimeter of the work area to prevent individual animals from entering the work area. The WEF would be monitored daily and maintained.

During the non-active season for blunt-nosed leopard lizards (October 16–April 14), to the extent feasible, ground-disturbing activities would not occur in areas where blunt-nosed leopard lizards or sign of the species have been observed and that contain burrows suitable for blunt-nosed leopard lizards. If ground-disturbing activities are scheduled during the non-active season, suitable burrows identified during the surveys would be avoided through establishment of 50-foot no-work buffers. The Project Biologist may reduce the size of the no-work buffers if information indicates that the extent of the underground portion of burrows is less than 50 feet.

During the active season when blunt-nosed leopard lizards are moving aboveground (April 15–October 15), the following measures would be implemented in areas where blunt-nosed leopard lizards or signs of blunt-nosed leopard lizards have been observed:

- **Establishment of no-work buffers**—The Project Biologist would establish, monitor, and maintain 50-foot no-work buffers around burrows and egg clutch sites identified during surveys. The 50-foot no-work buffers would be established around burrows in a manner that allows for a connection between the burrow site and the suitable natural habitat adjacent to the construction footprint so that blunt-nosed leopard lizards or hatchlings may leave the area after eggs have hatched. Construction activities would not occur within the 50-foot no-work buffers until such time as the eggs have hatched and blunt-nosed leopard lizards have left the area.
- **Fencing of work areas**—Prior to installing WEF, the Project Biologist would confirm that no blunt-nosed leopard lizards are present within a work area by conducting focused blunt-nosed leopard lizard observational surveys for 12 days over the course of a 30- to 60-day period. At least one survey session would occur over 4 consecutive days. These observational surveys may be paired with scent detection dog surveys for blunt-nosed leopard lizard scat.

Within 3 days of completing these surveys with negative results, WEF would be installed in a configuration that accounts for burrow locations and enables blunt-nosed leopard lizards to leave the work area. The following day, the Project Biologist would conduct an observational survey. If no blunt-nosed leopard lizards are observed, the Project Biologist would install additional WEF to further enclose the work area. This work area would be monitored daily while the WEF is in place.

If blunt-nosed leopard lizards are observed prior to installing the last of the WEF, the Project Biologist would continue observational surveys until the lizard is observed leaving the work area or until 30 days elapse with no blunt-nosed leopard lizard observations within the work area. The Project Biologist may use conservation dogs to assist with this determination.

BIO-MM#40: Provide Compensatory Mitigation for Impacts on Blunt-Nosed Leopard Lizard Habitat

The Authority would provide compensatory mitigation to offset the permanent and temporary loss of potentially suitable habitat for the blunt-nosed leopard lizard. Mitigation would be provided at a ratio of 1:1 unless a higher ratio is required by authorizations issued under the FESA or CESA. Compensatory mitigation would be provided using one or more of the methods described in BIO-MM#10.

Impacts from Implementing Mitigation Measure BIO-MM#40

As addressed in the discussion of BIO-MM#10, compensatory mitigation could involve some secondary impacts; however, these impacts would be beneficial and the measures set forth in BIO-MM#11 would be implemented to minimize any adverse impacts.

BIO-MM#41: Conduct Pre-Construction Surveys and Implement Avoidance and Minimization Measures for Giant Garter Snake

Prior to any ground-disturbing activity that occurs within 200 feet of suitable giant garter snake aquatic habitat, the Project Biologist would conduct a pre-construction survey for giant garter snake no earlier than 24 hours before the commencement of the activity. The Project Biologist would remain on-site for the duration of the ground-disturbing activity. If a giant garter snake is encountered during construction, the Project Biologist would direct that work that has the potential to injure the snake be stopped until it is determined that work can continue without potential harm to the snake, or the snake moves out of the immediate work area on its own volition. Pre-construction surveys in work areas would be repeated whenever construction activity lapses for 2 weeks or more.

To the extent feasible, WEF would be installed along the upper bank of suitable aquatic habitat located within 200 feet of the boundary of the work area (provided access to such areas is available) or at the boundary of the work area to prevent snakes from moving into upland areas within the work area. The biological monitor would regularly inspect fencing. In addition, the contractor would maintain all construction equipment to prevent leaks of fuels, lubricants, or other fluids and would conduct service and refueling procedures in uplands at least 100 feet away from wetlands or waterways.

To the extent feasible, construction activities within 200 feet of giant garter snake habitat would be conducted between May 1 and October 1, the active period for this species. Conducting construction activities during this period reduces the likelihood of mortality because snakes are expected to actively move and avoid danger. If dewatering of giant garter snake habitat is necessary, any dewatered habitat must remain dry for at least 15 consecutive days after April 15 and prior to excavating or filling of the dewatered habitat.

BIO-MM#42: Provide Compensatory Mitigation for Impacts on Giant Garter Snake Habitat

The Authority would provide compensatory mitigation, in accordance with authorizations issued under the FESA and CESA, for direct and indirect impacts including both temporary and permanent impacts on giant garter snake habitat. Compensatory mitigation would be provided at a minimum ratio of 1:1 for potentially suitable aquatic and upland habitat. Compensatory mitigation would be provided using one or more of the methods described in BIO-MM#10.

Impacts from Implementing Mitigation Measure BIO-MM#42

As addressed in the discussion of BIO-MM#10, compensatory mitigation could involve some secondary impacts; however, these impacts would be beneficial and the measures set forth in BIO-MM#11 would be implemented to minimize any adverse impacts.

BIO-MM#43: Conduct Pre-Construction Surveys and Delineate Active Nest Buffers for Breeding Birds

Prior to any ground-disturbing activity, including vegetation removal, scheduled to occur during the bird breeding season (February 1 to September 1), the Project Biologist would conduct visual pre-construction surveys within the work area for nesting birds and active nests (nests with eggs or young) of non-raptor species protected under the MBTA and/or the Cal. Fish and Game Code.

In the event that active bird nests are observed during the pre-construction survey, the Project Biologist would delineate no-work buffers. No-work buffers would be set at a distance of 75 feet, unless a larger buffer is required pursuant to regulatory authorizations issued under the FESA or CESA. No-work buffers would be maintained until nestlings have fledged and are no longer reliant on the nest or parental care for survival or the Project Biologist determines that the nest has been abandoned. In circumstances where it is not feasible to maintain the standard no-work buffer, the no-work buffer may be reduced, provided that the Project Biologist monitors the active nest during the construction activity to ensure that the nesting birds do not become agitated. Additional measures that may be used when no-work buffers are reduced include visual screens and noise barriers.

BIO-MM#44: Implement Avoidance and Minimization Measures for Mountain Plover and Sandhill Crane

The Authority would implement the following measures to avoid or minimize disturbance of flocks of wintering mountain plovers and sandhill cranes potentially occurring in the San Joaquin Valley Subsection:

- To avoid disturbance of wintering mountain plovers and sandhill cranes in the San Joaquin Valley Subsection, no construction activities involving heavy equipment or loud noise (e.g., pile driving) would be permitted within 250 feet of modeled habitat for mountain plover or within 0.75 mile of sandhill crane roost sites from October 1 to March 15, when large concentrations of both species are most likely to be present.
- Alternatively, the Authority or its contractor may conduct surveys for and avoid mountain plover wintering sites and sandhill crane roost sites prior to construction activities in or adjacent to modeled habitat between January and March 15 (no work could occur from October to December to allow surveys to be conducted). A minimum of four surveys would be conducted from October 1 to December 31 by a qualified biologist (or team of biologists) experienced with observing both species (preferably in the regional RSA) within 0.75 mile of the portion of the project footprint where construction would occur. The Authority or its contractor may also identify mountain plover wintering sites and sandhill crane roost sites to be avoided by contacting local birders or biologists familiar with mountain plover and sandhill crane habitat use within 0.75 mile of the project footprint.
  - Biologists would collect geospatial data on mountain plover (flocks of 30 birds or more) and sandhill crane (roost sites) observations in the field using handheld tablets, smartphones, or GPS units that enable drawing of points and multipoint polygons. After surveys are completed, all observations would be digitized into a single file and shared with the Authority and contractor.
  - Contractors would avoid disturbance of mountain plovers by siting all activities between January 1 and March 15 more than 250 feet from observed mountain plover wintering sites.
  - Contractors would avoid disturbance of observed sandhill crane roost sites by not conducting any nighttime (1 hour before sunset to 1 hour after sunrise) work within 0.75 mile of observed roost sites between January 1 and March 15.

BIO-MM#45: Conduct Surveys for Burrowing Owls

No more than 30 days but no less than 14 days prior to any ground-disturbing activity in burrowing owl habitat, the Project Biologist would conduct pre-construction surveys for burrowing owl within suitable habitat located in the work area and/or extending 250 feet from the boundary of the work area, where access is available. Surveys would be conducted in accordance with the SCVHP's condition of approval for covered activities in burrowing owl habitat (County of Santa Clara et al. 2012: page 6-62). This methodology is consistent with the CDFW *Staff Report on Burrowing Owl Mitigation* (CDFG 2012), but it may be updated based on future changes by the SCVHA.

BIO-MM#46: Implement Avoidance and Minimization Measures for Burrowing Owl

Occupied burrowing owl burrows found during pre-construction surveys would be avoided in accordance with the SCVHP's condition of approval for covered activities in burrowing owl habitat (County of Santa Clara et al. 2012: page 6-62). To the extent feasible, the Project Biologist would establish 250-foot no-work buffers around occupied burrowing owl burrows in the work area. An occupied burrow is defined as any burrow at which (1) an adult owl is observed on two or more pre-construction surveys, or (2) a pair of adult owls is observed on one or more pre-construction survey. Construction may proceed outside the 250-foot nondisturbance zone. Construction may proceed inside the 250-foot nondisturbance no-work buffer zone during the breeding season if the season-specific criteria (nesting season: February 1–August 31; non-nesting season: September 1–January 31) described in the SCVHP are met.

BIO-MM#47: Provide Compensatory Mitigation for Loss of Active Burrowing Owl Burrows and Habitat

To compensate for permanent impacts on occupied burrowing owl breeding habitat, the Authority would provide compensatory mitigation at a minimum 1:1 ratio for occupied breeding and foraging habitat. Lands proposed as compensatory mitigation would meet one of the following criteria:

- Support at least two breeding adult owls for every breeding adult owl displaced by construction of the project
- Support at least 1 acre of burrowing owl breeding habitat for every acre of habitat affected (i.e., 1:1 mitigation ratio). For the purposes of this measure, burrowing owl breeding habitat is defined as any land cover type with all of the following attributes:
  - Open terrain with well-drained soils
  - Short, sparse vegetation with few shrubs and no trees
  - Underground burrows or burrow surrogates (e.g., debris piles, culverts, pipes) for nesting and shelter from predators or weather. Burrows in earthen levees, berms, or canal banks within or along the margins of agricultural fields can be counted as compensatory breeding habitat as long as adjacent fields or pastures are suitable for foraging.
  - Abundant and accessible prey (arthropods, small rodents, amphibians, lizards)

Impacts from Implementing Mitigation Measure BIO-MM#47

As addressed in the discussion of BIO-MM#10, compensatory mitigation could involve some secondary impacts; however, these impacts would be beneficial and the measures set forth in BIO-MM#11 would be implemented to minimize any adverse impacts.

BIO-MM#48: Conduct Pre-Construction Surveys for Eagles

At least 1 year prior to the start of any ground-disturbing activities and construction, the Project Biologists would conduct nesting season surveys for eagles. Surveys for bald and golden eagle nests would be conducted within 4 miles of any construction areas supporting suitable nesting habitat and important eagle roost sites and foraging areas. Surveys would be conducted in accordance with the USFWS *Interim Golden Eagle Inventory and Monitoring Protocols* (Pagel et al. 2010), CDFW's *Bald Eagle Breeding Survey Instructions* (CDFW 2017), or current guidance. A nesting territory or inventoried habitat would be considered unoccupied by golden eagles only after completing at least two full surveys in a single breeding season. Prior to initial construction activities, the Project Biologist would conduct a pre-construction sweep of the project site for golden eagle use.

BIO-MM#49: Implement Avoidance Measures for Active Eagle Nests

Prior to the start of any ground-disturbing activity, if an occupied nest (as defined by Pagel et al. 2010) is detected within 4 miles of the work areas, the Authority would implement a 1-mile line-of-sight and 0.5-mile no-line-of-sight no-work buffer during the breeding season (January 1 through August 31) so that construction activities do not result in injury or disturbance to eagles. The no-work buffer would be maintained throughout the breeding season or until the young have fledged and are no longer dependent on the nest or parental care that includes nest use for survival.

Buffers around occupied nests may be reduced if the Project Biologist determines that smaller buffers would be sufficient to avoid impacts on nesting eagles. Factors to be considered for determining buffer size would include the presence of natural buffers provided by vegetation or topography, nest height, locations of foraging territory, and baseline levels of noise and human activity. Buffers would be maintained and nests monitored until the Project Biologist has determined that young have fledged and are no longer reliant on the nest or parental care that includes nest use for survival.

Eagle nest exclusion zones may be removed if monitoring reveals the nest not to be in use as determined by the Project Biologist. An in-use eagle nest is one that is "a bald or golden eagle nest characterized by the presence of one or more eggs, dependent young, or adult eagles on the nest in the past ten days during the breeding season" (USFWS 2016d). Monitoring to demonstrate whether or not eagle nests are in use would follow observational procedures described by Pagel et al. (2010).

In bald and golden eagle nesting territories, the Project Biologist would examine debris piles and determine if there is a potential to attract prey species. If the Project Biologist determines debris piles may attract prey species and pose a danger to eagles, the debris piles would be removed or moved.

BIO-MM#50: Provide Compensatory Mitigation for Loss of Eagle Nests

If pre-construction surveys identify in-use or alternate eagle nests in the permanent impact area, the Authority, in consultation with the USFWS, would develop a nest relocation or replacement plan for the affected nest(s). The plan would describe why there is no practicable alternative to nest removal while enabling project construction. Any relocation or replacement of eagle nests would be in accordance with the BGEPA and subject to the following minimum requirements:

- The nest would be relocated, or a suitable nest would be provided, within the same nesting territory to provide a viable nesting option for the affected eagle pair.
- Post-construction monitoring to confirm continued nesting within the affected nesting territory would be conducted for a minimum of 3 years using observation procedures described by Pagel et al. (2010).

BIO-MM#51: Implement Avoidance Measures for California Condor

During any ground-disturbing activities within the range of the California condor, as delineated in the USFWS database, the Authority would implement the following avoidance measures:

- The Project Biologist would be present for construction activities occurring within 2 miles of known California condor roosting sites.
- If USFWS informs the Authority or if the Authority is otherwise made aware that California condors are roosting within 0.5 mile of a work area, no construction activity would occur during the period between 1 hour before sunset and 1 hour after sunrise.
- All construction materials located within work areas, including items that could pose a risk of entanglement, such as ropes and cables, would be properly stored and secured when not in use.
- Littering of trash and food waste is prohibited. All litter, small artificial items (e.g., screws, washers, nuts, bolts), and food waste would be collected and disposed of from work areas on at least a daily basis.
- All fuels and components with hazardous materials or wastes would be handled in accordance with applicable regulations. These materials would be kept in segregated, secured, or secondary containment facilities as necessary. Any spills of liquid substances that could harm condors would be immediately addressed.
- Avoid the use of ethylene glycol–based anti-freeze or other ethylene glycol–based liquid substances. All parked vehicles/equipment would be kept free of leaks, particularly anti-freeze.
- Polychemical lines would not be used or stored on site to preclude condors from obtaining and ingesting pieces of them.

- If a California condor lands in any work area, the Project Biologist would assess construction activities occurring at the time and determine whether those activities present a potential hazard to the individual condor. Activities determined by the Project Biologist to present a potential hazard to the condor would be stopped until the bird has abandoned the area. Methods approved by the USFWS for hazing California condors to encourage abandonment of the construction site, *Guidance on Hazing California Condors* (USFWS 2014), may be used as necessary.
- Prior to construction-related uses of helicopters, the Project Biologist would coordinate with the USFWS to establish that no California condors are present in the area. If California condors are observed in the area in which helicopters would operate (i.e., the helicopter's flight pattern from its point of origin, during construction use, and on its return flight), helicopter use would not be permitted until the Project Biologist has determined that the California condors have left the area.
- Nighttime light disturbance would be minimized in and adjacent to suitable habitat where California condors may be present. In the event that nighttime lighting is required, it would be focused, shielded, and directed away from adjacent suitable habitat, including nighttime roost areas. The Project Biologist would be on-site during nighttime light use to determine if the lighting poses a risk or otherwise disturbs or harms condors.

BIO-MM#52: Conduct Pre-Construction Surveys and Monitoring for Raptors

If construction or other vegetation removal activities are scheduled to occur during the breeding season for raptors (January 1–September 1), no more than 14 days before the start of the activities, the Project Biologist would conduct pre-construction surveys for nesting raptors in areas where suitable habitat is present. Specifically, such surveys would be conducted in habitat areas within the work area and, where access is available, within 500 feet of the work area boundary where breeding raptors with active nests are found, the Project Biologist would delineate a 500-foot buffer (or as modified by regulatory authorizations for species listed under the FESA or CESA) around the nest to be maintained until the young have fledged from the nest and are no longer reliant on the nest or parental care for survival or until such time as the Project Biologist determines that the nest has been abandoned.

BIO-MM#53: Conduct Surveys for Swainson's Hawk Nests

Surveys must be performed no more than 1 year prior to the commencement of construction activities. The Project Biologist would conduct surveys for Swainson's hawk during the nesting season (March 1–August 31) within both the work area and a 0.5-mile buffer surrounding the work area, provided access to such areas is available. No sooner than 30 days prior to any ground-disturbing activity, the Project Biologist would conduct pre-construction surveys of nests identified during the earlier surveys to determine if any are occupied. The initial nesting season surveys and subsequent pre-construction nest surveys would follow the protocols set out in the *Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley* (SHTAC 2000).

BIO-MM#54: Implement Avoidance and Minimization Measures for Swainson's Hawk Nests

Any active Swainson's hawk nests (defined as a nest used one or more times in the last 5 years) found within 0.5-mile of the boundary of the work area during the nesting season (March 1–August 31) would be monitored daily by the Project Biologist to assess whether the nest is occupied. If the nest is occupied, the Project Biologist would establish no-work buffers following CDFW's *Staff Report Regarding Mitigation for Impacts to Swainson's Hawks (*Buteo swainsoni*) in the Central Valley of California* (CDFG 1994), and the status of the nest would be monitored until the young fledge or for the length of construction activities, whichever occurs first.

If ground-disturbing activities or other construction activities may cause nest abandonment or forced fledging within the specified buffer area, the biological monitor would monitor the nest site to determine if the nest is abandoned. If an occupied Swainson's hawk nest tree is to be removed as a result of construction, or nest abandonment is observed during construction, an incidental take permit under CESA would be obtained and impacts would be minimized and fully mitigated.

BIO-MM#55: Provide Compensatory Mitigation for Loss of Swainson's Hawk Nesting Trees and Habitat

To compensate for permanent impacts on active Swainson's hawk nest trees (i.e., trees in which Swainson's hawks were observed building nests during protocol-level surveys described in BIO-MM#53) and foraging habitat, the Authority would provide compensatory mitigation that replaces affected nest trees and provides foraging habitat. Lands proposed as compensatory mitigation for Swainson's hawk would meet the following minimum criteria:

- Support at least three mature native riparian trees suitable for Swainson's hawk nesting (i.e., valley oak, Fremont cottonwood, or willow) for each Swainson's hawk nest tree removed by construction of the project extent
- Support at least one Swainson's hawk nesting territory in the last 5 years

To compensate for impacts on Swainson's hawk foraging habitat, the Authority would contribute to the project's mitigation commitment for Swainson's hawk foraging habitat, which would be calculated based on the following ratios:

- 1:1 for impacts on Primary Active Foraging Habitat
- 0.75:1 for impacts on Secondary Active Foraging Habitat
- 0.5:1 for impacts on Tertiary Active Foraging Habitat

Impacts from Implementing Mitigation Measure BIO-MM#55

As addressed in the discussion of BIO-MM#10, compensatory mitigation could involve some secondary impacts; however, these impacts would be beneficial and the measures set forth in BIO-MM#11 would be implemented to minimize any adverse impacts.

BIO-MM#56: Conduct Surveys and Implement Avoidance Measures for Active Tricolored Blackbird Nest Colonies

Prior to initiation of construction at any location within 300 feet of suitable nesting habitat, the Project Biologist with experience surveying for and observing tricolored blackbird would conduct pre-construction surveys to establish use of nesting habitat by tricolored blackbird colonies. Surveys would be conducted in suitable habitat within 300 feet of proposed construction areas, where access allows, during the nesting season (generally March 15–July 31).

If construction is initiated near suitable habitat during the nesting season, three surveys would be conducted within 15 days prior to construction, with one of the surveys within 5 days prior to the start of construction. If active tricolored blackbird nesting colonies are identified, construction activities must avoid the nesting colonies and associated habitat during the breeding season (generally March 15–July 31) to the extent practicable within 300 feet of the colony, consistent with the CDFW's *Staff Guidance Regarding Avoidance of Impacts to Tricolored Blackbird Breeding Colonies on Agricultural Fields in 2015* (CDFW 2015). This minimum buffer may be reduced in areas with dense forest, buildings, or other habitat features between the construction activities and the active nest colony, or where there is sufficient topographic relief to protect the colony from excessive noise or visual disturbance as determined by a Project Biologist experienced with tricolored blackbird. If tricolored blackbirds colonize habitat adjacent to construction after construction has been initiated, the Authority would reduce disturbance through establishment of buffers or sound curtains, as determined by the Project Biologist.

BIO-MM#57: Provide Compensatory Mitigation for Impacts on Tricolored Blackbird Habitat

The Authority would provide compensatory mitigation required to offset impacts on tricolored blackbird. Compensatory mitigation would replace permanent loss of habitat with habitat that is commensurate with the type (nesting, roosting, and foraging) and amount of habitat lost. Suitable tricolored blackbird nesting habitat would be permanently protected or restored and managed at a ratio of 3:1 (protected or restored:affected) at a location subject to CDFW approval, and in proximity to the nearest breeding colony observed within the past 15 years, if possible. Suitable breeding season foraging habitat would be protected and managed at a ratio of 1:1 (protected:affected) at a location subject to CDFW approval. Suitable nonbreeding season foraging habitat would be

protected or restored at a ratio of 1:1 (protected:affected). Compensatory mitigation would be provided using one or more of the methods described in the CMP.

Impacts from Implementing Mitigation Measure BIO-MM#57

As addressed in the discussion of BIO-MM#10, compensatory mitigation could involve some secondary impacts; however, these impacts would be beneficial and the measures set forth in BIO-MM#11 would be implemented to minimize any adverse impacts.

BIO-MM#58: Provide Compensatory Mitigation for Impacts on Waterfowl, Shorebird, and Sandhill Crane Habitat

The Authority would provide compensatory mitigation required to offset impacts on waterfowl and shorebirds in the UPR and GEA IBAs. Compensatory mitigation would replace permanent loss of habitat with habitat that is commensurate with the type (nesting, roosting, or foraging) and amount of habitat lost as follows:

- Suitable waterfowl and shorebird nesting and foraging habitat would be permanently protected and enhanced at a suitable location at a ratio of 1:1 (protected:affected) for permanent habitat loss; 1:1 (protected:affected) for habitat where hearing damage could result during operations (residual noise of 93 dBA or greater, as measured outside the HSR right-of-way); and 0.5:1 for habitat where arousal, visual disturbance, or masking effects result from operations (residual noise of 77 dBA or greater, as measured outside of the HSR right-of-way). Protection and enhancement of habitat would be implemented within the GEA and UPR IBAs or a suitable alternative location.
- Enhancement activities could include improved water management (to increase food supplies); improvement or replacement of water management infrastructure; vegetation control and management; contouring to increase topographic heterogeneity (to increase habitat diversity); or levee repair, maintenance, and replacement.

Impacts from Implementing Mitigation Measure BIO-MM#58

As addressed in the discussion of BIO-MM#10, compensatory mitigation could involve some secondary impacts; however, these impacts would be beneficial and the measures set forth in BIO-MM#11 would be implemented to minimize any adverse impacts.

BIO-MM#59: Conduct Pre-Construction Surveys for San Joaquin Kit Fox

Within 30 days prior to the start of any ground-disturbing activity, the Project Biologist would conduct pre-construction surveys in suitable kit fox habitat in the work area. The Project Biologist would conduct the surveys in accordance with USFWS' *San Joaquin Kit Fox Survey Protocol for the Northern Range* (USFWS 1999) between May 1 and September 30 for the purpose of identifying potential San Joaquin kit fox dens. All dens would be mapped and their type and status determined. Den types would be identified as defined in Exhibit A (Definitions) of the USFWS' *Standardized Recommendations for Protection of the Endangered San Joaquin Kit Fox prior to or during Ground Disturbance* (USFWS 2011). If any occupied or potential dens are found during pre-construction surveys, they would be flagged and a 50-foot no-work buffer would be established around the den until the den type is identified cleared, in accordance with regulations under the FESA and CESA, if necessary to allow construction activities to proceed. The Project Biologist may employ the use of conservation dogs (scent dogs) to augment focused species surveys using methods described in Smith et al. (2006). The Project Biologist would coordinate with USFWS and CDFW before using conservation dogs.

BIO-MM#60: Implement San Joaquin Kit Fox Avoidance and Minimization Measures

The Authority would implement USFWS' *Standardized Recommendations for Protection of the San Joaquin Kit Fox Prior to or During Ground Disturbance* (USFWS 2011) to minimize impacts on this species, including:

- Disturbance of all kit fox dens would be avoided to the extent feasible.
- Construction activities that occur within 200 feet of any occupied dens would cease within one-half hour after sunset and would not begin earlier than one-half hour before sunrise, to the extent feasible.

- All construction pipes, culverts, or similar structures with a diameter of 4 inches or greater that are stored within the construction footprint for one or more overnight period would be thoroughly inspected for kit foxes before the pipe is subsequently buried, capped, or otherwise used or moved.
- If a San Joaquin kit fox is detected within a work area during construction, the Project Biologist would request approval from the USFWS and CDFW to capture and relocate the kit fox if it does not safely leave the area by its own volition.
- To minimize the temporary impacts of WEF and construction exclusion fencing on kit fox and their movement/migration corridors during construction, artificial dens would be installed along the outer perimeter of WEF and construction exclusion fencing. Artificial dens or similar escape structures would also be installed at dedicated wildlife crossing structures to provide escape cover and protection against predation. The artificial dens would be located on parcels owned by the Authority or at locations where access is available.

BIO-MM#61: Provide Compensatory Mitigation for Impacts on San Joaquin Kit Fox Habitat
The Authority would provide compensatory mitigation for impacts on San Joaquin kit fox habitat through the acquisition of suitable habitat that is acceptable to USFWS and CDFW. Habitat would be replaced at a minimum ratio of 1:1 for high- or moderate-value suitable habitat (natural lands) and at a ratio of 0.5:1 for low-value suitable habitat (urban or agricultural lands), unless a higher ratio is required by regulatory authorizations issued under the FESA and CESA. Compensatory mitigation would be provided using one or more of the methods described in BIO-MM#10.

Impacts from Implementing Mitigation Measure BIO-MM#61
As addressed in the discussion of BIO-MM#10, compensatory mitigation could involve some secondary impacts; however, these impacts would be beneficial and the measures set forth in BIO-MM#11 would be implemented to minimize any adverse impacts.

BIO-MM#62: Implement Avoidance and Minimization Measures for Fresno Kangaroo Rat
Prior to any ground-disturbing activity, the Project Biologist would assess suitable habitat within the work area to determine whether kangaroo rat burrows or signs of kangaroo rats are present. If no burrows or signs of kangaroo rats are detected and kangaroo rats are determined to be absent from the work area, the Project Biologist would oversee the installation, maintenance, and monitoring of WEF along the perimeter of the work area where adjacent to potentially suitable habitat.

If kangaroo rat individuals, burrows, or signs of the presence are found within the work area during the habitat assessment, the Project Biologist would take further steps to determine whether, or the extent to which, Fresno kangaroo rats are present, including through trapping, genetic analysis of scat, or the use of conservation dogs trained to detect the species, or as otherwise provided pursuant to authorizations issued under the FESA and CESA.

In the unlikely event that Fresno kangaroo rat is confirmed present in the work area, USFWS and CDFW would be notified within 2 business days or as required under authorizations issued under the FESA or CESA. The Project Biologist would install WEF in areas where Fresno kangaroo rats are present and would establish 50-foot no-work buffers, unless a different buffer distance is specified under authorizations issued under the FESA and CESA.

BIO-MM#63: Provide Compensatory Mitigation for Impacts on Fresno Kangaroo Rat Habitat
Impacts on habitat occupied by Fresno kangaroo rat would be compensated for through a CMP prepared in accordance with BIO-MM#10, at a minimum 1:1 ratio for potentially suitable habitat through the purchase of agency-approved bank credits or through preservation of suitable habitat (i.e., alkali sink scrub or grassland on the San Joaquin Valley floor) in perpetuity.

Impacts from Implementing Mitigation Measure BIO-MM#63
As addressed in the discussion of BIO-MM#10, compensatory mitigation could involve some secondary impacts; however, these impacts would be beneficial and the measures set forth in BIO-MM#11 would be implemented to minimize any adverse impacts.

BIO-MM#64: Conduct Pre-Construction Surveys for American Badger Den Sites and Implement Avoidance and Minimization Measures

Prior to any ground-disturbing activity, the Project Biologist would conduct pre-construction surveys for American Badger den sites within suitable habitat located within the work area. These surveys would be conducted no less than 14 days and no more than 30 days prior to the start of ground-disturbing activities in a work area. The Project Biologist would establish a 100-foot no-work buffer around occupied maternity dens throughout the pup-rearing season (February 15–July 1) and a 50-foot no-work buffer around occupied dens during other times of the year. If nonmaternity dens are found and cannot be avoided during construction activities, they would be monitored for badger activity. If the Project Biologist determines that dens may be occupied, passive den exclusion measures would be implemented for 3–5 days to discourage the use of these dens prior to project disturbance activities.

BIO-MM#65: Conduct Pre-Construction Surveys for Ringtail and Ringtail Den Sites and Implement Avoidance Measures

Prior to any ground-disturbing activity, the Project Biologist would conduct pre-construction surveys for ringtail and ringtail den sites in suitable habitat within the work area. These surveys would be conducted no more than 30 days before the start of ground-disturbing activities in a work area. The Project Biologist would establish 100-foot no-work buffers around occupied maternity dens throughout the pup-rearing season (May 1–June 15) and a 50-foot no-work buffer around occupied dens during other times of the year.

BIO-MM#66: Conduct Pre-Construction Surveys for Dusky-Footed Woodrat and Implement Avoidance Measures

Prior to any ground-disturbing activity, the Project Biologist would conduct pre-construction surveys for woodrat stick houses within suitable habitat located within the work area. These surveys would be conducted no more than 14 days before the start of ground-disturbing activities in a work area. The Project Biologist would establish a 10-foot no-work buffers around each stick house using ESA fencing. If stick houses are found within temporary or permanent impact areas and cannot be avoided, the following condition would be implemented:

- Removal of woodrat stick houses would not occur between March and May when nesting is most likely. Outside this period, the contractor, under supervision of the Project Biologist, may dismantle stick houses by hand or using small construction machinery (e.g., Bobcat or similar) and move nesting material to suitable habitat outside the project footprint so that woodrats may rebuild new houses.

BIO-MM#67: Conduct Pre-Construction Surveys for Special-Status Bat Species

No more than 1 year before the replacement or modification of any bridges or removal of other structures modeled as bat habitat and where access is available, the Project Biologist would conduct a survey of the bridge looking for evidence of roosting bats. If bat sign is detected, biologists would conduct an evening visual emergence survey of the bridge or structure, from a half hour before sunset to 1–2 hours after sunset for a minimum of 2 nights within the season that construction would be taking place. If a potentially active bat roost is in the bridge or structure, passive monitoring with full-spectrum bat detectors would be used to assist in determining species present. To the extent possible, all monitoring would be conducted during favorable weather conditions (calm nights with temperatures conducive to bat activity and no precipitation predicted). The biologists would analyze the bat call data using appropriate software and would prepare a report that would be submitted to the Authority, including an assessment of the significance of the roost for local bat populations.

BIO-MM#68: Implement Bat Avoidance and Relocation Measures

If active hibernacula or maternity roosts are identified in the work area or 500 feet extending from the work area during pre-construction surveys, they would be avoided to the extent feasible. If avoidance of a hibernacula is not feasible, the Project Biologist would prepare a relocation plan to remove the hibernacula and provide for construction of an alternative bat roost outside of the work area. The Project Biologist would implement the relocation plan before the commencement

of any ground-disturbing activities that would occur within 500 feet of the hibernacula. Removal of roosts would be guided by accepted exclusion and deterrent techniques.

BIO-MM#69: Implement Bat Exclusion and Deterrence Measures
If nonbreeding or nonhibernating individuals or groups of bats are found roosting within the work area, the Project Biologist would facilitate the eviction of the bats by either opening the roosting area to change the lighting and airflow conditions, or installing one-way doors or other appropriate methods.

To the extent feasible, the Authority would leave the roost undisturbed by project activities for a minimum of 1 week after implementing exclusion and/or eviction activities. Steps would not be taken to evict bats from active maternity or hibernacula; instead such features may be relocated pursuant to a relocation plan.

BIO-MM#70: Prepare and Implement an Annual Vegetation Control Plan
Prior to O&M of the HSR, the Authority would prepare an annual vegetation control plan (VCP) to address vegetation removal for the purpose of maintaining clear areas around facilities, reducing the risk of fire, and controlling invasive weeds during the operational phase. The Authority would generally follow the procedures established in Chapter C2 of the California Department of Transportation (Caltrans) Maintenance Manual to manage vegetation on Authority property (Caltrans 2014). Vegetation would be controlled by chemical, thermal, biological, cultural, mechanical, structural, and manual methods. The VCP would be updated each winter and completed in time to be implemented no later than April 1 of each year. The annual update to the VCP would include a section addressing issues encountered during the prior year and changes to be incorporated into the VCP. The plan would describe site-specific vegetation control methods, as outlined below:

- Chemical vegetation control methods
- Mowing program consistent with Section 1415 of the FAST Act
- Other nonchemical vegetation control
- Other chemical pest control methods (e.g., insects, snail, rodent)

Only Caltrans-approved herbicides may be used in the vegetation control program. Pesticide application would be conducted by certified pesticide applicators in accordance with all requirements of the California Department of Pesticide Regulation and County Agricultural Commissioners. Noxious/invasive weeds would be treated where requested by County Agricultural Commissioners. The Authority would cooperate in area-wide efforts to control noxious/invasive weeds if such programs have been established by local agencies.

BIO-MM#71: Restore Temporary Riparian Impacts
Within 90 days of completing construction in a work area, the Project Biologist would direct the revegetation of any riparian areas temporarily disturbed as a result of the construction activities, using appropriate native plants and seed mixes. Native plants and seed mixes would be obtained from stock originating from local sources, to the extent feasible. The Project Biologist would monitor restoration activities consistent with provisions in the RRP (BIO-MM#1).

BIO-MM#72: Provide Compensatory Mitigation for Permanent Impacts on Riparian Habitat
The Authority would compensate for permanent impacts on riparian habitats at a ratio of 2:1 (mixed riparian and palustrine forested wetland) or 4:1 (California sycamore woodland), unless a higher ratio is required by agencies with regulatory jurisdiction over the resource. Compensatory mitigation may occur through habitat restoration, the acquisition of credits from an approved mitigation bank, participation in an in-lieu fee program or habitat preservation or enhancement at a permittee responsible mitigation site.

Impacts from Implementing Mitigation Measure BIO-MM#72
As addressed in the discussion of BIO-MM#10, compensatory mitigation could involve some secondary impacts; however, these impacts would be beneficial and the measures set forth in BIO-MM#11 would be implemented to minimize any adverse impacts.

BIO-MM#73: Restore Aquatic Resources Subject to Temporary Impacts

Within 90 days of the completion of construction activities in a work area, the Authority would begin to restore aquatic resources that were temporarily affected by the construction. As set out in the RRP (BIO-MM#1), such areas would be, to the extent feasible, restored to their natural topography. In areas where gravel or geotextile fabrics have been installed to protect substrate and to otherwise minimize impacts, the material would be removed and the affected features would be restored. The Authority would revegetate affected aquatic resources using appropriate native plants and seed mixes (from local sources where available). The Authority would conduct maintenance monitoring consistent with the provisions of the RRP**.**

BIO-MM#74: Prepare and Implement a Compensatory Mitigation Plan for Impacts on Aquatic Resources

The Authority would prepare and implement a CMP that identifies mitigation to address temporary and permanent loss, including functions and values, of aquatic resources as defined as waters of the U.S. under the federal CWA and/or waters of the state under the Porter-Cologne Act. The compensatory mitigation for state- and federally protected wetlands would meet the federal and state policy for no net loss of functions and values. Mitigation implemented under this measure would be consistent with and would help advance mitigation commitments at the program level, including mitigation intended to address impacts in the GEA. Compensatory mitigation may involve the restoration, establishment, enhancement, and/or preservation of aquatic resources through one or more of the following methods:

- Purchase of credits from an agency-approved mitigation bank
- Preservation of aquatic resources through acquisition of property
- Establishment, restoration, or enhancement of aquatic resources
- In-lieu fee contribution determined through consultation with the applicable regulatory agencies

The following ratios would be used for compensatory mitigation for permanent impacts, unless a higher ratio is required pursuant to regulatory authorizations issued under Section 404 of the CWA and the Porter-Cologne Act:

- Vernal pools: 2:1
- Seasonal wetlands: between 1.1:1 and 1.5:1 based on impact type, function and values lost
  - 1:1 off-site for permanent impacts
  - 1:1 on-site and 0.1:1 to 0.5:1 off-site for temporary impacts
- All other wetland types: 1:1
- All non-wetland types: mitigated onsite at 1:1 or offsite 1:1 if onsite mitigation is not possible.

For permittee-responsible mitigation involving establishment, restoration, enhancement, or preservation of aquatic resources by the Authority, the CMP would contain, but would not be limited to the following primary information:

- Objectives—A description of the resource types and amounts that would be provided, the type of compensation (i.e., restoration, establishment, enhancement, and/or preservation), and the manner in which the resource functions of the compensatory mitigation project would address the needs of the watershed or ecoregion
- Site selection—A description of the factors considered during the term sustainability of the resource
- Adaptive management plan—A management strategy to address changes in site conditions or other components of the compensatory mitigation project
- Financial assurances—A description of financial assurances that would be provided to support success of the compensatory mitigation

Additional information required in a CMP as outlined in 33CFR 332.4(c),as deemed appropriate and necessary by the USACE would also be addressed in the CMP. In circumstances where the Authority intends to fulfill compensatory mitigation obligations by securing credits from approved

mitigation banks or in-lieu fee programs, the CMP need only include the name of the specific mitigation bank or in-lieu fee program to be used, the number of credits proposed to be purchased, and a rationale for why this number of credits was determined appropriate.

Impacts from Implementing Mitigation Measure BIO-MM#74

As addressed in the discussion of BIO-MM#10, compensatory mitigation could involve some secondary impacts; however, these impacts would be beneficial and the measures set forth in BIO-MM#11 would be implemented to minimize any adverse impacts.

BIO-MM#75: Implement Transplantation and Compensatory Mitigation for Protected Trees

Prior to ground-disturbing activities, the Project Biologist would conduct surveys in the work area to identify protected trees.

The Project Biologist would establish ESAs around protected trees with the potential to be affected by construction activities, but do not require removal. The contractor, under the direction of the Project Biologist, would install ESA fencing 5 feet outward from the drip lines of such protected trees.

The Authority would provide compensatory mitigation for impacts on protected trees, including impacts associated with removing or trimming a protected tree. Compensation would be based on requirements set out in applicable local government ordinances, policies, and regulations. Compensatory mitigation may include, but is not limited to, the following:

- Transplantation of protected trees to areas outside of the work area.
- Replacement of protected trees at an off-site location, based on the number of protected trees affected, at a ratio not to exceed 3:1 for native trees or 1:1 for ornamental trees, unless higher ratios are required by local government ordinances or regulations.
- Contribution to a tree-planting fund.

BIO-MM#76: Minimize Impacts on Wildlife Movement during Construction

During construction, all known wildlife crossing structures, such as underpasses and culverts, would be maintained unobstructed to the extent possible; no equipment storage, staging, or unnecessary operations would be conducted in such areas. Where an existing underpass or culvert must be closed or obstructed, a temporary crossing structure or an alternative movement corridor would be created where feasible. Construction would be timed to minimize impacts on movement by providing at least one crossing feature in a region. For example, to minimize impacts on wildlife using the Fisher Creek culvert, construction at Fisher Creek would not commence until the construction of the Tulare Swale undercrossing is complete. Fencing would be placed to funnel individuals to temporary or alternative crossing structures or movement corridors.

To the extent feasible, the Authority would avoid placing fencing, either temporarily or permanently, within known movement routes for wildlife (e.g., the Fisher Creek underpass) in those portions of the alignment where the tracks are elevated (e.g., viaducts or bridges). The Authority would avoid conducting ground-disturbing activities within known wildlife movement routes during nighttime hours, to the extent feasible, and would shield nighttime lighting to avoid illuminating wildlife movement corridors in circumstances where feasible.

To avoid impeding movement of aquatic species, the Authority would employ the use of vibratory (rather than impact) pile driving for work in or within 200 feet of waterbodies that provide habitat for steelhead or giant garter snake, where feasible. To allow for movement of steelhead and other fish species around dewatered sites, the capture and translocation of fish around the job site to a downstream location would be undertaken on consultation with the NMFS and CDFW.

Additionally, to the extent feasible, the Authority would establish wildlife-friendly fencing at soil stabilization areas and tunnel portals where a large right-of-way would be required. While access restriction fencing directly adjacent to the rail, tunnel portals, and HSR facilities would still be necessary for human safety and security, it would not be necessary around the larger

construction footprints necessary for soil stabilization areas and tunnel portal work areas. Within these areas, a wildlife-friendly fence would be used with the following attributes (Paige 2012):

- Three- or four-strand wire design
- No more than 40 inches tall (to allow adult mammals to jump over)
- Bottom 18 inches off the ground (to allow animals to crawl under) (changes in topography such as gullies or dips can be used to provide this clearance distance)
- At least 12 inches between the top two wires
- Smooth top and bottom wires
- No vertical stays between posts; if stays are necessary, consider stiff plastic or composite stays
- Wood or steel posts at 16.5-foot intervals
- Gates, drop-downs, or other passage where wildlife can concentrate and cross
- Flagging or other measure to increase fence visibility (especially important for low-flying birds)

BIO-MM#77: Design Wildlife Crossings to Facilitate Wildlife Movement

To the extent feasible, the Authority would design all wildlife crossings created specifically for terrestrial species consistent with the guidelines and recommendations in the WCA (Authority 2020a: Appendix C). The guidelines and recommendations include the following features:

- Native earthen bottom
- Avoid metal walls
- Unobstructed entrances (e.g., no riprap, energy dissipaters, grates), although vegetative cover, adjacent to and near the entrances of crossings, is permissible
- Openness and a clear line of sight from end to end
- Design entrances to minimize light reflection from train lights
- Cover materials within the crossing such as rock or brush piles where smaller animals can take cover
- Year-round absence of water for a portion of the width of the crossing (i.e., no flowing water)
- Where water is likely to be present within a crossing as a result of a high groundwater table or proximity to an existing floodplain, wildlife crossing design would include features to minimize water entry into the crossing (e.g., impermeable groundwater barriers, berms) and to maximize drainage and drying time (e.g., slopes, sump pumps or permeable soils)
- Where hydrologic flow balancing features (culverts) provide wildlife connectivity, "shelves" would be constructed, where feasible, to allow small and medium animals to pass through the structure when it is flooded
- Slight grade at approaches to prevent flooding
- Hydrologic designs (ledges, cross slopes, water detention features, infiltration features, water proofing, or other features) to maintain crossing functionality (a dry crossing path) up to and including 100-year storm events for 95 percent of the year (347 days)
- Limited open space distance between crossing and cover/habitat
- Separation from human use areas (e.g., trails, multiuse undercrossings)
- Avoidance of artificial light at approaches to wildlife crossings

- To mitigate impenetrable barriers caused by construction of concrete vehicle barriers beneath viaducts in the Monterey Corridor and Morgan Hill and Gilroy Subsections (Alternatives 1 and 3), install Type L Concrete Barrier Wildlife Passageways at stations 718, 735, 755, 846, and 875

BIO-MM#78: Establish Wildlife Crossings at Embankment in West Slope of Pacheco Pass
The Authority would create dedicated wildlife crossings to accommodate wildlife movement across permanently fenced infrastructure in the western portion of the Pacheco Pass Subsection near Casa de Fruta, where wildlife movement would be significantly reduced. Wildlife crossings would be placed approximately every 0.3 mile, as feasible, where the alignment is at grade, on embankment, or trenched at the following locations:

- Crossing A: B3161+34: 130 feet long by 40 feet wide by 23 feet high.
- Crossing B: B3174+00: 144 feet long by 40 feet wide by 38 feet high
- Crossing C: B3197+00: 165 feet long by 40 feet wide by 38 feet high
- Crossing D: B3209+98: 185 feet long by 40 feet wide by 38 feet high

Crossings would conform to the minimum spacing and dimensions set forth in the WCA (Authority 2020a: Appendix C), unless different dimensions or frequencies are specified in authorizations issued under the FESA or CESA. Additionally, to the extent feasible, specific designs would incorporate the features outlined under BIO-MM#77 to facilitate wildlife movement through dedicated crossings.

BIO-MM#79: Provide Wildlife Movement between the Santa Cruz Mountains and Diablo Range
The Authority would address effects of permeability reduction caused by construction of the MOWF. Within 2 years of the start of construction at the MOWF, the Authority would conserve or improve wildlife movement between the Santa Cruz Mountain and the Diablo Range wildlife linkage (Penrod et al. 2013) by conserving natural or agricultural lands that provide for wildlife movement, enhancing wildlife movement between the Santa Cruz Mountains and the Diablo Range, or both.

The extent of preservation or enhancement would provide for one of the following:

- An increase in permeability of the Santa Cruz Mountains to Diablo Range Wildlife Linkage (as mapped by Penrod et al. 2013) and the Soap Lake 100-year floodplain equivalent to the decrease in permeability at the MOWF in its combination of magnitude and affected area
- Protection of 238 acres (Alternatives 1, 2, and 4) or 239 acres (Alternative 3) of lands prioritized for their importance to wildlife movement in the Santa Cruz Mountains to Diablo Range Wildlife Linkage and the Soap Lake 100-year floodplain, which corresponds to a 1-to-1 ratio of protected land to project footprint at the MOWF
- A combination of enhancement and protection where the implemented percentages of the above enhancement and preservation combine to 100 percent

Acquisition and enhancement efforts would prioritize lands in either the Santa Cruz Mountains to Diablo Range Wildlife Linkage or the Soap Lake 100-year floodplain, particularly along known wildlife movement routes or corridors, especially those adjacent to or near wildlife crossing structures under UPRR, Monterey Road, and the HSR. The prioritization of lands for protection would be developed in coordination with local stakeholders, such as the SCVHA, the SCVOSA, The Nature Conservancy, the Peninsula Open Space Authority, and with wildlife agency staff.

Preservation of natural or agricultural lands would be in perpetuity through either fee title acquisition or conservation easement.

Enhancement efforts may include enhancement of movement on lands protected by the Authority, or it may entail funding projects that would enhance movement on other protected lands, reduce or eliminate existing barriers to movement, or construct structures to improve wildlife movement.

Impacts from Implementing Mitigation Measure BIO-MM#79

As addressed in the discussion of BIO-MM#10, compensatory mitigation could involve some secondary impacts; however, these impacts would be beneficial and the measures set forth in BIO-MM#11 would be implemented to minimize any adverse impacts.

BIO-MM#80: Minimize Permanent Intermittent Noise, Visual, and Train Strike Impacts on Wildlife Movement

To address the permanent intermittent impact of noise, visual disturbance, and train strike on wildlife movement in the UPR and GEA IBAs, the Authority would build additional structures in these areas to minimize or avoid such impacts. Structures would be designed with the goal of reducing or eliminating the visual presence of the moving train and exceedance of the established quantitative noise thresholds (as measured at the outer edges of the HSR right-of-way), as described in the WCA:

- Permanent hearing damage: 140 dBA or greater
- Temporary hearing damage: 93 dBA or greater but less than 140 dBA
- Masking: 84 dBA or greater but less than 93 dBA
- Arousal: 77 dBA or greater but less than 84 dBA

The Authority would build opaque noise barriers to cover or obscure some or all of the train, including the OCS, if feasible, and the following locations:

- In the GEA IBA near Volta, between Stations B4550+00 and B4630+00 (all alternatives)
- In the UPR IBA (corresponding to the 10-year Pajaro River floodplain), between Stations B1932+00 and B2164+00 (Alternatives 1, 2, and 4)
- In the UPR IBA between Stations B1870+00 and B2097+00 (Alternative 3)

The noise barriers would be a minimum height of 17 feet and would be designed to provide a minimum of 10 dBA attenuation of sound generated by HSR operations, as measured immediately outside the noise barrier. The noise barriers would be built in conjunction with the installation of track and OCS and would be completed before HSR train operations begin.

Under all alternatives, for approximately 3.4 miles In the GEA IBA, centered approximately at Mud Slough between Stations B4914+00 and B5095+00, the rail design would be modified to enclose the train's operating envelope and OCS. The enclosure would be constructed using opaque, nonglare materials that provide a minimum of 10 dBA attenuation of sound generated by HSR operations, as measured immediately outside the enclosure. The enclosure would also be designed to minimize sound generated by HSR train exit and entry. The Authority would design the guideway enclosure in compliance with all HSR design, operations, and maintenance requirements, including but not limited to:

- Train performance
- Passenger comfort
- Fire-life-safety readiness and response
- Loading to viaduct girder structure and embankment foundation
- 100-year service life under suitable, acceptable maintenance practices and costs

The guideway enclosure would be built in conjunction with the installation of track and OCS and would be completed before HSR train operations begin. A preliminary engineering feasibility analysis is provided in Appendix 3.7-C, HSR Guideway Enclosure for the Grasslands Ecological Area.

If structure designs in the UPR and GEA IBAs can be demonstrated through quantitative modeling to reduce sound levels outside the HSR right-of-way to less than 77 dBA, no additional measures would be necessary. If residual noise of 77 dBA or more (as measured outside the HSR right-of-way) is still demonstrated, and therefore would exceed one or more of the quantitative noise thresholds, HSR would implement the compensatory mitigation approach described in BIO-MM#58, which requires compensatory mitigation for lost habitat for waterbirds. The amount of compensatory mitigation required under BIO-MM#58, if implemented in concert

with this mitigation measure, would depend on the extent of noise reduction that can be demonstrated using noise barriers or enclosures. Mitigation implemented under this measure would be consistent with and would help advance mitigation commitments at the program level, including mitigation intended to address impacts in the GEA.

The Authority would consult with CDFW, USFWS, Grasslands Water District, the owner(s) of private properties affected by the 3.4-mile HSR project footprint, and other stakeholders as part of final design of the guideway enclosure.

BIO-MM#81: Minimize Permanent Intermittent Impacts on Terrestrial Species Wildlife Movement

To address the permanent intermittent impact of operations on wildlife movement from train strike and entrapment, the Authority would implement an array of exclusion features for terrestrial species. These features include the following, which are specified in detail in the WCA (Authority 2020a: Appendix C):

- Permanent chain-link fencing along all at-grade portions
- Fencing buried 3.5 feet at a 45-degree angle on the outside of the fence beneath the existing grade in the following locations: Alternative 2 between Stations B725 and B1075 (Coyote Valley) and Stations B1810 and B4310; Alternatives 1, 2 and 4 between Stations B2160 to B2350 (eastern Soap Lake and western Pacheco Pass); Alternative 3 between Stations B2040 and B2280 (eastern Soap Lake); and all alternatives between Station B31545 and B4310 (Pacheco Pass)
- Angled barbed wire at the top of chain-link fencing to prevent large animals from jumping over the fence and into the right-of-way in the following locations: Alternative 2 between Stations B725 and B1075 (Coyote Valley) and Stations B1810 and B4310; Alternatives 1, 2 and 4 between Stations B2160 to B2350 (eastern Soap Lake and western Pacheco Pass); Alternative 3 between Stations B2040 and B2280 (eastern Soap Lake); and all alternatives between Station B31545 and B5337 (Pacheco Pass and San Joaquin Valley)
- Fine-mesh (0.25- to 0.5-inch mesh size) fencing or other barrier designed to exclude small animals (e.g., California tiger salamander, Fresno kangaroo rat, blunt-nosed leopard lizard, and giant garter snake) and extending at least 2 feet aboveground and at least 6 to 10 inches below-ground with an overhanging 90-degree lip (minimum 6 inches) to prevent climbing in the following locations: Alternative 2 between Stations B840 and B960; Alternative 4 between Stations B800 and B900; all alternatives between Stations B3148 and B3223; and all alternatives between Station B4050 and Station B5337
- All gates designed to prevent animal access
- Jump out exit features that allow large mammals such as deer to exit the fenced right-of-way would be placed near at-grade road crossings in Coyote Valley at the following station numbers : B688, B691, B703, B730, B759, B761, B822, B823, B862, B863, B902, B935, B971, and B972
- Small, one-way exit flaps would be provided on each of the four fenced sections at each fence opening in Coyote Valley
- Prevent wildlife entry into the rail alignment at unfenced, at-grade rail sections using Rosehill anti-trespass panels or another method that has been shown to be effective for targeted focal species
- WEF, exit features, and exclusion devices would be inspected at least monthly to enforce proper function as described in the WCA (Authority 2020a: Appendix C).

BIO-MM#82: Minimize Permanent Intermittent Impacts on Aerial Species Wildlife Movement

To address the permanent intermittent impact of operations on aerial wildlife movement from train strike and entrapment, the Authority would implement an array of deterrent and diversion features for avian species. These features include the following, which are specified in detail in the WCA (Authority 2020a: Appendix C):

- Install pigeon wire or other features to discourage birds from perching on OCS throughout the project
- In selected areas, place flight barriers such as fencing, pole barriers or a tubular screen (Life Impacto Cero 2015) to the height of OCS to avoid birds flying into the rail alignment and being struck by the train in the following locations: Alternatives 1–3 between Stations B2270 and 2390 (near the San Jose International Airport); Alternative 4 between Stations B2872 and 2930 (near the San Jose International Airport); Alternatives 1, 2, and 4 between Stations B2164 and B2255 (eastern Soap Lake); Alternative 3 between Stations B2097 and B2185 (eastern Soap Lake); Alternatives 1, 2, and 4 between Stations B2340 and B3325 (western Pacheco Pass); Alternative 3 between Stations B2270+B3325 (western Pacheco Pass) and all alternatives between Stations B4035 and B4310 (eastern Pacheco Pass).
- Modify OCS poles to preclude bird entrapment in hollow poles (e.g., avoid the use of tubular poles or cap openings in all poles)
- Design aerial structures and tunnel portals to discourage bats from roosting in expansion joints or other crevices; light tunnel entrances

BIO-MM#83: Implement Removal of Carrion that May Attract Condors and Eagles

During operations in California condor and eagle foraging areas, automated security monitoring and track inspections would be used to detect fence failures or the presence of a carcass (carrion) within the right-of-way that could be an attractant to condors and eagles. Dead and injured wildlife found in the right-of-way would be removed when the train is not in operation. This measure would apply to Alternatives 1, 2, and 4 between Stations B2164 and B2255 (eastern Soap Lake); Alternative 3 between Stations B2097 and B2185 (eastern Soap Lake); Alternatives 1, 2, and 4 between Stations B2340 and B3325 (western Pacheco Pass); Alternative 3 between Stations B2270 and B3325 (western Pacheco Pass), and all alternatives between Stations B4035 and B4310 (eastern Pacheco Pass).

BIO-MM#84: Provide Compensatory Mitigation for Impacts on Conservation Easements

The Authority would provide compensatory mitigation to offset impacts on conservation areas. Compensatory mitigation, identified through consultation with the affected organizations, would replace the permanent loss of conservation areas with lands that are commensurate with the land cover type and ecological function of the lands lost at a ratio of 2:1 (protected:affected). In addition, the Authority would compensate affected organizations (e.g. The Nature Conservancy, SCVHA, SCVOSA, CDFW) for any incurred penalties (i.e., fees or other monetary considerations resulting from the termination of a conservation easement or establishment of a new conservation easement) resulting from the permanent loss of a conservation area. Mitigation implemented under this measure would be consistent with and would help advance mitigation commitments at the program level, including mitigation intended to address impacts in the GEA.

Impacts from Implementing Mitigation Measure BIO-MM#84

As addressed in the discussion of BIO-MM#10, compensatory mitigation could involve some secondary impacts; however, these impacts would be beneficial and the measures set forth in BIO-MM#11 would be implemented to minimize any adverse impacts.

BIO-MM#85: Provide Compensatory Mitigation for Impacts on California Sycamore Woodland at the Pacheco Creek Reserve

To offset permanent impacts at the Pacheco Creek Reserve and alleviate conflict with the SCVHP, the Authority would provide compensatory mitigation at a 1:1 ratio. The replacement reserve would be of the same acreage as the existing reserve (8.2 acres) or greater, and it would be primarily

composed of a contiguous patch of the California sycamore alluvial woodland, the conservation target on which the reserve was formed. Mitigation lands can be co-located with the mitigation under BIO-MM#72 to meet the 10-acres minimum patch size requirement stipulated in Objective 9.2 of the SCVHP. This mitigation may be accomplished through preservation, enhancement, or restoration, or a combination thereof, with a preference given to mitigation opportunities in the Pajaro River HUC-8 watershed.

Impacts from Implementing Mitigation Measure BIO-MM#85

As addressed in the discussion of BIO-MM#10, compensatory mitigation could involve some secondary impacts; however, these impacts would be beneficial, and the measures set forth in BIO-MM#11 would be implemented to minimize any adverse impacts.

3.7.9 Impact Summary for NEPA Comparison of Alternatives

Under NEPA, project effects are evaluated based on the criteria of context, intensity, and duration (short- or long-term). Impacts are identified and described according to the effects caused by the project after consideration of the project IAMFs and mitigation measures as identified in Sections 3.7.5.2 and 3.7.8. The effectiveness of measures to avoid, minimize, or mitigate impacts are considered in making significance determinations under NEPA. Thus, if a measure sufficiently mitigates an impact, the effect is not significant. Therefore, significance under NEPA is described as either an impact or no effect. General indicators of significance, based on guidelines or criteria in NEPA, CESA, FESA, and regulatory guidance from the FRA include:

- Potential modification or destruction of habitat; movement corridors; or breeding, feeding, and sheltering areas for endangered, threatened, rare, or other special-status species
- Potential measurable degradation of protected habitats, sensitive vegetation communities, wetlands, or other habitat areas identified in plans, policies, or regulations
- Potential loss of a substantial number of any species that could affect the abundance or diversity of that species beyond the level of normal variability
- Potential indirect impacts, both temporary and permanent, from excessive noise that elicits a negative response and avoidance behavior

Table 3.7-26 shows a comparison of project impacts by alternative, followed by a summary of the impacts. Impact acreages presented are a sum of the permanent and temporary impacts.

Table 3.7-26 Comparison of Project Alternative Impacts for Biological and Aquatic Resources (acres)

Impact	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Special-Status Species				
Impact BIO#1: Permanent Conversion or Degradation of Habitat for Special-Status Plant Species	The project would remove or disturb habitat for 54 special-status plant species, 8 of which are listed under the FESA or CESA, and could degrade habitat outside of but adjacent to the project footprint. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on special-status plants and their habitat under all alternatives.			
Habitat for all special-status plants (nonoverlapping)	1,639.4	1,673.0	1,658.3	1,583.3
Impact BIO#2: Permanent Conversion or Degradation of Habitat for and Mortality of Bay Checkerspot Butterfly	The project would remove or disturb habitat (including critical habitat) for Bay checkerspot butterfly, and could degrade habitat outside of but adjacent to the project footprint. Activities could also result in mortality of individuals, if present in affected habitat. Increased shadows from construction of the viaduct in the Morgan Hill and Gilroy Subsection could alter flight behavior. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on Bay checkerspot butterfly under Alternative 1.	Impacts under Alternative 2 would be similar to Alternative 1 but would not have shadow impacts on flight behavior because it would be constructed on an embankment instead of viaduct. The area of affected habitat would be the same as Alternative 1.	Impacts under Alternative 3 would be similar to Alternative 1, but would affect slightly more habitat than Alternative 1.	Impacts under Alternative 4 would be similar to Alternative 1, but would affect less habitat.
Habitat for Bay checkerspot butterfly	32.4	42.5	32.4	25.4
Designated critical habitat for Bay checkerspot butterfly	26.0	34.8	26.0	21.0

Impact	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Impact BIO#3: Permanent Conversion or Degradation of Habitat for and Mortality of Vernal Pool Crustaceans	The project would or disturb habitat for Conservancy fairy shrimp, longhorn fairy shrimp, vernal pool fairy shrimp, and vernal pool tadpole shrimp, and could degrade vernal pool habitat outside of but adjacent to the project footprint. Activities could also result in mortality of individuals, if present in affected habitat. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on vernal pool crustaceans under all alternatives.			
Habitat for vernal pool fairy shrimp	27.6			
Habitat for vernal pool tadpole shrimp	27.6			
Habitat for longhorn fairy shrimp	27.6			
Habitat for Conservancy fairy shrimp	27.6			
Impact BIO#4: Removal or Pruning of Elderberry Plants Potentially Supporting Valley Elderberry Longhorn Beetle	The project may remove elderberry plants potentially occupied by valley elderberry longhorn beetle and could degrade habitat outside of but adjacent to the project footprint. Removal of occupied elderberry plants would result in mortality of individuals. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on valley elderberry longhorn beetle under all alternatives.			
Habitat potentially supporting valley elderberry longhorn beetle	158.9			
Impact BIO#5: Permanent Conversion or Degradation of Habitat for and Mortality of Crotch Bumble Bee	The project would convert and disturb habitat and could result in the mortality of individual bees if underground nest colonies or overwintering queens are present in the project footprint at the time of construction. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on Crotch bumble bee under all alternatives.			
Habitat potentially supporting Crotch bumble bee	1,583.6	1,616.3	1,592.8	1,539.7
Impact BIO#6: Permanent Conversion of Habitat for and Direct Mortality of Steelhead and Pacific Lamprey, and Permanent Conversion of Essential Fish Habitat for Pacific Coast Salmon	The project would remove or disturb stream habitat for CCC and SCCC steelhead, Pacific lamprey, and designated EFH for Pacific Coast (Chinook and coho) salmon, and could degrade habitat downstream of the project footprint at affected stream crossings. Pile-driving and dewatering activities could also result in mortality of individuals, if present in affected habitat. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on special-status fish under all alternatives.			
Habitat for CCC/SCCC steelhead	34.0	36.1	46.8	31.1

Impact	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Designated freshwater EFH for Pacific Coast salmon	9.8	10.2	9.8	6.6
Habitat for Pacific lamprey	207.4	213.1	212.6	200.5
Designated critical habitat for CCC/SCCC steelhead	8.2	9.4	9.4	7.5
Impact BIO#7: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Tiger Salamander	The project would remove or disturb habitat (including critical habitat) for California tiger salamander, and could degrade habitat outside of but adjacent to the project footprint. Activities could also result in mortality of individuals, if present in affected habitat. Construction BMPs, WEAP training, and biological monitoring during construction, would minimize direct and indirect impacts on California tiger salamander under all alternatives.			
Habitat for California tiger salamander	3,159.7	3,392.7	3,404.3	2,968.6
Designated critical habitat for California tiger salamander	278.5			
Impact BIO#8: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Red-Legged Frog	The project would remove or disturb habitat (including critical habitat) for California red-legged frog, and could degrade habitat outside of but adjacent to the project footprint. Activities could also result in mortality of individuals, if present in affected habitat. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on California red-legged frog under all alternatives.			
Habitat for California red-legged frog	2,837.6	3,333.5	3,001.6	2,469.7
Designated critical habitat for California red-legged frog	923.6	923.6	923.0	923.6
Impact BIO#9: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Foothill Yellow-Legged Frog	The project would remove or disturb habitat for foothill yellow-legged frog, and could degrade habitat outside of but adjacent to the project footprint. Activities could also result in mortality of individuals, if present in affected habitat. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on foothill yellow-legged frog under all alternatives.			
Habitat for foothill yellow-legged frog	133.0	131.2	132.9	127.7
Impact BIO#10: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Western Spadefoot	The project extent would remove or disturb habitat for western spadefoot, and could degrade habitat outside of but adjacent to the project footprint. Activities could also result in mortality of individuals, if present in affected habitat. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on western spadefoot under all alternatives.			
Habitat for western spadefoot	740.8	740.8	760.9	740.8

Impact	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Impact BIO#11: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Western Pond Turtle	The project would remove or disturb habitat for western pond turtle, and could degrade habitat outside of but adjacent to the project footprint. Activities could also result in mortality of individuals, if present in affected habitat. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on western pond turtle under all alternatives.			
Habitat for western pond turtle	3,901.0	4,388.2	3,811.5	3,517.2
Impact BIO#12: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Blunt-Nosed Leopard Lizard	The project would remove or disturb habitat for blunt-nosed leopard lizard, and could degrade habitat outside of but adjacent to the project footprint. Activities could also result in mortality of individuals, if present in affected habitat. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on blunt-nosed leopard lizard under all alternatives.			
Habitat for blunt-nosed leopard lizard	696.3			
Impact BIO#13: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Joaquin Coachwhip, Northern California Legless Lizard, and Coast Horned Lizard	The project would remove or disturb habitat for San Joaquin coachwhip, northern California legless lizard, and coast horned lizard, and could degrade habitat outside of but adjacent to the project footprint. Activities could also result in mortality of individuals, if present in affected habitat. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on these species under all alternatives.			
Habitat for San Joaquin coachwhip	855.9	855.9	855.8	855.9
Habitat for northern California legless lizard	19.8	19.8	19.7	19.8
Habitat for coast horned lizard	1,227.1	1,227.1	1,226.8	1,227.1
Impact BIO#14: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Giant Garter Snake	The project would remove or disturb habitat for giant garter snake, and could degrade habitat outside of but adjacent to the project footprint. Activities could also result in mortality of individuals, if present in affected habitat. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on giant garter snake under all alternatives.			
Habitat for giant garter snake	568.0			
Impact BIO#15: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Short-Eared Owl and Grasshopper Sparrow	The project would remove or disturb habitat for short-eared owl and grasshopper sparrow, and could degrade habitat outside of but adjacent to the project footprint. Activities could also destroy or cause abandonment of active nests, if present in affected habitat. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on these species under all alternatives.			
Habitat for short-eared owl	514.9			

Impact	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Habitat for grasshopper sparrow	945.8	945.8	945.7	945.8
Impact BIO#16: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Mountain Plover and Western Snowy Plover (Interior Population)	The project would remove or disturb habitat for mountain plover, and could degrade habitat outside of but adjacent to the project footprint. Activities could also destroy or cause abandonment of active western snowy plover nests, if present in affected habitat, and disturb wintering mountain plovers. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on these species under all alternatives.			
Habitat for mountain plover	907.6			
Habitat for western snowy plover	35.1			
Impact BIO#17: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Burrowing Owl	The project would remove or disturb habitat for burrowing owl. Activities could also result in mortality of individuals by crushing occupied burrows or collapsing burrow entrances and preventing escape. Activities could also disturb nesting pairs and cause them to abandon eggs or young. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on burrowing owl under all alternatives.			
Habitat for burrowing owl	2,176.8	2,441.1	2,366.3	2,014.6
Impact BIO#18: Permanent Conversion or Degradation of Habitat for and Disturbance of Golden Eagle and Bald Eagle	The project would remove or disturb habitat for golden eagle and bald eagle. Activities within 0.5 mile of active nests could cause nesting pairs to abandon eggs or young. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct impacts on these species under all alternatives.			
Habitat for golden eagle	1,552.5	1,581.5	1,561.8	1,505.9
Habitat for bald eagle	536.8	548.8	526.6	515.7
Impact BIO#19: Injury or Disturbance of California Condor	The project would be constructed at the edge of the California condor's range; however, individuals could fly over, forage, or land during construction activities. Construction debris and other materials could be ingested or cause entanglement. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct impacts on California condor under all alternatives.			
Impact BIO#20: Permanent Conversion or Degradation of Habitat for and Disturbance of Special-Status Raptors (American Peregrine Falcon, Northern Harrier, White-Tailed Kite) and Other Raptors	The project would remove or disturb habitat for American peregrine falcon, northern harrier, white-tailed kite, and other raptors. Activities within 500 feet of active nests could cause nesting pairs to abandon eggs or young. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct impacts on these species under all alternatives.			
Habitat for American peregrine falcon	4,594.7	5,287.7	4,682.6	4,012.5

Impact	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Habitat for northern harrier	2,481.1	2,751.3	2,675.0	2,356.6
Habitat for white-tailed kite	3,218.4	3,478.5	3,412.9	2,971.9
Impact BIO#21: Permanent Conversion or Degradation of Habitat for and Disturbance of Swainson's Hawks	The project would remove or disturb habitat for Swainson's hawk. Activities within 0.5 mile of active nests could cause nesting pairs to abandon eggs or young. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct impacts on Swainson's hawk under all alternatives.			
Habitat for Swainson's hawk	1,534.4	1,743.5	1,534.4	1,480.8
Impact BIO#22: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Purple Martin, Olive-Sided Flycatcher, and Loggerhead Shrike	The project would remove or disturb habitat for purple martin, olive-sided flycatcher, and loggerhead shrike. Activities could also destroy or cause abandonment of active nests, if present in affected habitat. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on these species under all alternatives.			
Habitat for loggerhead shrike	3,275.8	3,535.8	3,471.7	3,029.2
Habitat for purple martin	443.8	443.8	442.0	443.8
Habitat for olive-sided flycatcher	463.6	463.6	461.7	463.6
Impact BIO#23: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Least Bell's Vireo, Yellow Warbler, and Yellow-Breasted Chat	The project would remove or disturb habitat for least Bell's vireo, yellow warbler, and yellow-breasted chat, and could degrade habitat outside of but adjacent to the project footprint. Activities could also destroy or cause abandonment of active nests, if present in affected habitat. Construction BMPs, WEAP training, restoration and revegetation of disturbed areas, and invasive weed control measures would minimize direct and indirect impacts on these species under all alternatives.			
Habitat for least Bell's vireo	119.3	124.5	120.7	105.3
Habitat for yellow warbler	54.2	55.1	53.5	45.3
Habitat for yellow-breasted chat	47.1	47.1	46.3	44.1

Impact	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Impact BIO#24: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Tricolored Blackbird and Yellow-Headed Blackbird	The project would remove or disturb habitat for tricolored blackbird and yellow-headed blackbird, and could degrade habitat outside of but adjacent to the project footprint. Activities could also destroy or cause abandonment of active nests, if present in affected habitat. Construction BMPs, pre-construction nest surveys, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on these species under all alternatives.			
Habitat for tricolored blackbird	2,630.3	2,906.9	2,836.6	2,498.2
Habitat for yellow-headed blackbird	10.6			
Impact BIO#25: Permanent Conversion or Degradation of Habitat for and Disturbance of Sandhill Crane	The project would remove or disturb habitat for sandhill crane, and could degrade habitat outside of but adjacent to the project footprint. Activities could also disturb wintering sandhill cranes, if present in affected habitat. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on sandhill crane under all alternatives.			
Habitat for greater sandhill crane	524.5			
Habitat for lesser sandhill crane	669.1			
Impact BIO#26: Loss of Denning and Dispersal Habitat for and Direct Mortality or Disturbance of San Joaquin Kit Fox	The project would remove or disturb habitat for San Joaquin kit fox, and could degrade habitat outside of but adjacent to the project footprint. Activities could also result in mortality of individuals by crushing occupied burrows or collapsing burrow entrances and preventing escape. Activities could also disturb individuals and impair breeding, feeding, or sheltering behavior. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on San Joaquin kit fox under all alternatives.			
Habitat for San Joaquin kit fox	2,881.6	2,881.6	2,914.4	2,881.0
Impact BIO#27: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Fresno Kangaroo Rat	The project would remove or disturb habitat for Fresno kangaroo rat. Activities could also result in mortality of individuals, if present in affected habitat. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct impacts on Fresno kangaroo rat under all alternatives.			
Habitat for Fresno kangaroo rat	105.1			
Impact BIO#28: Loss of Denning and Dispersal Habitat for and Direct Mortality or Disturbance of American Badger	The project would remove or disturb habitat for American badger, and could degrade habitat outside of but adjacent to the project footprint. Activities could also result in mortality of individuals by crushing occupied burrows or collapsing burrow entrances and preventing escape. Activities could also disturb individuals and impair breeding, feeding, or sheltering behavior. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on American badger under all alternatives.			
Habitat for American badger	1,173.1	1,204.7	1,178.5	1,129.1

Impact	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Impact BIO#29: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Francisco Dusky-Footed Woodrat and Ringtail	The project would remove or disturb habitat for San Francisco dusky-footed woodrat and ringtail. Activities could also result in mortality of individuals, if present in affected habitat. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct impacts on San Francisco dusky-footed woodrat and ringtail under all alternatives.			
Habitat for San Francisco dusky-footed woodrat and ringtail	502.4	512.8	513.3	479.9
Impact BIO#30: Loss of Roost Sites for and Direct Mortality or Disturbance of Special-Status Bats	The project would remove roosting habitat for pallid bat, Townsend's big-eared bat, western mastiff bat, and western red bat. Activities could also destroy or cause abandonment of occupied roost sites, if present in affected habitat. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct impacts on these species under all alternatives.			
Habitat for pallid bat	4,128.3	4,813.3	4,205.2	3,559.3
Habitat for Townsend's big-eared bat	2,120.9	2,370.4	2,318.0	1,850.5
Habitat for western mastiff bat	3,415.9	4,102.6	3,492.8	2,858.9
Habitat for western red bat	4,594.7	5,287.7	4,682.6	4,012.5
Impact BIO#31: Intermittent Disturbance or Degradation of Habitat for Special-Status Plants during Operations	O&M activities may occasionally remove or disturb and degrade habitat for special-status plants in and adjacent to the project footprint. Annual WEAP training for maintenance personnel would minimize intermittent direct and indirect impacts on special-status plants under Alternative 1.	Impacts under Alternative 2 would be the same as under Alternative 1. There are no special-status plant species or activity types unique to one alternative; all have the same potential to result in intermittent direct and indirect impacts.	Impacts under Alternative 3 would be the same as under Alternative 1. There are no special-status plant species or activity types unique to one alternative; all have the same potential to result in intermittent direct and indirect impacts.	Impacts under Alternative 4 would be the same as under Alternative 1. There are no special-status plant species or activity types unique to one alternative; all have the same potential to result in intermittent direct and indirect impacts.

Impact	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Impact BIO#32: Intermittent Disturbance or Degradation of Habitat for Special-Status Wildlife during Operations	O&M activities may occasionally remove or disturb habitat for special-status wildlife in and adjacent to the project footprint. Impacts would the same as during construction but would occur where activities were conducted in or adjacent to modeled habitat. Annual environmental awareness training for maintenance personnel would minimize intermittent direct and indirect impacts on special-status wildlife under Alternative 1. Operations effects on special-status wildlife individuals (i.e., injury or mortality) are addressed in the discussion of effects on wildlife movement.	Impacts under Alternative 2 would be the same as under Alternative 1. There are no special-status wildlife species or activity types unique to one alternative; all have the same potential to result in intermittent direct and indirect impacts.	Impacts under Alternative 3 would be the same as under Alternative 1. There are no special-status wildlife species or activity types unique to one alternative; all have the same potential to result in intermittent direct and indirect impacts.	Impacts under Alternative 4 would be the same as those under Alternative 2. There are no special-status wildlife species or activity types unique to one alternative; all have the same potential to result in intermittent direct and indirect impacts.
Non-Special-Status Wildlife				
Impact BIO#33: Mortality of Non-Special-Status Terrestrial Wildlife	The project could result in mortality of non-special-status terrestrial wildlife by crushing or mangling small ground-dwelling animals hidden underground or in dense vegetation, inadvertently releasing hazardous materials into aquatic habitat, or removing vegetation and structures that support non-special-status birds and bats. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct impacts on non-special-status wildlife under Alternative 1.	Impacts under Alternative 2 would be the same as under Alternative 1. There are no non-special-status wildlife species or activity types unique to one alternative; all have the same potential to result in direct impacts.	Impacts under Alternative 3 would be the same as under Alternative 1. There are no non-special-status wildlife species or activity types unique to one alternative; all have the same potential to result in direct impacts.	Impacts under Alternative 4 would be the same as under Alternative 1. There are no non-special-status wildlife species or activity types unique to one alternative; all have the same potential to result in direct impacts.

Impact	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Impact BIO#34: Removal or Degradation of Habitat for and Disturbance of Waterfowl and Shorebirds	The project would remove or disturb habitat for waterfowl and shorebirds in two Audubon IBAs, and could degrade habitat outside of but adjacent to the project footprint. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on waterfowl and shorebird habitat under Alternative 1.	Impacts under Alternative 2 would the same as under Alternative 1 because its footprint is identical where it crosses the Audubon IBAs.	Impacts under Alternative 3 would be similar to but greater than under Alternative 1 because Alternative 3 would cross more of the 10-year Soap Lake floodplain and agricultural lands east of Gilroy.	Impacts under Alternative 4 would the same as under Alternative 1 because its footprint is identical where it crosses the Audubon IBAs.
Special-Status Plant Communities				
Impact BIO#35: Permanent Conversion or Degradation of Special-Status Plant Communities	The project would remove or disturb the following special-status plant communities, and could degrade special-status plant communities adjacent to the project footprint. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on special-status plant communities under all alternatives.			
Alkali marsh	9.7			
Alkali scrub wetland	0.9			
Alkali vernal pool	27.1			
California annual grassland	1,138.4	1,166.4	1,144.0	1,091.9
California sycamore woodland	12.6			
Freshwater marsh	2.3	2.4	11.3	2.3
Mixed chaparral	19.6	19.6	19.5	19.6
Mixed riparian	26.3	27.6	30.3	20.9
Palustrine forested wetland	31.9	31.5	26.3	27.9
Seasonal wetland	16.2	16.4	13.9	11.6
Vernal pools	0.4			
Total area of special-status plant communities affected	1,269.4	1,299.0	1,281.3	1,209.9

Impact	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Impact BIO#36: Intermittent Disturbance Degradation of Special-Status Plant Communities during Operations	O&M activities may occasionally remove or disturb and degrade special-status plant communities in and adjacent to the project footprint. Annual environmental awareness training for maintenance personnel would minimize intermittent direct and indirect impacts on special-status plant communities under all alternatives.			
Aquatic Resources				
Impact BIO#37: Permanent Conversion or Degradation of Aquatic Resources Considered Jurisdictional under Section 404 of the Federal Clean Water Act or Regulated by the State	The project would remove or disturb federally protected wetland and nonwetland cover types (i.e., aquatic resources), and could degrade aquatic resources outside of but adjacent to the project footprint. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on aquatic resources under all alternatives.			
Wetlands	58.2 (P) 19.3 (T)	58.1 (P) 19.6 (T)	67.8 (P) 11.9 (T)	56.2 (P) 13.6 (T)
Nonwetlands	42.3 (P) 68.3 (T)	49.9 (P) 69.9 (T)	43.0 (P) 68.8 (T)	40.4 (P) 64.7 (T)
Total jurisdictional aquatic resources (permanent and temporary impacts total)	188.0	197.4	191.5	174.8
Impact BIO#38: Permanent Conversion or Degradation of Resources Regulated under California Fish and Game Code Section 1600 et seq.	The project would remove or disturb riparian habitat and aquatic resources subject to regulation under Section 1600 et seq., and could degrade such habitats outside of but adjacent to the project footprint. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on aquatic resources under all alternatives.			
Riparian habitat	55.1	56.1	54.5	46.4
Rivers, lakes, and streams	126.2	137.0	112.2	105.1
Total aquatic resources	181.3	193.1	166.7	151.5
Impact BIO#39: Intermittent Disturbance and Degradation of Aquatic Resources during Operations	O&M activities may occasionally remove or disturb and degrade aquatic resources in and adjacent to the project footprint. Annual environmental awareness training for maintenance personnel would minimize intermittent direct and indirect impacts on aquatic resources under all alternatives.			

Impact	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Protected Trees				
Impact BIO#40: Removal of Trees Protected under Municipal Tree Ordinances	The project may remove or prune trees protected under municipal tree ordinances. Ground disturbance could result in increased invasive weed cover that reduce the viability and regeneration of protected trees. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on protected trees under all alternatives.			
Impact BIO#41: Disturbance of Trees Protected under Municipal Tree Ordinances during Operations	Ongoing vegetation management within the electrical safety zone could result in temporary impacts (i.e., occasional trimming). Any protected trees requiring removal would have been removed during construction. The Authority would require that all workers attend WEAP training about sensitive biological resources, including protected trees.			
Wildlife Movement				
Impact BIO#42: Temporary Disruption of Wildlife Movement	The project would temporarily affect wildlife movement by creating temporary barriers to movement (e.g., construction fencing and dewatering), creating noise and vibration that alters or delays animal movements as they attempt to avoid the work area, and introducing artificial light during nighttime construction that alters or delays animal movements as they avoid lit areas. Wildlife exclusion fencing, and construction work windows would minimize temporary direct and indirect impacts on wildlife movement under all alternatives.	Impacts under Alternative 2 would be less than under Alternative 1 because Alternative 2 would stay within instead of circumvent downtown Morgan Hill, thus avoiding agricultural lands and staying farther from Coyote Creek, a known wildlife movement corridor. Alternative 2 would have the lowest temporary impact on wildlife movement of the four alternatives.	Impacts under Alternative 3 would be greater than those under Alternative 1 because Alternative 3 would cross more land protected to conserve wildlife movement and more of the Santa Cruz to Gabilan Range modeled wildlife corridor in the Soap Lake 10-year floodplain than the other alternatives. Alternative 3 would have the greatest temporary impact on wildlife movement of the four alternatives.	Impacts under Alternative 4 would be similar to those under Alternative 2.
Impact BIO#43: Permanent Impacts on Wildlife Movement	The project would create a barrier to local and regional wildlife movement and fragment habitat. Dedicated wildlife crossings and modification of viaducts and drainage culverts to facilitate wildlife movement as proposed in the WCA would minimize permanent direct impacts on wildlife movement.	Impacts on terrestrial wildlife movement under Alternative 2 would be greater than under Alternative 1 because the alignment profile is at grade (rather than viaduct) through most portions of the Monterey Corridor and Morgan Hill and Gilroy Subsections, precluding the movement of several species.	Impacts under Alternative 3 would be greater than under Alternatives 1 and 2 because Alternative 3 would cross more of the Soap Lake floodplain and more undeveloped agricultural lands than these alternatives, and it would also result in more in-water impacts on aquatic species movement due to greater impacts on Llagas Creek.	Impacts under Alternative 4 would be similar to those under Alternative 2.

Impact	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Impact BIO#44: Intermittent Nosie Disturbance of Wildlife Using Corridors during Operations	Noise from project operations could disturb and startle birds, particularly in the UPR and GEA IBAs, as well as cause varying degrees of hearing damage, leading to impacts on bioenergetic and reproductive success, as well as increasing the risk of train strike.	Impacts under Alternative 2 would be the same as under Alternative 1 because both would have the same alignment and profile in the IBAs.	Impacts under Alternative 3 would be greater than under the other alternatives because Alternative 3 would traverse more of the Soap Lake 10-year floodplain.	Impacts under Alternative 4 would be similar to but slightly greater than those under Alternatives 1 and 2 because of the presence of the MOWF at the edge of the Soap Lake 10-year floodplain.
Impact BIO#45: Intermittent Vibration Disturbance of Wildlife Using Corridors during Operations	Vibration associate with project operations are likely to have the greatest impacts on reptiles and amphibians because of their sensitivity to ground movement; however, vibration is not anticipated to result in substantial or long-lasting impacts. The impact would be most pronounced in at-grade portions of the alignment.	Impacts under Alternative 2 would be greater than those under Alternative 1 because more of the alignment would be at grade.	Impacts under Alternative 3 would be similar to but greater than those under Alternative 1 because, while Alternative 3 would be on aerial structure in many of the same areas as Alternative 1, it would also cross more land conserved to protect movement corridors, including the Santa Cruz Mountains to Diablo Range wildlife linkage.	Impacts under Alternative 4 would be similar to those under Alternative 2 because of their similar use of at-grade and embankment profiles.
Impact BIO#46: Intermittent Visual Disturbance of Wildlife Using Corridors during Operations	Moving trains could increase stress and provoke flight in birds using nearby habitat, resulting in altered behavior and physiological consequences, as well as possible nest abandonment. The GEA and the Soap Lake 10-year floodplain are the two areas most susceptible to these impacts.	Impacts under Alternative 2 would be the same as those under Alternative 1.	Impacts under Alternative 3 would be greater than those under the other three alternatives because it would traverse more of the Soap Lake 10-year floodplain.	Impacts under Alternative 4 would be the same as those under Alternatives 1 and 2.

Impact	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Impact BIO#47: Intermittent and Permanent Lighting Disturbance of Wildlife Using Corridors during Operations	Nighttime lighting, including light from passing trains, could disturb wildlife attempting to move through or across the alignment. The impact would be most marked in areas with low existing light levels, especially where the alignment would be at grade.	Impacts under Alternative 2 would be similar to those under Alternative 1. Although more of Alternative 2 would be at grade, these portions would be in existing transportation corridors where light levels are already high.	Impacts under Alternative 3 would be greater than under the other three alternatives because it would cross agricultural areas east of Gilroy at grade, would cross more of the Santa Cruz Mountains to Diablo Range wildlife linkage, and would include the East Gilroy MOWF and Station in areas that currently experience low light levels.	Impacts under Alternative 4 would be the same as those under Alternative 2.
Impact BIO#48: Mortality Resulting from Train Strike during Operations	Train strike is likeliest to cause mortality of terrestrial wildlife species along at-grade portions of the alignment. Alternative 1 would pose the lowest risk of train strike to terrestrial movement guilds because of the amount that would be on aerial structure. All profiles present risk of train strike to the aerial movement guild, although some focal groups are more susceptible to at-grade profiles, while others are more susceptible to elevated portions of the alignment.	Impacts under Alternative 2 would be greater than those under Alternative 1 because of the amount of the alignment at grade and on embankment.	Alternative 3 would present the greatest risk of train strike because, while much of it, like Alternative 1, would be on aerial structure, it would also cross through agricultural lands east of Gilroy at grade and would travel more closely to Coyote Creek than the other alternatives.	Impacts under Alternative 4 would be the same as those under Alternative 2.
Impact BIO#49: Injury and Mortality Resulting from Power Line Strike during Operations	Risk of power line strike would be ubiquitous along the alignment because of the consistent presence of electrical infrastructure. Alternative 1 could pose a greater risk to burrowing owls at San Jose International Airport, and would follow Coyote Creek for a greater distance than Alternatives 2 and 4.	Impacts under Alternative 2 would be similar to those under Alternative 1, except that there would be lesser risk to burrowing owls near the San Jose International Airport.	Impacts under Alternative 3 would be similar, although the distribution of the most severe risks would differ: Alternative 3 would cross less of the UPR IBA, although more of that distance would be in the Soap Lake 10-year floodplain, the area of most intensive bird use.	Impacts under Alternative 4 would be the same as those under Alternative 2.

Impact	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Impact BIO#50: Mortality resulting from Entrapment in OCS Poles during Operations	The project is expected to avoid direct impacts from entrapment in OCS poles by design features that would preclude access to the poles.			
Conservation Areas				
Impact BIO#51: Permanent Conversion or Degradation of Conservation Areas	The project would remove or disturb conservation area lands, and could degrade conservation area lands outside of but adjacent to the project footprint. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on jurisdictional aquatic resources under all alternatives.			
Acres of conservation areas affected	572.4	584.7	640.0	566.6
Number of conservation areas affected	9	11	10	7
Impact BIO#52: Introduction of Invasive Species or Contaminants into Conservation Areas during Operations	The project could have indirect impacts on conservation areas in all subsections. Routine inspections and maintenance of the HSR right-of-way could introduce contaminants from spills and invasive nonnative species to adjacent lands, degrading habitat for special-status species, special-status plant communities, aquatic resources, and wildlife corridors. All project alternatives would be similar in their potential to cause these impacts; however, Alternative 3 would result in the most permanent impacts and, by extrapolation, the most indirect impacts during the operations period.			
Habitat Conservation Plans				
Impact BIO#53: Conflict with Santa Clara Valley Habitat Plan	The project could conflict with the following conservation actions of the SCVHP: ▪ Action LAND-L4 requires the acquisition and enhancement of natural and semi-natural landscapes between the Santa Teresa Hills and Metcalf Canyon to the south that will contribute to providing connectivity between the Santa Cruz Mountains and Diablo Range to promote the movement of covered and other native species at many spatial scales. ▪ Action LAND-WP7 requires the acquisition of habitat near Santa Teresa Hills and Tulare Hill to provide connectivity between populations in the Diablo Range and the Santa Cruz foothills. ▪ Action LAND-R3 requires the acquisition in fee title of or obtaining conservation easements on lands that protect at least 40 acres of existing California sycamore woodland so that this very rare and threatened land cover type is preserved in the study area. Potential conflicts with Actions LAND-L4 and LAND-WP7 are not expected in that the project would not interfere with land acquisition because the project alternatives would be located in areas outside the areas identified for acquisition. There would be a potential conflict with Action LAND-R3 because the SCVHA is in the process of obtaining a conservation easement to protect California sycamore woodland along Pacheco Creek at the Pacheco Creek Reserve, and the project would have permanent and temporary direct impacts within the area targeted for protection.			

Impact	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Impact BIO#54: Conflict with Santa Clara Valley Greenprint	The project would not conflict with the Santa Clara Valley Greenprint. Strategy 3 of the Greenprint includes the goal of protecting and maintaining connections between large open-space parcels to provide large habitat blocks, critical linkages, and climate resilience. The project would cross three of ten conservation focus areas identified under Strategy 3: Coyote Valley, Upper Pajaro River, and Coyote Creek. However, the Greenprint does not identify quantitative goals or strategies for these areas. In addition, Alternative 3 would affect protected parcels identified by the Greenprint as important for agricultural land protection (Bloomfield North and Bloomfield South easements), but these parcels are not included in its habitat conservation goals. Since the project (all alternatives) would not prevent the successful implementation of any Greenprint strategy, and since the project would not preclude implementation of the Greenprint in any of the conservation focus areas that would be affected by the project (all alternatives), nor would the impacts on conservation parcels result in a substantial impact on Greenprint implementation, the project alternatives would not conflict with implementation of the Greenprint.			
Impact BIO#55: Conflict with Coyote Valley Linkage	Construction of the project alternatives would result in potential conflicts with two recommended wildlife crossing modifications proposed under the Coyote Valley Linkage: a wildlife overpass at Metcalf Canyon Road or at Bailey Road and a wildlife undercrossing at Blanchard Road. HSR would not prohibit implementation of the Coyote Valley Linkage Plan under any alternative; however, it would increase the complexity of construction and incrementally increase the length of the proposed crossings (except under Alternative 4).			

FESA = federal Endangered Species Act
CESA = California Endangered Species Act
BMP = best management practice
WEAP = worker environmental awareness program
CCC = central California coast
SCCC = south-central California coast
EFH = essential fish habitat
O&M = operations and maintenance
IBA = Important Bird Area
WCA = Wildlife Corridor Assessment
UPR = Upper Pajaro River
GEA = Grasslands Ecological Area
MOWF = maintenance of way facility
OCS = overhead contact system
HSR = high-speed rail
SCVHP = Santa Clara Valley Habitat Plan
SCVHA = Santa Clara Valley Habitat Agency

[1] The alkali vernal pool type includes areas mapped as vernal pool complexes. Acreage provided is an estimate of the wetted vernal pool area within vernal pool complexes.

3.7.9.1 Special-Status Species

Special-Status Plants

Construction of the project alternatives would have direct and indirect impacts on habitat for special-status plant species and individual special-status plant occurrences, if any are present in affected habitat. The primary project activities affecting special-status plant habitat would be HSR right-of-way, TCEs, and utility easements. Additional effects on aquatic special-status plants may result from groundwater depletion during tunnel construction and the resultant disruption of hydrologic cycles of surface water resources and/or affected to protected trees. Work to construct Tunnels 1 and 2 would affect the greatest area of special-status plant habitat due to the extent of undeveloped native plant communities at the portal sites (e.g., chaparral, oak woodland, California sycamore woodland). All project alternatives would be nearly identical with respect to the number of species potentially affected. Alternative 3 would affect habitat for one additional species. Alternatives 1, 3, and 4 would have slightly less permanent and temporary impacts on state- and federally listed species, in terms of acres affected, than Alternative 2. Project operations would be conducted in areas that would have already been subjected to extensive ground disturbance and construction activities. BIO-MM#1, BIO-MM#2, BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#6, BIO-MM#7, BIO-MM#8, BIO-MM#9, BIO-MM#10, BIO-MM#11, and BIO-MM#12 are available to reduce this impact.

Bay Checkerspot Butterfly

Construction of the project alternatives would cause direct (permanent and temporary) and indirect impacts on habitat for Bay checkerspot butterfly (including critical habitat) and could cause direct impacts on individuals (i.e., injury, mortality, or disturbance), if any are present in affected habitat. Impacts would occur where modeled habitat and designated critical habitat are present in or adjacent to the project footprint. Under Alternatives 1 and 3, shadows cast by the viaduct onto butterfly habitat in the Morgan Hill and Gilroy Subsection could alter flight behavior of Bay checkerspot butterflies. Because Alternative 2 would be constructed on an embankment instead of viaduct and Alternative 4 would use the existing Caltrain and UPRR right-of-way, they would not result in shadow impacts on flight behavior. Alternative 2 would affect a greater area of Bay checkerspot butterfly habitat and critical habitat because it would entail a larger footprint in the Tulare Hill area. BIO-MM#1, BIO-MM#2, BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#6, BIO-MM#10, BIO-MM#13, BIO-MM#14, BIO-MM#15, and BIO-MM#16 are available to reduce this impact.

Vernal Pool Crustaceans

Construction of the project alternatives may have direct and indirect impacts on Conservancy fairy shrimp, longhorn fairy shrimp, vernal pool fairy shrimp, and vernal pool tadpole shrimp habitat and on individuals if any are present in affected habitat. The primary project activities affecting vernal pool crustaceans would be HSR right-of-way, maintenance access easements, new culverts, traction power infrastructure, utility easements, and other ground-disturbing activities that occur within vernal pools and improvements that would alter the hydroperiod of vernal pools. Such activities could lead to conversion of vernal pool habitat to HSR track and systems, direct mortality of individuals and cysts through crushing by construction equipment, and alteration of hydrology that supports vernal pool ecosystems. All project alternatives would have the same impacts on these species, including acreage of affected habitat, because the alternatives would be identical in the subsections where modeled habitat occurs. BIO-MM#1, BIO-MM#2, BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#6, BIO-MM#10, BIO-MM#13, BIO-MM#17, BIO-MM#18, BIO-MM#19, and BIO-MM#20 are available to reduce this impact.

Valley Elderberry Longhorn Beetle

Construction of the project alternatives may have direct and indirect impacts on valley elderberry longhorn beetle habitat and on individual beetles if any are present in affected habitat. The primary project activities affecting valley elderberry longhorn beetle would be HSR right-of-way, maintenance access easements, new culverts, traction power infrastructure, utility easements, and other ground-disturbing activities within riparian land cover, activities removing elderberry shrubs, and improvements that would alter the local topography or hydrologic regime that could

result in reduced fitness or death of the host plant. Because of its dependence on the host plant, loss of occupied host plants and individuals could extirpate a population or cause it eventually to reach a point where it cannot persist. All project alternatives would have the same impacts on valley elderberry longhorn beetle, including acreage of affected habitat, because the alternatives would be identical in the subsections where modeled habitat occurs. BIO-MM#1, BIO-MM#2, BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#6, BIO-MM#11, BIO-MM#13, BIO-MM#21, and BIO-MM#22 are available to reduce this impact.

Crotch's Bumble Bee

Construction of the project alternatives may have direct and indirect impacts on Crotch's bumble bee through ground-disturbing activities, which would convert and disturb habitat and could result in the mortality of individual bees if underground nest colonies or overwintering queens are present in the project footprint at the time of construction. Alternative 2 would result in the greatest extent of potential impacts, primary because of the ground disturbance involved in the embankment profile. BIO-MM#1, BIO-MM#2, BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#6, BIO-MM#12, BIO-MM#23, and BIO-MM#24 are available to reduce this impact.

Special-Status Fish

Construction of the project alternatives may have direct and indirect impacts on special-status fish, if any are present in affected habitat, and on their habitat (including designated critical habitat for CCC and SCCC steelhead and Chinook and coho salmon EFH). The primary project activities affecting special-status fish would be HSR right-of-way (including bridge and viaduct construction and channel realignment), TCE, utility easement, bike lane/pedestrian bridge, and new culverts. Additional effects on steelhead may result from groundwater depletion during tunnel construction and the associated disruption of hydrologic cycles of steelhead-bearing streams. All project alternatives would have the same types of impacts on special-status fish and their habitat at affected stream crossings, but the number of affected crossings (and therefore amount of affected habitat) would slightly vary among alternatives. Alternative 2 would affect a greater amount of modeled habitat and designated critical habitat for CCC steelhead than Alternatives 1, 3, and 4 due to the addition of TCEs over Llagas Creek in the Morgan Hill and Gilroy Subsection. Alternative 3 would permanently affect a greater amount of designated critical habitat for SCCC steelhead than Alternatives 1, 2, and 4 due to additional crossings of the Pajaro River and Llagas Creek in the Morgan Hill and Gilroy Subsection. BIO-MM#1, BIO-MM#3, BIO-MM#4, BIO-MM#6, BIO-MM#9, BIO-MM#10, BIO-MM#13, BIO-MM#25, BIO-MM#26, BIO-MM#27, and BIO-MM#28 are available to reduce this impact.

California Tiger Salamander

Construction of the project alternatives would have both permanent and temporary direct and indirect impacts on California tiger salamander habitat (including critical habitat) and on individuals, if any are present in affected habitat. The primary project activities affecting California tiger salamander habitat and critical habitat would be HSR right-of-way, access easements, roadway right-of-way (permanent), TCE, underground easement, and utility easement. Additional effects on California tiger salamander may result from groundwater depletion during tunnels construction and the associated disruption of hydrologic cycles of surface water resources. All project alternatives would have broadly similar impacts on this species, with differences in area of affected habitat, because the portions of the project alternatives that overlap with modeled habitat have identical footprints. BIO-MM#1, BIO-MM#2, BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#6, BIO-MM#9, BIO-MM#10, BIO-MM#13, BIO-MM#29, BIO-MM#30, and BIO-MM#31 are available to reduce this impact.

California Red-Legged Frog

Construction of the project alternatives would have direct and indirect impacts on California red-legged frog habitat (including critical habitat) and on individuals, if any are present in affected habitat. The primary project activities affecting California red-legged frog habitat and critical habitat would be access easement, HSR right-of-way, roadway right-of-way (permanent), underground easement, utility easement, and TCE. Additional effects on California red-legged

frog may result from groundwater depletion during tunnel construction and the associated disruption of hydrologic cycles of surface water resources. All project alternatives would have broadly similar impacts on this species, with differences in area of affected habitat. Most portions of the project alternatives that overlap with modeled habitat have identical footprints. BIO-MM#1, BIO-MM#2, BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#6, BIO-MM#9, BIO-MM#10, BIO-MM#13, BIO-MM#32, and BIO-MM#33 are available to reduce this impact.

Foothill Yellow-Legged Frog

Construction of the project alternatives would have direct and indirect impacts on foothill yellow-legged frog habitat and on individuals, if any are present in affected habitat. The primary project activities affecting foothill yellow-legged frog habitat would be HSR right-of-way, underground easement, and TCE. Additional effects on foothill yellow-legged frog may result from groundwater depletion during tunnel construction and the associated disruption of hydrologic cycles of surface water resources. All project alternatives would have similar impacts on this species, with minor differences in area of affected habitat, because the portions of the alternatives that overlap with modeled habitat have identical footprints. BIO-MM#1, BIO-MM#2, BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#6, BIO-MM#9, BIO-MM#10, BIO-MM#13, BIO-MM#34, and BIO-MM#35 are available to reduce this impact.

Western Spadefoot

Construction of the project alternatives would have direct and indirect impacts on western spadefoot habitat and on individuals, if any are present in affected habitat. The primary permanent direct impact would be conversion of habitat (which may or may not be occupied at the time of construction) to HSR track and systems. Permanent direct impacts on western spadefoot habitat and individuals would include removal of aquatic breeding habitat; terrestrial cover and aestivation habitat; and vernal pool complex breeding, cover, and aestivation habitat. All project alternatives would have similar impacts on this species, with minor differences in the extent of affected habitat. BIO-MM#1, BIO-MM#2, BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#6, BIO-MM#9, BIO-MM#13, BIO-MM#36, and BIO-MM#37 are available to reduce this impact.

Western Pond Turtle

Construction of the project alternatives would have direct and indirect impacts on western pond turtle habitat and on individuals, if any are present in affected habitat. The primary project activities affecting western pond turtle habitat would be access easement, HSR right-of-way, roadway right-of-way (permanent), underground easement, utility easement, and TCE. Additional effects on western pond turtle may result from groundwater depletion during tunnel construction and the associated disruption of hydrologic cycles of surface water resources. All project alternatives would have broadly similar impacts on this species, with differences in the extent of affected habitat, because the portions of the alternatives that overlap with modeled habitat have identical footprints. BIO-MM#1, BIO-MM#2, BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#6, BIO-MM#9, BIO-MM#13, BIO-MM#36, and BIO-MM#37 are available to reduce this impact.

Blunt-Nosed Leopard Lizard

Construction of the project alternatives would have direct and indirect impacts on blunt-nosed leopard lizard habitat and on individuals, if any are present in affected habitat. The primary project activities affecting blunt-nosed leopard lizard habitat would be access easement, HSR right-of-way, and utility easement. All project alternatives would have identical impacts on this species because the portions of the alternatives that overlap with suitable habitat have identical footprints. BIO-MM#1, BIO-MM#2, BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#6, BIO-MM#10, BIO-MM#13, BIO-MM#38, and BIO-MM#40 are available to reduce this impact. BIO-MM#39 would avoid direct impacts on individuals (i.e., take of a California fully protected species).

San Joaquin Coachwhip, Northern California Legless Lizard, and Coast Horned Lizard

Construction of the project alternatives would have direct and indirect impacts on suitable habitat for San Joaquin coachwhip, northern California legless lizard, and coast horned lizard and may have impacts on individuals, if any are present in affected habitat. The project activities affecting

habitat for these three species would be HSR right-of-way, TCE, and underground easement. Work to construct Tunnels 1 and 2 would have the largest impacts on San Joaquin coachwhip and coast horned lizard habitat; work to construction Tunnel 1 and the west Portal of Tunnel 2 would have the largest impacts on northern California legless lizard habitat. All project alternatives would have identical impacts on these species because the portions of the alternatives that overlap with suitable habitat have identical footprints. BIO-MM#1, BIO-MM#2, BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#6, BIO-MM#13, BIO-MM#36, and BIO-MM#37 are available to reduce this impact.

Giant Garter Snake

Construction of the project alternatives would have direct and indirect impacts on giant garter snake habitat and on individuals, if any are present in affected habitat. The primary project activities affecting habitat for giant garter snake would be HSR right-of-way, maintenance access easements, new culverts, traction power infrastructure, and utility easements. All project alternatives would identical impacts on giant garter snake because the portions of the alternatives that overlap with suitable habitat have identical footprints. BIO-MM#1, BIO-MM#2, BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#6, BIO-MM#10, BIO-MM#13, BIO-MM#41, and BIO-MM#42 are available to reduce impact.

Short-Eared Owl and Grasshopper Sparrow

Construction of the project alternatives would have direct and indirect impacts on habitat for short-eared owl and grasshopper sparrow and may have impacts on individuals, if any are present in affected habitat. The project activities affecting habitat for short-eared owl and grasshopper sparrow would be access easements, automatic train control (ATC) sites, communication radio antennas, HSR right-of-way, staging areas, traction power infrastructure, underground easements, and utility easements. All project alternatives would have identical impacts on these species because the portions of the alternatives that overlap with suitable habitat have identical footprints. BIO-MM#1, BIO-MM#2, BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#6, BIO-MM#13, and BIO-MM#43 are available to reduce this impact.

Mountain Plover and Snowy Plover

Construction of the project alternatives would have direct and indirect impacts on habitat for mountain plover and western snowy plover (interior population) and may have impacts on snowy plover individuals, if any are present in affected habitat. The project activities affecting habitat for mountain plover and western snowy plover would be access easements, ATC sites, communication radio antenna, HSR right-of-way, HSR maintenance stations, roadway right-of-way (permanent and temporary), traction power infrastructure, and utility easements. All project alternatives would have identical impacts on these species because the portions of the alternatives that overlap with suitable habitat have identical footprints. BIO-MM#1, BIO-MM#2, BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#6, BIO-MM#13, BIO-MM#43, and BIO-MM#44 are available to reduce this impact.

Burrowing Owl

Construction of the project alternatives would have direct and direct impacts on habitat for burrowing owl and may have impacts on individuals, if any are present in affected habitat. The project activities affecting habitat for burrowing owl would be HSR right-of-way, maintenance access easements, new culverts, traction power infrastructure, and utility easements. All project alternatives would have identical impacts on this species in the Pacheco Pass and San Joaquin Valley Subsections because the portions of the alternatives that overlap with suitable habitat have identical footprints. Alternatives 2 and 3 would have similar impacts on suitable habitat in the remaining subsections. Alternative 1 would affect a similar amount of habitat as Alternatives 2 and 3 in the San Jose Diridon Station Approach and Monterey Corridor Subsections, but less habitat in the Morgan Hill and Gilroy Subsection because of the increased extent of viaduct that would result in less ground disturbance. Alternative 4 would affect the least amount of habitat because of its reduced footprint. BIO-MM#1, BIO-MM#2, BIO-MM#3, BIO-MM#4, BIO-MM#5,

BIO-MM#6, BIO-MM#10, BIO-MM#13, BIO-MM#45, BIO-MM#46, and BIO-MM#47 are available to reduce this impact.

Golden Eagles and Bald Eagles

Construction of the project alternatives would have direct impacts on habitat for bald and golden eagles and may have impacts on individuals, if any are present in affected habitat. The project activities affecting habitat for these species would be access easements, ATC sites, communication radio antennas, high-voltage line construction access road, HSR right-of-way, HSR stations/maintenance facilities, network upgrades, new culverts, roadway right-of-way (temporary and permanent), staging areas, traction power infrastructure, underground easements, and utility easements. The project alternatives would have similar impacts on these species, with minor differences in the acreage of affected habitat. BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#6, BIO-MM#13, BIO-MM#48, and BIO-MM#50 are available to reduce this impact. BIO-MM#49 would avoid direct impacts on individuals (i.e., take of California fully protected species).

California Condor

Construction of the project alternatives could have direct impacts on California condor individuals, if any are present within construction areas. Project activities could introduce construction materials which could entangle birds, or introduce construction fluids or other materials which could be ingested by birds causing injury. The project alternatives would have similar impacts on California condor. BIO-MM#5, BIO-MM#6, BIO-MM#13, and BIO-MM#51 would avoid direct impacts on individual California condors (i.e., take of California fully protected species).

Raptors

Construction of the project alternatives would have direct impacts on habitat for raptors and may have direct impacts on individuals, if any are present in affected habitat. All project activities could potentially affect habitat for raptors because nesting habitat is present throughout the entire habitat study area. All project alternatives would have broadly similar impacts on these species, with differences in the extent of affected habitat for the three special-status raptor species (American peregrine falcon, northern harrier, and white-tailed kite). BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#6, BIO-MM#13, and BIO-MM#52 are available to reduce this impact.

Swainson's Hawk

Construction of the project alternatives would have direct impacts on nesting and foraging habitat for Swainson's hawk and may have direct impacts on individuals, if any are present in affected nesting habitat. The project activities affecting habitat for Swainson's hawk would be ATC sites, communication radio antenna, access easements, HSR right-of-way, HSR stations/maintenance facilities, network upgrades, non-HSR TCEs, roadway right-of-way (permanent and temporary), staging areas, traction power infrastructure, underground easements, and utility easements. Alternatives 1 and 3 would have identical impacts on this species because the portions of the alternatives that overlap with suitable habitat have identical footprints. Alternative 2 would affect more acres of foraging habitat than Alternatives 1, 3, and 4 because Alternative 2 would cross more agricultural land cover in the Monterey Corridor and Morgan Hill and Gilroy Subsections than the other three alternatives. BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#6, BIO-MM#10, BIO-MM#13, BIO-MM#53, BIO-MM#54, and BIO-MM#55 are available to reduce this impact.

Purple Martin, Olive-Sided Flycatcher, and Loggerhead Shrike

Construction of the project alternatives would have direct impacts on habitat for purple martin, olive-sided flycatcher, and loggerhead shrike and may have impacts on individuals, if any are present in affected habitat. The primary project activities affecting habitat for purple martin and olive-sided flycatcher would be HSR right-of-way within the Morgan Hill and Gilroy and Pacheco Pass Subsections. All project activities would affect habitat for loggerhead shrike. All alternatives would have similar impacts on these species, with minor differences in the acreage of affected habitat. BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#6, BIO-MM#13, and BIO-MM#43 are available to reduce this impact.

Special-Status Riparian Birds

Construction of the project alternatives would have direct and indirect impacts on habitat for special-status riparian birds (i.e., least Bell's vireo, yellow warbler, and yellow-breasted chat) and may have impacts on individuals, if any are present in affected habitat. The primary project activities affecting special-status riparian birds would be HSR right-of-way, access easements, new culverts, and underground easement. Additional effects on riparian birds may result from groundwater inflows into tunnels during construction and the associated disruption of hydrologic cycles of surface water resources. All alternatives would have broadly similar impacts on these species, with differences in the acreage of affected habitat. BIO-MM#1, BIO-MM#2, BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#6, BIO-MM#9, BIO-MM#13, and BIO-MM#43 are available to reduce this impact.

Tricolored Blackbird and Yellow-Headed Blackbird

Construction of the project alternatives would have direct impacts on habitat for tricolored blackbird and yellow-headed blackbird, and may have impacts on individuals, if any are present in affected habitat. The project activities affecting tricolored blackbird and yellow-headed blackbird would be access easements, HSR right-of-way, and TCEs; all project activities could affect tricolored blackbird. Additional effects on tricolored blackbird and yellow-headed blackbird may result from groundwater inflows into tunnels during construction and the associated disruption of hydrologic cycles of surface water resources. The alternatives would have slightly different impacts on suitable habitat for tricolored blackbird, ranging from approximately 2,900 acres under Alternative 2 to approximately 2,500 acres under Alternative 4. All project alternatives would have the same impacts on yellow-headed blackbird, including acreage of affected habitat, because the portions of the alternatives that overlap with modeled habitat have identical footprints. BIO-MM#1, BIO-MM#2, BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#6, BIO-MM#9, BIO-MM#10, BIO-MM#13, BIO-MM#56, and BIO-MM#57 are available to reduce this impact.

Sandhill Crane

Construction of the project alternatives would have direct and indirect impacts on habitat for greater and lesser sandhill crane and direct impacts (i.e., disturbance) on individuals, if any are present. The primary project activities affecting habitat for sandhill crane would be access easements, ATC sites, communication radio antenna, HSR right-of-way, HSR maintenance stations, roadway right-of-way (permanent and temporary), traction power infrastructure, and utility easements. All project alternatives would have identical impacts on this species because the portions of the alternatives that overlap with suitable habitat in the San Joaquin Valley Subsection have identical footprints. BIO-MM#1, BIO-MM#2, BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#6, BIO-MM#10, BIO-MM#13, BIO-MM#44, and BIO-MM#58 are available to reduce this impact.

San Joaquin Kit Fox

Construction of the project alternatives would have direct and indirect impacts on San Joaquin kit fox habitat and on individuals, if any are present in affected habitat. The primary project activities affecting San Joaquin kit fox habitat would be HSR right-of-way, TCE, and underground easement. All project alternatives would have nearly identical impacts on this species because the portions of the alternatives that overlap with suitable habitat in the Pacheco Pass and San Joaquin Valley Subsections have identical footprints. BIO-MM#1, BIO-MM#2, BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#6, BIO-MM#10, BIO-MM#13, BIO-MM#59, BIO-MM#60, and BIO-MM#61 are available to reduce this impact.

Fresno Kangaroo Rat

Construction of the project alternatives would have direct impacts on habitat for Fresno kangaroo rat and may have impacts on individuals, if any are present in affected habitat. The project activities affecting habitat for Fresno kangaroo rat would be limited to the project footprint east of I-5 and would primarily include HSR right-of-way. All project alternatives would have identical impacts on this species because the portions of the alternatives that overlap with suitable habitat in the San Joaquin Valley Subsection have identical footprints. BIO-MM#1, BIO-MM#2, BIO-

MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#6, BIO-MM#10, BIO-MM#13, BIO-MM#62, and BIO-MM#63 are available to reduce this impact.

American Badger

Construction of the project alternatives would have direct and indirect impacts on American badger habitat and on individuals, if any are present in affected habitat. The primary project activities affecting American badger habitat would be HSR right-of-way, TCE, underground easement, and utility easement. All project alternatives would have similar impacts on this species, with minor differences in area of affected habitat, because the portions of the alternatives that overlap with modeled habitat have nearly identical footprints. BIO-MM#1, BIO-MM#2, BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#6, BIO-MM#13, and BIO-MM#64 are available to reduce this impact.

San Francisco Dusky-Footed Woodrat and Ringtail

Construction of the project would have direct and indirect impacts on habitat for San Francisco dusky-footed woodrat and ringtail and may have impacts on individuals, if any are present in affected habitat. The primary project activity affecting habitat for San Francisco dusky-footed woodrat and ringtail would be HSR right-of-way. All project alternatives would have similar impacts on these species, with minor differences in acreage of affected habitat, because the portions of the alternatives that overlap with modeled habitat have nearly identical footprints. BIO-MM#1, BIO-MM#2, BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#6, BIO-MM#13, BIO-MM#65, and BIO-MM#66 are available to reduce this impact. BIO-MM#62 would avoid direct impacts on individual ringtails (i.e., take of a California fully protected species).

Special-Status Bats

Construction of the project would have direct impacts on roosting habitat for special-status bats and may have impacts on individuals, if any are present in affected habitat. The primary project activity affecting habitat for special-status bats would be HSR right-of-way. The project alternatives would have similar impacts on this species, with differences in acreage (in descending order, Alternatives 2, 3, 1, and 4) ranging from approximately 5,700 acres to 4,400 acres. BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#6, BIO-MM#13, BIO-MM#67, BIO-MM#68, and BIO-MM#69 are available to reduce this impact.

3.7.9.2 Non-Special-Status Wildlife

Construction of the project alternatives would involve construction activities that could result in mortality of non-special-status terrestrial wildlife. Heavy equipment (e.g., excavator, bulldozer) could crush or mangle small, ground-dwelling amphibians (e.g., Sierran treefrog), reptiles (e.g., common garter snake), or mammals (e.g., western harvest mouse) hidden underground or in dense herbaceous cover during ground disturbance, and vehicle traffic on dirt roads could crush burrows occupied by such animals. Inadvertent release of hazardous materials (e.g., oils, fluids) into aquatic habitat during construction could cause mortality of amphibians and reptiles through dermal contact or absorption. Vegetation removal and structure modification or demolition activities could cause mortality of non-special-status birds and bats. This permanent direct impact could occur throughout the project extent because all terrestrial wildlife species (not just special-status species limited to specific land cover types) could potentially be affected. Project features to avoid or minimize impacts on special-status wildlife would also address impacts on non-special-status wildlife.

Construction of the project alternatives would result in temporary and permanent impacts on wetland and open-water habitat for waterfowl and shorebirds. Although habitat for waterfowl and shorebirds occurs in limited amounts throughout the project extent, the highest concentration of these important bird habitats (and hence the occurrence of these species) has been documented in the GEA and UPR (Soap Lake) Audubon IBAs. Additional effects on riparian species may result from groundwater inflows into tunnels during construction and the associated disruption of hydrologic cycles of surface water resources. Alternative 3 would have slightly greater temporary impacts on these habitats than Alternatives 1 and 2 and slightly lesser permanent impacts.

Operations of the project would introduce new noise sources to the GEA and UPR Audubon IBAs. Noise that adds to ambient noise can possibly affect birds through several mechanisms; however, because the noise from passing trains would be intermittent and not continuous, it would not substantially contribute to masking biologically important sounds (e.g., vocal signals of other birds) with human-generated noise. All project alternatives would generate abrupt, infrequent, loud noises that together with the sight of fast-approaching trains could increase stress or change bird behavior. This direct, intermittent impact would be the same for all project alternatives because they all pass through both Audubon IBAs. BIO-MM#1, BIO-MM#2, BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#6, BIO-MM#43, AND BIO-MM#58 are available to reduce this impact.

3.7.9.3 Special-Status Plant Communities

Construction activities within the project footprint would have direct impacts on special-status plant communities. These impacts would include removal or disruption (i.e., trampling and crushing) of special-status plant communities by construction vehicles and personnel. With respect to vegetation removal, it should be noted that vegetation within the HSR right-of-way would be permanently removed. Additional effects on riparian or aquatic special-status plant communities may result from groundwater depletion during tunnel construction and the associated disruption of hydrologic cycles of surface water resources and/or affect protected trees. The project alternatives would have identical impacts on alkali marsh, alkali scrub wetland, alkali vernal pool, vernal pool, California sycamore woodland, and mixed chaparral cover types supporting special-status plant communities because the portions of the alternatives that overlap with these cover types have identical footprints; impacts on most other communities would be broadly similar across alternatives, although Alternative 3 would result in the greatest effect on mixed riparian. BIO-MM#1, BIO-MM#2, BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#6, BIO-MM#7, BIO-MM#9, BIO-MM#71, BIO-MM#72, BIO-MM#73, and BIO-MM#74 are available to reduce this impact.

3.7.9.4 Aquatic Resources

Construction of the project alternatives would have direct and indirect impacts on aquatic resources. Construction of those portions of the project extent that cross or abut aquatic resources could result in placement of fill (e.g., for construction of bridge supports), installation of culverts, and associated in-channel work. Construction of track and systems could also alter surface and subsurface hydrology that supplies or drains aquatic features. Additional effects on aquatic resources may result from groundwater depletion during tunnel construction and the associated disruption of hydrologic cycles of surface water resources. All four project alternatives would affect a generally similar amount of aquatic resources; however, Alternative 2 would have slightly greater impacts than Alternatives 1, 3, and 4. Alternative 4 would have lesser impacts than Alternatives 1, 2, and 3. BIO-MM#1, BIO-MM#2, BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#6, BIO-MM#9, BIO-MM#25, BIO-MM#71, BIO-MM#72, BIO-MM#73, and BIO-MM#74 are available to reduce this impact.

3.7.9.5 Protected Trees

Construction of the project would have direct and indirect impacts on trees protected under local ordinances through removal (permanent) and trimming or root disruption (temporary). The primary indirect impact would be habitat degradation from increased cover of nonnative invasive plants. All three project alternatives would affect a similar areal extent of land cover types potentially supporting protected trees. Additional effects on protected trees may result from groundwater depletion during tunnel construction. BIO-MM#9 and BIO-MM#75 are available to reduce this impact.

3.7.9.6 Wildlife Movement

Construction of the project alternatives would have temporary, permanent, and intermittent permanent impacts on wildlife corridors and movement. Impacts would occur where wildlife movement is known or likely to occur across or near the project footprint. Temporary impacts during construction (when all construction areas would be fenced) would be greatest under Alternative 3, which bisects agricultural lands east of Gilroy. Additional effects on fish movement may result from groundwater inflows into tunnels during construction and the associated disruption of hydrologic cycles of streams. Alternative 4 would have the least impact because it would make use of the existing UPRR right-of-way and would thus require a smaller project footprint. Alternative 1 would avoid impacts east of Gilroy, but it would have the same impacts as Alternative 3 in the area east of Morgan Hill. Permanent impacts would be greatest under Alternative 2, which would be primarily at grade or on embankment through the Morgan Hill and Gilroy Subsection, creating an almost complete barrier to east-west wildlife movement across the Santa Clara Valley, whereas Alternatives 1 and 3 would be on viaduct in this subsection. Alternative 3 would have greater impacts than Alternative 1 because it would be at grade or on embankment across agricultural areas east of Gilroy, it would bisect protected lands in the Soap Lake floodplain, and it would cross more of the Santa Cruz to Gabilan critical linkage. Intermittent permanent impacts (i.e., operations impacts—primarily train strike) would vary both by location and by species movement guild. Alternative 2 would have the greatest impacts on terrestrial species because of its at-grade or embankment profiles in the Morgan Hill and Gilroy Subsection. Alternative 1 would have the greatest impact on burrowing owls because it would be at grade near the San Jose International Airport, where a breeding colony of burrowing owls is known to be persist. Alternatives 1 and 3 would have the greatest impact on riparian birds because those alternatives would follow more of the Coyote Creek corridor than Alternative 2. Alternative 3 would pose the greatest hazard for waterfowl and shorebirds because it passes closer to the Soap Lake 10-year floodplain than the other three alternatives. Under all alternatives, carrion on or near the right-of-way could attract eagles and California condors, resulting in a potential for train strike to occur. BIO-MM#3, BIO-MM#76, BIO-MM#77, BIO-MM#78, BIO-MM#79, BIO-MM#80, BIO-MM#81, BIO-MM#82, and BIO-MM#83 are available to reduce this impact.

3.7.9.7 Conservation Areas

Construction of the project would have direct and indirect impacts on conservation areas. The primary project activities affecting conservation areas would be HSR right-of-way, TCE, and utility easement. Additional effects on water resources in conservation areas over the tunnel alignment may result from groundwater depletion during tunnel construction and the associated disruption of hydrologic cycles of surface water resources. All project alternatives would have identical impacts on Romero Ranch Conservation Easement, because all alternatives have identical footprints in this area. All project alternatives would have similar impacts on Soap Lake properties, by acres, and Alternatives 1 and 2 would be identical; however, Alternative 3 would have greater permanent impacts. The remaining major difference between project alternatives is that Alternative 3 would have an impact on the Silacci Conservation Area, while Alternatives 1 and 2 would have no impact on this area. The difference between the impacts on all other conservation areas would be minor by acres and number of conservation areas affected. BIO-MM#9, BIO-MM#10 and BIO-MM#84 are available to reduce this impact.

3.7.9.8 Habitat Conservation Plans

Construction of the project alternatives would result in potential impacts on three HCPs: the SCVHP, the Greenprint, and the Coyote Valley Linkage. The SCVHP is an adopted federal HCP and NCCP prepared pursuant to Section 10 of the FESA and NCCPA, respectively. The Greenprint and Coyote Valley Linkage are approved regional or local HCPs. The project alternatives could have impacts on habitat connectivity under the SCVHP between the Santa Cruz Mountains and the Diablo Range by potentially limiting or affecting the movement of species between these regions. Additionally, the alternatives would have permanent and temporary impacts in a particular area targeted for protection; consequently, additional lands would need to be secured to meet the

objectives of that identified acquisition action. All four alternatives would have identical impacts. BIO-MM#79, BIO-MM#84, and BIO-MM#85 are available to further reduce this impact.

The project alternatives could also have impacts on wildlife crossings proposed under the Coyote Valley Linkage, primarily by increasing the length of proposed crossings and increasing the engineering complexity and associated cost of implementing the crossings. BIO-MM#77 and BIO-MM#79 are available to reduce this impact.

3.7.10 CEQA Significance Conclusions

As described in Section 3.1.5.4, the impacts of project actions under CEQA are evaluated against thresholds to determine whether a project action would result in no impact, a less-than-significant impact, or a significant impact. Table 3.7-27 shows the CEQA significance determinations for each impact discussed in Section 3.7.7.

Under all four alternatives, nearly all construction-related impacts on biological and aquatic resources would be significant before mitigation. Permanent and temporary construction impacts would result from removal or disturbance of multiple land cover types that provide habitat for native plants and animals (including special-status species). Some land cover types are also designated as aquatic resources or special-status plant communities; impacts on these resources would be significant under all four alternatives. Significant impacts on special-status wildlife would also occur where HSR track and systems cross known wildlife corridors and Audubon IBAs.

Impact BIO#1: Permanent Conversion or Degradation of Habitat for Special-Status Plant Species

The Authority would implement mitigation measures to reduce the impacts on special-status plants. BIO-MM#1 would involve preparation of an RRP that would identify and describe procedures for restoring temporarily disturbed habitat to its former state. BIO-MM#2 would require the project biologist to develop a WCP prior to ground-disturbing activity to minimize and avoid the spread of invasive weeds into the project footprint and adjacent areas. BIO-MM#3 would require the project biologist to establish ESAs and nondisturbance zones (including WEF, where applicable) that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#4 and BIO-MM#6 would require the project biologist to monitor construction activities for compliance with avoidance and minimization measures and established ESAs and nondisturbance zones and to document such monitoring through a compliance reporting program, respectively. BIO-MM#5 would require the project biologist to establish vehicle speed limits within the project footprint; restrict vehicle traffic to established roads, construction areas, and other permissible areas; and direct that routes be marked to prevent off-road traffic prior to ground-disturbing activity. BIO-MM#7 would require the project biologist to conduct presence/absence surveys for special-status plant species and special-status plant communities within the project footprint to be avoided during construction prior to any ground-disturbing activity. BIO-MM#8 would require preparation of a plan for the salvage and relocation of any special-status plant species found during presence/absence surveys prior to ground-disturbing activity. BIO-MM#9 would involve preparation and implementation of a groundwater AMMP that would require monitoring of groundwater-dependent surface water resources (including those providing habitat for special-status plants) within the tunnel groundwater study area, providing supplemental water where needed, and remediating or compensating for any adverse effects identified during monitoring. BIO-MM#10 would involve preparation and implementation of a CMP that would require creating, preserving, restoring, or enhancing habitat for special-status species in the regional RSA to compensate for permanent and temporary impacts on species habitat; BIO-MM#11 would minimize impacts associated with mitigation efforts; and BIO-MM#12 would require compensatory mitigation for special-status plants at a 1:1 ratio. These measures would minimize direct and indirect impacts on habitat for special-status plants, provide for the avoidance or salvage and relocation of special-status plant occurrences in the project footprint, and compensate for impacts on habitat and any relocated plants. Therefore, the impact would be less than significant.

Table 3.7-27 CEQA Significance Conclusions and Mitigation Measures for Biological and Aquatic Resources

CEQA Impacts	Impact Description and CEQA Level of Significance Before Mitigation	Mitigation Measure	CEQA Level of Significance After Mitigation
Special-Status Species			
Impact BIO#1: Permanent Conversion or Degradation of Habitat for Special-Status Plant Species	Significant for all alternatives: Construction of the project would remove or disturb habitat for special-status plant species and could degrade habitat outside of but adjacent to the work areas.	BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan BIO-MM#2: Prepare and Implement a Weed Control Plan BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#7: Conduct Botanical Surveys for Special-Status Plant Species and Special-Status Plant Communities BIO-MM#8: Prepare and Implement Plan for Salvage, Relocation, and/or Propagation of Special-Status Plant Species BIO-MM#9: Prepare and Implement a Groundwater Management Adaptive Management and Monitoring Plan BIO-MM#10: Prepare a Compensatory Mitigation Plan for Species and Species Habitat BIO-MM#11: Implement Measures to Minimize Impacts During Off-Site Habitat Restoration, or Enhancement, or Creation on Mitigation Sites BIO-MM#12: Provide Compensatory Mitigation for Impacts on Listed Plant Species	Less than Significant

CEQA Impacts	Impact Description and CEQA Level of Significance Before Mitigation	Mitigation Measure	CEQA Level of Significance After Mitigation
Impact BIO#2: Permanent Conversion or Degradation of Habitat for and Mortality of Bay Checkerspot Butterfly	Significant for all alternatives: Construction of the project would remove or disturb habitat (including critical habitat) for Bay checkerspot butterfly and could degrade habitat outside of but adjacent to the work areas. Activities could also result in mortality of individuals, if present in affected habitat. Increased shadows from construction of the viaduct the Morgan Hill and Gilroy Subsection could alter flight behavior.	BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan BIO-MM#2: Prepare and Implement a Weed Control Plan BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#10: Prepare a Compensatory Mitigation Plan for Species and Species Habitat BIO-MM#13: Implement Work Stoppage BIO-MM#14: Avoid Direct Impacts on Bay Checkerspot Butterfly Host Plants BIO-MM#15: Prepare and Implement Bay Checkerspot Butterfly Protection Plan BIO-MM#16: Provide Compensatory Mitigation for Impacts on Bay Checkerspot Butterfly Habitat	Less than Significant
Impact BIO#3: Permanent Conversion or Degradation of Habitat for and Mortality of Vernal Pool Crustaceans	Significant for all alternatives: Construction of the project would remove or disturb habitat for vernal pool crustaceans and could degrade habitat outside of but adjacent to the work areas. Activities could also result in mortality of individuals, if present in affected habitat.	BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan BIO-MM#2: Prepare and Implement a Weed Control Plan BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#10: Prepare a Compensatory Mitigation Plan for Species and Species Habitat BIO-MM#13: Implement Work Stoppage BIO-MM#17: Conduct Pre-Construction Surveys for Vernal Pool Wildlife Species BIO-MM#18: Implement Seasonal Vernal Pool Work Restriction BIO-MM#19: Implement and Monitor Vernal Pool Avoidance Minimization Measures within Temporary Impact Areas BIO-MM#20: Provide Compensatory Mitigation for Impacts on Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp Habitat	Less than Significant

CEQA Impacts	Impact Description and CEQA Level of Significance Before Mitigation	Mitigation Measure	CEQA Level of Significance After Mitigation
Impact BIO#4: Removal or Pruning of Elderberry Plants Potentially Supporting Valley Elderberry Longhorn Beetle	Significant for all alternatives: The project may remove elderberry plants potentially occupied by valley elderberry longhorn beetle, and could degrade habitat outside of but adjacent to the work areas. Removal of occupied elderberry plants would result in mortality of individuals.	BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan BIO-MM#2: Prepare and Implement a Weed Control Plan BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#10: Prepare a Compensatory Mitigation Plan for Species and Species Habitat BIO-MM#11: Implement Measures to Minimize Impacts During Off-Site Habitat Restoration, or Enhancement, or Creation on Mitigation Sites BIO-MM#13: Implement Work Stoppage BIO-MM#21: Implement Avoidance Measures for Elderberry Shrubs outside Permanent Impact Areas BIO-MM#22: Provide Compensatory Mitigation for Impacts on Valley Elderberry Longhorn Beetle Habitat	Less than Significant
Impact BIO#5: Permanent Conversion or Degradation of Habitat for and Mortality of Crotch's Bumble Bee	Significant for all alternatives: The project would convert and disturb habitat and could result in the mortality of individual bees if underground nest colonies or overwintering queens are present in the project footprint at the time of construction.	BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan BIO-MM#2: Prepare and Implement a Weed Control Plan BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#12: Provide Compensatory Mitigation for Impacts on Listed Plant Species BIO-MM#23: Conduct Surveys and Implement Avoidance Measures for Crotch's Bumble Bee BIO-MM#24: Provide Compensatory Mitigation for Impacts on Crotch's Bumble Bee	Less than Significant

CEQA Impacts	Impact Description and CEQA Level of Significance Before Mitigation	Mitigation Measure	CEQA Level of Significance After Mitigation
Impact BIO#6: Permanent Conversion of Habitat for and Direct Mortality of Steelhead and Pacific Lamprey, and Permanent Conversion of Essential Fish Habitat for Pacific Coast Salmon	Significant for all alternatives: The project would remove or disturb stream habitat for CCC and SCCC steelhead, Pacific lamprey, and Pacific Coast salmon EFH, and could degrade habitat downstream of the work areas at affected stream crossings. Pile-driving and dewatering activities could also result in mortality of individuals, if present in affected habitat.	BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#9: Prepare and Implement a Groundwater Management Adaptive Management and Monitoring Plan BIO-MM#10: Prepare a Compensatory Mitigation Plan for Species and Species Habitat BIO-MM#13: Implement Work Stoppage BIO-MM#25: Prepare Plan for Dewatering and Water Diversions BIO-MM#26: Prepare and Implement a Cofferdam Fish Rescue Plan BIO-MM#27: Prepare and Implement an Underwater Sound Control Plan BIO-MM#28: Provide Compensatory Mitigation for Impacts on Steelhead Habitat	Less than Significant
Impact BIO#7: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Tiger Salamander	Significant for all alternatives: The project would remove or disturb habitat (including critical habitat) for California tiger salamander, and could degrade habitat outside of but adjacent to the work areas. Activities could also result in mortality of individuals, if present in affected habitat.	BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan BIO-MM#2: Prepare and Implement a Weed Control Plan BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#9: Prepare and Implement a Groundwater Management Adaptive Management and Monitoring Plan BIO-MM#10: Prepare a Compensatory Mitigation Plan for Species and Species Habitat BIO-MM#13: Implement Work Stoppage BIO-MM#29: Conduct Pre-Construction Surveys for California Tiger Salamander BIO-MM#30: Implement Avoidance and Minimization Measures for California Tiger Salamander BIO-MM#31: Provide Compensatory Mitigation for Impacts on California Tiger Salamander Habitat	Less than Significant

CEQA Impacts	Impact Description and CEQA Level of Significance Before Mitigation	Mitigation Measure	CEQA Level of Significance After Mitigation
Impact BIO#8: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Red-Legged Frog	Significant for all alternatives: The project would remove or disturb habitat (including critical habitat) for California red-legged frog, and could degrade habitat outside of but adjacent to the work areas. Activities could also result in mortality of individuals, if present in affected habitat.	BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan BIO-MM#2: Prepare and Implement a Weed Control Plan BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#9: Prepare and Implement a Groundwater Management Adaptive Management and Monitoring Plan BIO-MM#10: Prepare a Compensatory Mitigation Plan for Species and Species Habitat BIO-MM#13: Implement Work Stoppage BIO-MM#32: Conduct Pre-Construction Surveys and Implement Avoidance and Minimization Measures for California Red-Legged Frog BIO-MM#33: Provide Compensatory Mitigation for Impacts on California Red-Legged Frog Habitat	Less than Significant
Impact BIO#9: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Foothill Yellow-Legged Frog	Significant for all alternatives: The project would remove or disturb habitat for foothill yellow-legged frog, and could degrade habitat outside of but adjacent to the work areas. Activities could also result in mortality of individuals, if present in affected habitat.	BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan BIO-MM#2: Prepare and Implement a Weed Control Plan BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#9: Prepare and Implement a Groundwater Management Adaptive Management and Monitoring Plan BIO-MM#10: Prepare a Compensatory Mitigation Plan for Species and Species Habitat BIO-MM#13: Implement Work Stoppage BIO-MM#34: Conduct Pre-construction Surveys and Implement Avoidance and Minimization Measures for Foothill Yellow-Legged Frog BIO-MM#35: Provide Compensatory Mitigation for Impacts on Foothill Yellow-Legged Frog Habitat	Less than Significant

CEQA Impacts	Impact Description and CEQA Level of Significance Before Mitigation	Mitigation Measure	CEQA Level of Significance After Mitigation
Impact BIO#10: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Western Spadefoot	Significant for all alternatives: The project would remove or disturb habitat for western spadefoot, and could degrade habitat outside of but adjacent to the work areas. Activities could also result in mortality of individuals, if present in affected habitat.	BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan BIO-MM#2: Prepare and Implement a Weed Control Plan BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#9: Prepare and Implement a Groundwater Management Adaptive Management and Monitoring Plan BIO-MM#13: Implement Work Stoppage BIO-MM#36: Conduct Pre-Construction Surveys for Special-Status Reptiles and Amphibians BIO-MM#37: Implement Avoidance and Minimization Measures for Special-Status Reptiles and Amphibians	Less than Significant
Impact BIO#11: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Western Pond Turtle	Significant for all alternatives: The project would remove or disturb habitat for western pond turtle, and could degrade habitat outside of but adjacent to the work areas. Activities could also result in mortality of individuals, if present in affected habitat.	BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan BIO-MM#2: Prepare and Implement a Weed Control Plan BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#9: Prepare and Implement a Groundwater Management Adaptive Management and Monitoring Plan BIO-MM#13: Implement Work Stoppage BIO-MM#36: Conduct Pre-Construction Surveys for Special-Status Reptiles and Amphibians BIO-MM#37: Implement Avoidance and Minimization Measures for Special-Status Reptiles and Amphibians	Less than Significant

CEQA Impacts	Impact Description and CEQA Level of Significance Before Mitigation	Mitigation Measure	CEQA Level of Significance After Mitigation
Impact BIO#12: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Blunt-Nosed Leopard Lizard	Significant for all alternatives: The project would remove or disturb habitat for blunt-nosed leopard lizard, and could degrade habitat outside of but adjacent to the work areas. Activities could also result in mortality of individuals, if present in affected habitat.	BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan BIO-MM#2: Prepare and Implement a Weed Control Plan BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#10: Prepare a Compensatory Mitigation Plan for Species and Species Habitat BIO-MM#13: Implement Work Stoppage BIO-MM#38: Conduct Surveys for Blunt-Nosed Leopard Lizard BIO-MM#39: Implement Avoidance Measures for Blunt-Nosed Leopard Lizard BIO-MM#40: Provide Compensatory Mitigation for Impacts on Blunt-Nosed Leopard Lizard Habitat	Less than Significant
Impact BIO#13: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Joaquin Coachwhip, Northern California Legless Lizard, and Coast Horned Lizard	Significant for all alternatives: The project would remove or disturb habitat for San Joaquin coachwhip, northern California legless lizard, and coast horned lizard, and could degrade habitat outside of but adjacent to the work areas. Activities could also result in mortality of individuals, if present in affected habitat.	BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan BIO-MM#2: Prepare and Implement a Weed Control Plan BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#13: Implement Work Stoppage BIO-MM#36: Conduct Pre-Construction Surveys for Special-Status Reptiles and Amphibians BIO-MM#37: Implement Avoidance and Minimization Measures for Special-Status Reptiles and Amphibians	Less than Significant

CEQA Impacts	Impact Description and CEQA Level of Significance Before Mitigation	Mitigation Measure	CEQA Level of Significance After Mitigation
Impact BIO#14: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Giant Garter Snake	Significant for all alternatives: The project would remove or disturb habitat for giant garter snake, and could degrade habitat outside of but adjacent to the work areas. Activities could also result in mortality of individuals, if present in affected habitat.	BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan BIO-MM#2: Prepare and Implement a Weed Control Plan BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#10: Prepare a Compensatory Mitigation Plan for Species and Species Habitat BIO-MM#13: Implement Work Stoppage BIO-MM#41: Conduct Pre-Construction Surveys and Implement Avoidance and Minimization Measures for Giant Garter Snake BIO-MM#42: Provide Compensatory Mitigation for Impacts on Giant Garter Snake Habitat	Less than Significant
Impact BIO#15: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Short-Eared Owl and Grasshopper Sparrow	Significant for all alternatives: The project would remove or disturb habitat for short-eared owl and grasshopper sparrow, and could degrade habitat outside of but adjacent to the work areas. Activities could also destroy or cause abandonment of active nests, if present in affected habitat.	BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan BIO-MM#2: Prepare and Implement a Weed Control Plan BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#13: Implement Work Stoppage BIO-MM#43: Conduct Pre-Construction Surveys and Delineate Active Nest Buffers for Breeding Birds	Less than Significant

CEQA Impacts	Impact Description and CEQA Level of Significance Before Mitigation	Mitigation Measure	CEQA Level of Significance After Mitigation
Impact BIO#16: Permanent Conversion or Degradation of Habitat for Mountain Plover and Disturbance of Western Snowy Plover (Interior Population)	Significant for all alternatives: The project would remove or disturb habitat for mountain plover, and could degrade habitat outside of but adjacent to the work areas. Activities could also destroy or cause abandonment of active western snowy plover nests, if present in affected habitat, and disturb wintering mountain plovers.	BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan BIO-MM#2: Prepare and Implement a Weed Control Plan BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#13: Implement Work Stoppage BIO-MM#43: Conduct Pre-Construction Surveys and Delineate Active Nest Buffers for Breeding Birds BIO-MM#44: Implement Avoidance and Minimization Measures for Mountain Plover and Sandhill Crane	Less than Significant
Impact BIO#17: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Burrowing Owl	Significant for all alternatives: The project would remove or disturb habitat for burrowing owl. Activities could also result in mortality of individuals by crushing occupied burrows or collapsing burrow entrances and preventing escape. Activities could also disturb nesting pairs and cause them to abandon eggs or young.	BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan BIO-MM#2: Prepare and Implement a Weed Control Plan BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#10: Prepare a Compensatory Mitigation Plan for Species and Species Habitat BIO-MM#13: Implement Work Stoppage BIO-MM#45: Conduct Surveys for Burrowing Owl BIO-MM#46: Implement Avoidance and Minimization Measures for Burrowing Owl BIO-MM#47: Provide Compensatory Mitigation for Loss of Active Burrowing Owl Burrows and Habitat	Less than Significant

CEQA Impacts	Impact Description and CEQA Level of Significance Before Mitigation	Mitigation Measure	CEQA Level of Significance After Mitigation
Impact BIO#18: Permanent Conversion or Degradation of Habitat for and Disturbance of Golden Eagle and Bald Eagle	Significant for all alternatives: The project would remove or disturb habitat for golden eagle and bald eagle. Activities within 0.5 mile of active nests could cause nesting pairs to abandon eggs or young.	BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#13: Implement Work Stoppage BIO-MM#48: Conduct Pre-Construction Surveys for Eagles BIO-MM#49: Implement Avoidance Measures for Active Eagle Nests BIO-MM#50: Provide Compensatory Mitigation for Loss of Eagle Nests	Less than Significant
Impact BIO#19: Injury or Disturbance of California Condor	Significant for all alternatives. The project could affect California condor through entrapment in construction materials or ingestion of fluids or other materials causing injury.	BIO-MM#5: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#13: Implement Work Stoppage BIO-MM#51: Implement Avoidance Measures for California Condor	Less than Significant
Impact BIO#20: Permanent Conversion or Degradation of Habitat for and Disturbance of Special-Status Raptors (American Peregrine Falcon, Northern Harrier, White-Tailed Kite) and Other Raptors	Significant for all alternatives: The project would remove or disturb habitat for American peregrine falcon, northern harrier, white-tailed kite, and other raptors. Activities within 1,000 feet of active nests could cause nesting pairs to abandon eggs or young.	BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#13: Implement Work Stoppage BIO-MM#52: Conduct Pre-Construction Surveys and Monitoring for Raptors	Less than Significant

CEQA Impacts	Impact Description and CEQA Level of Significance Before Mitigation	Mitigation Measure	CEQA Level of Significance After Mitigation
Impact BIO#21: Permanent Conversion or Degradation of Habitat for and Disturbance of Swainson's Hawks	Significant for all alternatives: The project would remove or disturb habitat for Swainson's hawk. Activities within 1,320 feet of active nests could cause nesting pairs to abandon eggs or young.	BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#10: Prepare a Compensatory Mitigation Plan for Species and Species Habitat BIO-MM#13: Implement Work Stoppage BIO-MM#53: Conduct Surveys for Swainson's Hawks Nests BIO-MM#54: Implement Avoidance and Minimization Measures for Swainson's Hawk Nests BIO-MM#55: Provide Compensatory Mitigation for Loss of Swainson's Hawk Nesting Trees and Habitat	Less than Significant
Impact BIO#22: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Purple Martin, Olive-Sided Flycatcher, and Loggerhead Shrike	Significant for all alternatives: The project would remove or disturb habitat for purple martin, olive-sided flycatcher, and loggerhead shrike. Activities could also destroy or cause abandonment of active nests, if present in affected habitat.	BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#13: Implement Work Stoppage BIO-MM#43: Conduct Pre-Construction Surveys and Delineate Active Nest Buffers for Breeding Birds	Less than Significant
Impact BIO#23: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Least Bell's Vireo, Yellow Warbler, and Yellow-Breasted Chat	Significant for all alternatives: The project would remove or disturb habitat for least Bell's vireo, yellow warbler, and yellow-breasted chat, and could degrade habitat outside of but adjacent to the work areas. Activities could also destroy or cause abandonment of active nests, if present in affected habitat.	BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan BIO-MM#2: Prepare and Implement a Weed Control Plan BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#9: Prepare and Implement a Groundwater Management Adaptive Management and Monitoring Plan BIO-MM#13: Implement Work Stoppage BIO-MM#43: Conduct Pre-Construction Surveys and Delineate Active Nest Buffers for Breeding Birds BIO-MM#72: Provide Compensatory Mitigation for Permanent Impacts to Riparian Habitat	Less than Significant

CEQA Impacts	Impact Description and CEQA Level of Significance Before Mitigation	Mitigation Measure	CEQA Level of Significance After Mitigation
Impact BIO#24: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Tricolored Blackbird and Yellow-Headed Blackbird	Significant for all alternatives: The project would remove or disturb habitat for tricolored blackbird and yellow-headed blackbird, and could degrade habitat outside of but adjacent to the work areas. Activities could also destroy or cause abandonment of active nests, if present in affected habitat.	BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan BIO-MM#2: Prepare and Implement a Weed Control Plan BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#9: Prepare and Implement a Groundwater Management Plan BIO-MM#10: Prepare a Compensatory Mitigation Plan for Species and Species Habitat BIO-MM#13: Implement Work Stoppage BIO-MM#56: Conduct Surveys and Implement Avoidance Measures for Active Tricolored Blackbird Nest Colonies BIO-MM#57: Provide Compensatory Mitigation for Impacts on Tricolored Blackbird Habitat	Less than Significant
Impact BIO#25: Permanent Conversion or Degradation of Habitat for and Disturbance of Sandhill Crane	Significant for all alternatives: The project would remove or disturb habitat for sandhill crane, and could degrade habitat outside of but adjacent to the work areas. Activities could also disturb wintering sandhill cranes, if present in affected habitat.	BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan BIO-MM#2: Prepare and Implement a Weed Control Plan BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#10: Prepare a Compensatory Mitigation Plan for Species and Species Habitat BIO-MM#13: Implement Work Stoppage BIO-MM#44: Avoid or Minimize Disturbance on Mountain Plover and Sandhill Crane BIO-MM#58: Provide Compensatory Mitigation for Impacts on Waterfowl, Shorebird, and Sandhill Crane Habitat	Less than Significant

CEQA Impacts	Impact Description and CEQA Level of Significance Before Mitigation	Mitigation Measure	CEQA Level of Significance After Mitigation
Impact BIO#26: Loss of Denning and Dispersal Habitat for and Direct Mortality or Disturbance of San Joaquin Kit Fox	Significant for all alternatives: The project would remove or disturb habitat for San Joaquin kit fox, and could degrade habitat outside of but adjacent to the work areas. Activities could also result in mortality of individuals by crushing occupied burrows or collapsing burrow entrances and preventing escape. Activities could also disturb individuals and impair breeding, feeding, and sheltering behavior.	BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan BIO-MM#2: Prepare and Implement a Weed Control Plan BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#10: Prepare a Compensatory Mitigation Plan for Species and Species Habitat BIO-MM#13: Implement Work Stoppage BIO-MM#59: Conduct Pre-Construction Surveys for San Joaquin Kit Fox BIO-MM#60: Implement San Joaquin Kit Fox Avoidance and Minimization Measures BIO-MM#61: Provide Compensatory Mitigation for Impacts on San Joaquin Kit Fox Habitat	Less than Significant
Impact BIO#27: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Fresno Kangaroo Rat	Significant for all alternatives: The project would remove or disturb habitat for Fresno kangaroo rat. Activities could also result in mortality of individuals, if present in affected habitat.	BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan BIO-MM#2: Prepare and Implement a Weed Control Plan BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#10: Prepare a Compensatory Mitigation Plan for Species and Species Habitat BIO-MM#13: Implement Work Stoppage BIO-MM#62: Implement Avoidance and Minimization Measures for Fresno Kangaroo Rat BIO-MM#63: Provide Compensatory Mitigation for Impacts on Fresno Kangaroo Rat Habitat	Less than Significant

CEQA Impacts	Impact Description and CEQA Level of Significance Before Mitigation	Mitigation Measure	CEQA Level of Significance After Mitigation
Impact BIO#28: Permanent Conversion or Degradation of Habitat for and Direct Mortality of American Badger	Significant for all alternatives: The project would remove or disturb habitat for American badger, and could degrade habitat outside of but adjacent to the work areas. Activities could also result in mortality of individuals by crushing occupied burrows or collapsing burrow entrances and preventing escape. Activities could also disturb individuals and impair breeding, feeding, or sheltering behavior.	BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan BIO-MM#2: Prepare and Implement a Weed Control Plan BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#13: Implement Work Stoppage BIO-MM#64: Conduct Pre-Construction Surveys for American Badger Den Sites and Implement Avoidance and Minimization Measures	Less than Significant
Impact BIO#29: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Francisco Dusky-Footed Woodrat and Ringtail	Significant for all alternatives: The project would remove or disturb habitat for San Francisco dusky-footed woodrat and ringtail. Activities could also result in mortality of individuals, if present in affected habitat.	BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan BIO-MM#2: Prepare and Implement a Weed Control Plan BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#13: Implement Work Stoppage BIO-MM#65: Conduct Pre-Construction Surveys for Ringtail and Ringtail Den Sites and Implement Avoidance Measures BIO-MM#66: Conduct Pre-Construction Surveys for Dusky-Footed Woodrat and Implement Avoidance Measures	Less than Significant
Impact BIO#30: Loss of Roost Sites for and Direct Mortality or Disturbance of Special-Status Bats	Significant for all alternatives: The project would remove roosting habitat for pallid bat, Townsend's big-eared bat, western mastiff bat, and western red bat. Activities could also destroy or cause abandonment of occupied roost sites, if present in affected habitat.	BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#13: Implement Work Stoppage BIO-MM#67: Conduct Pre-Construction Surveys for Special-Status Bat Species BIO-MM#68: Implement Bat Avoidance and Relocation Measures BIO-MM#69: Implement Bat Exclusion and Deterrence Measures	Less than Significant

CEQA Impacts	Impact Description and CEQA Level of Significance Before Mitigation	Mitigation Measure	CEQA Level of Significance After Mitigation
Impact BIO#31: Intermittent Disturbance of Habitat for Special-Status Plants during Operations	Significant for all alternatives: O&M activities may occasionally remove or disturb or degrade habitat for special-status plants and contribute to reduced survival of special-status plant occurrences.	BIO-MM#70: Prepare and Implement an Annual Vegetation Control Plan	Less than Significant
Impact BIO#32: Intermittent Disturbance of Habitat for and Direct Mortality of Special-Status Wildlife during Operations	Significant for all alternatives: O&M activities may occasionally remove or disturb and degrade habitat for special-status wildlife result in some areas becoming inhospitable for special-status wildlife.	BIO-MM#70: Prepare and Implement an Annual Vegetation Control Plan	Less than Significant
Impact BIO#33: Mortality of Non-Special-Status Terrestrial Wildlife	Less than significant for all alternatives: Mortality of non-special-status species is not a threshold of significance under CEQA. The project could result in mortality of non-special-status terrestrial wildlife by crushing or mangling small ground-dwelling animals hidden underground or in dense vegetation, inadvertently releasing hazardous materials into aquatic habitat, or removing vegetation and structures that support non-special-status birds and bats. However, project features to avoid or minimize impacts on special-status species would also have similar benefits in reducing impacts on common species.	No mitigation measures are required.	N/A

CEQA Impacts	Impact Description and CEQA Level of Significance Before Mitigation	Mitigation Measure	CEQA Level of Significance After Mitigation
Impact BIO#34: Removal or Degradation of Habitat for and Disturbance of Waterfowl and Shorebirds	Significant for all alternatives: The project would remove or disturb habitat for waterfowl and shorebirds in two Audubon IBAs, and could degrade habitat outside of but adjacent to the work areas.	BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan BIO-MM#2: Prepare and Implement a Weed Control Plan BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#10: Prepare a Compensatory Mitigation Plan for Species and Species Habitat BIO-MM#58: Provide Compensatory Mitigation for Impacts on Waterfowl, Shorebird, and Sandhill Crane Habitat	Less than Significant
Special-Status Plant Communities			
Impact BIO#35: Permanent Conversion or Degradation of Special-Status Plant Communities	Significant for all alternatives: The project would remove or disturb special-status plant communities, and could degrade special-status plant communities outside of but adjacent to the work areas.	BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan BIO-MM#2: Prepare and Implement a Weed Control Plan BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#7: Conduct Botanical Surveys for Special-Status Plant Species and Special-Status Plant Communities BIO-MM#9: Prepare and Implement a Groundwater Management Adaptive Management and Monitoring Plan BIO-MM#71: Restore Temporary Riparian Impacts BIO-MM#72: Provide Compensatory Mitigation for Permanent Impacts on Riparian Habitat	Less than Significant
Impact BIO#36: Intermittent Disturbance or Degradation of Special-Status Plant Communities during Operations	Significant for all alternatives: Operations activities may occasionally disturb or degrade special-status plant communities in and adjacent to the work areas.	BIO-MM#70: Prepare and Implement an Annual Vegetation Control Plan	Less than Significant

CEQA Impacts	Impact Description and CEQA Level of Significance Before Mitigation	Mitigation Measure	CEQA Level of Significance After Mitigation
Aquatic Resources			
Impact BIO#37: Permanent Conversion or Degradation of Aquatic Resources Considered waters of the U.S. or waters of the State	Significant for all alternatives: The project would remove or disturb waters of the U.S. or waters of the state, including wetlands (i.e., jurisdictional aquatic resources), and could degrade aquatic resources outside of but adjacent to the project footprint.	BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan BIO-MM#2: Prepare and Implement a Weed Control Plan BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#9: Prepare and Implement a Groundwater Management Adaptive Management and Monitoring Plan BIO-MM#25: Prepare Plan for Dewatering and Water Diversions BIO-MM#71: Restore Temporary Riparian Impacts BIO-MM#72: Provide Compensatory Mitigation for Permanent Impacts on Riparian Habitat BIO-MM#73: Restore Aquatic Resources Subject to Temporary Impacts BIO-MM#74: Prepare and Implement a Compensatory Mitigation Plan for Impacts on Aquatic Resources	Less than Significant
Impact BIO#38: Permanent Conversion or Degradation of Resources Regulated under California Fish and Game Code Section 1600 et seq.	Significant for all alternatives: The project would remove or disturb resources regulated under Section 1600 et seq. (i.e., riparian and other habitat types), and could degrade the resources outside of but adjacent to the work areas.	BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan BIO-MM#2: Prepare and Implement a Weed Control Plan BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#9: Prepare and Implement a Groundwater Management Adaptive Management and Monitoring Plan BIO-MM#25: Prepare Plan for Dewatering and Water Diversions BIO-MM#71: Restore Temporary Riparian Impacts BIO-MM#72: Provide Compensatory Mitigation for Permanent Impacts on Riparian Habitat BIO-MM#73: Restore Aquatic Resources Subject to Temporary Impacts BIO-MM#74: Prepare and Implement a Compensatory Mitigation Plan for Impacts on Aquatic Resources	Less than Significant

CEQA Impacts	Impact Description and CEQA Level of Significance Before Mitigation	Mitigation Measure	CEQA Level of Significance After Mitigation
Impact BIO#39: Intermittent Disturbance or Degradation of Aquatic Resources during Operations	Significant for all alternatives: Operations activities may occasionally disturb or degrade aquatic resources in and adjacent to the project footprint.	BIO-MM#70: Prepare and Implement an Annual Vegetation Control Plan	Less than Significant
Protected Trees			
Impact BIO#40: Removal or Mortality of Trees Protected under Municipal Tree Ordinances	Significant for all alternatives: The project may remove or prune trees protected under municipal tree ordinances. Ground disturbance could result in increased invasive weed cover that reduces the viability and regeneration of protected trees.	BIO-MM#9: Prepare and Implement a Groundwater Management Adaptive Management and Monitoring Plan BIO-MM#75: Implement Transplantation and Compensatory Mitigation for Protected Trees	Less than Significant
Impact BIO#41: Disturbance Of Trees Protected Under Municipal Tree Ordinances during Operations	Less than significant for all alternatives: Any trees within the project footprint would already have been removed. Occasional trimming of protected trees would not conflict with tree protection ordinances.	No mitigation measures are required.	N/A
Wildlife Movement			
Impact BIO#42: Temporary Disruption of Wildlife Movement	Significant for all alternatives: The project would temporarily affect wildlife movement by creating temporary barriers to movement (e.g., construction fencing and dewatering), creating noise and vibration that alters or delays animal movements as they attempt to avoid the work area, and introducing artificial light during nighttime construction that alters or delays animal movements as they avoid lit areas.	BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#25: Prepare Plan for Dewatering and Watering Diversions BIO-MM#76: Minimize Impacts on Wildlife Movement during Construction	Less than Significant

CEQA Impacts	Impact Description and CEQA Level of Significance Before Mitigation	Mitigation Measure	CEQA Level of Significance After Mitigation
Impact BIO#43: Permanent Impacts on Wildlife Movement	Alternatives 1, 3, and 4 Significant: The project would create a barrier to local and regional wildlife movement and fragment habitat.	BIO-MM#77: Design Wildlife Crossings to Facilitate Wildlife Movement BIO-MM#78: Establish Wildlife Crossings at Embankment in West Slope of Pacheco Pass BIO-MM#79: Provide Wildlife Movement between the Santa Cruz Mountains and Diablo Range	Less than Significant
	Alternative 2 Significant: The project would create a barrier to local and regional wildlife movement and fragment habitat in the same areas as Alts. 1, 3, and 4, and would also further degrade wildlife habitat connectivity across Coyote Valley.		Less than Significant
Impact BIO#44: Intermittent Noise Disturbance of Wildlife Using Corridors during Operations	Significant for all alternatives: noise of passing trains would cause direct impacts on large congregations of wintering waterbirds in the GEA IBA.	BIO-MM#58: Provide Compensatory Mitigation for Impacts on Waterfowl, Shorebird, and Sandhill Crane Habitat BIO-MM#80: Minimize Permanent Intermittent Noise, Visual, and Train Strike Impacts on Wildlife Movement	Less than Significant
Impact BIO#45: Intermittent Vibration Disturbance of Wildlife Using Corridors during Operations	Less than significant for all alternatives: Although vibration of passing trains would be perceptible to reptiles, amphibians, and small mammals, the disturbances would be brief and more frequent during daylight hours when most sensitive species are inactive.	No mitigation measures are required.	N/A
Impact BIO#46: Intermittent Visual Disturbance of Wildlife Using Corridors during Operations	Significant for all alternatives: Visual disturbance cause by passing trains would cause direct impacts on large congregations of wintering waterbirds in the GEA IBA.	BIO-MM#58: Provide Compensatory Mitigation for Impacts on Waterfowl, Shorebird, and Sandhill Crane Habitat BIO-MM#80: Minimize Permanent Intermittent Noise and Visual Impacts on Wildlife Movement	Less than Significant

CEQA Impacts	Impact Description and CEQA Level of Significance Before Mitigation	Mitigation Measure	CEQA Level of Significance After Mitigation
Impact BIO#47: Intermittent and Permanent Lighting Disturbance of Wildlife Using Corridors during Operations	Less than significant for all alternatives: Effects of light from passing trains and HSR facilities could alter wildlife behavior patterns, but such effects would be localized.	No mitigation measures are required.	N/A
Impact BIO#48: Mortality Resulting from Train Strike during Operations	Significant for all alternatives: Operations would cause direct mortality and injury of terrestrial and aerial wildlife trying to cross the alignment.	BIO-MM#77: Design Wildlife Crossings to Facilitate Wildlife Movement BIO-MM#80: Minimize Permanent Intermittent Noise, Visual, and Train Strike Impacts on Wildlife Movement BIO-MM#81: Minimize Permanent Intermittent Impacts on Terrestrial Species Wildlife Movement BIO-MM#82: Minimize Permanent Intermittent Impacts on Aerial Species Wildlife Movement BIO-MM#83: Implement Removal of Carrion that May Attract Condors and Eagles	Less than Significant
Impact BIO#49: Injury and Mortality Resulting from Power Line Strike during Operations	Significant for all alternatives: New power lines associated with project infrastructure could cause injury and mortality of birds.	BIO-MM#80: Minimize Permanent Intermittent Noise and Visual Impacts on Wildlife Movement BIO-MM#82: Minimize Permanent Intermittent Impacts on Aerial Species Movement	Less than Significant
Impact BIO#50: Mortality Resulting from Entrapment in OCS Poles during Operations	Less than significant for all alternatives: Minor design modification would eliminate this risk.	No mitigation measures are required.	N/A

CEQA Impacts	Impact Description and CEQA Level of Significance Before Mitigation	Mitigation Measure	CEQA Level of Significance After Mitigation
Conservation Areas			
Impact BIO#51: Permanent Conversion or Degradation of Conservation Areas	Significant for all alternatives: The project would remove or disturb conservation area lands which contain land cover types that provide habitat for special-status species, support special-status plant communities (including riparian habitat) or aquatic resources, support wildlife movement corridors, or any combination of these and could degrade conservation area lands outside of but adjacent to the project footprint.	BIO-MM#9: Prepare and Implement a Groundwater Management Adaptive Management and Monitoring Plan BIO-MM#10: Prepare a Compensatory Mitigation Plan for Species and Species Habitat BIO-MM#79: Provide Wildlife Movement between the Santa Cruz Mountains and Diablo Range BIO-MM#84: Provide Compensatory Mitigation for Impacts on Conservation Easements	Less than Significant
Impact BIO#52: Introduction of Invasive Species or Contaminants into Conservation Areas during Operations	Less than significant for all alternatives: Operations activities may occasionally disturb conservation area lands but such impacts would be limited in extent and duration.	No mitigation measures are required.	N/A
Habitat Conservation Plans			
Impact BIO#53: Conflict with Santa Clara Valley Habitat Plan	Significant for all alternatives: The project would have a potential conflict with Action LAND-R3 of the SCVHP.	BIO-MM#10: Prepare a Compensatory Mitigation Plan for Species and Species Habitat BIO-MM#79: Provide Wildlife Movement between the Santa Cruz Mountains and Diablo Range BIO-MM#84: Provide Compensatory Mitigation for Impacts on Conservation Easements BIO-MM#85: Provide Compensatory Mitigation for Permanent Impacts on California Sycamore Woodland at the Pacheco Creek Reserve	Less than Significant
Impact BIO#54: Conflict with Santa Clara Valley Greenprint	Less than significant for all alternatives: The project would not conflict with any strategies in the Santa Clara Valley Greenprint.	No mitigation measures are required.	N/A

CEQA Impacts	Impact Description and CEQA Level of Significance Before Mitigation	Mitigation Measure	CEQA Level of Significance After Mitigation
Impact BIO#55: Conflict with Coyote Valley Linkage	Significant for all alternatives: the project could conflict directly with provisions of an adopted habitat conservation plan.	BIO-MM#77: Design Wildlife Crossings to Facilitate Wildlife Movement BIO-MM#79: Provide Wildlife Movement between the Santa Cruz Mountains and Diablo Range	Less than Significant

CCC = central California coast
CEQA = California Environmental Quality Act
EFH = essential fish habitat
GEA = Grasslands Ecological Area
HSR = high-speed rail
IBA = Important Bird Area
N/A = not applicable
O&M = operations and maintenance
OCS = overhead contact system
SCCC = south-central California coast
SCVHP = Santa Clara Valley Habitat Plan

Impact BIO#2: Permanent Conversion or Degradation of Habitat for and Mortality of Bay Checkerspot Butterfly

The Authority would implement mitigation measures to reduce the impacts on Bay checkerspot butterfly. The Authority would implement mitigation measures to reduce the impacts on special-status plants. BIO-MM#1 would involve preparation of an RRP that would identify and describe procedures for restoring temporarily disturbed habitat to its former state. BIO-MM#2 would require the project biologist to develop a WCP prior to ground-disturbing activity to minimize and avoid the spread of invasive weeds into the project footprint and adjacent areas. BIO-MM#3 would require the project biologist to establish ESAs and nondisturbance zones (including WEF, where applicable) that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#4 and BIO-MM#6 would require the project biologist to monitor construction activities for compliance with avoidance and minimization measures and established ESAs and nondisturbance zones and to document such monitoring through a compliance reporting program, respectively. BIO-MM#5 would require the project biologist to establish vehicle speed limits within the project footprint; restrict vehicle traffic to established roads, construction areas, and other permissible areas; and direct that routes be marked to prevent off-road traffic prior to ground-disturbing activity. BIO-MM#13 would give the project biologist authority to halt any construction activities that could injure or kill individuals belonging to species listed under the FESA or CESA. BIO-MM#14 requires identification and avoidance of Bay checkerspot butterfly host plants prior to and during construction, helping to avoid impacts on individuals. BIO-MM#15 would require preparation and implementation of a Bay Checkerspot Butterfly Protection Plan that contains measures to maintain and improve habitat connectivity for butterflies between Coyote Ridge and Tulare Hill. BIO-MM#16 identifies minimum compensatory mitigation requirements for Bay checkerspot butterfly that would be included in the CMP developed under BIO-MM#10. These measures are expected to minimize direct and indirect impacts on Bay checkerspot butterfly habitat and individuals and would provide habitat of comparable quality to offset habitat loss. Therefore, the impact would be less than significant.

Impact BIO#3: Permanent Conversion or Degradation of Habitat for and Mortality of Vernal Pool Crustaceans

The Authority would implement mitigation measures to reduce the impacts on vernal pool crustaceans. The Authority would implement mitigation measures to reduce the impacts on special-status plants. BIO-MM#1 would involve preparation of an RRP that would identify and describe procedures for restoring temporarily disturbed habitat to its former state. BIO-MM#2 would require the project biologist to develop a WCP prior to ground-disturbing activity to minimize and avoid the spread of invasive weeds into the project footprint and adjacent areas. BIO-MM#3 would require the project biologist to establish ESAs and nondisturbance zones (including WEF, where applicable) that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#4 and BIO-MM#6 would require the project biologist to monitor construction activities for compliance with avoidance and minimization measures and established ESAs and nondisturbance zones and to document such monitoring through a compliance reporting program, respectively. BIO-MM#5 would require the project biologist to establish vehicle speed limits within the project footprint; restrict vehicle traffic to established roads, construction areas, and other permissible areas; and direct that routes be marked to prevent off-road traffic prior to ground-disturbing activity. BIO-MM#13 would give the project biologist authority to halt any construction activities that could injure or kill individuals belonging to species listed under the FESA or CESA. Prior to construction, the Authority would conduct pre-construction sampling for federally listed vernal pool crustaceans consistent with USFWS survey protocols under BIO-MM#17. To avoid indirect impacts from ground-disturbing activities, the Authority would restrict activities within 250 feet of vernal pools and suitable seasonal wetlands between October 15 and April 15 as outlined in BIO-MM#18. The Authority would avoid and minimize impacts on vernal pool crustaceans within temporary impact areas as outlined in BIO-MM#19. BIO-MM#20 would require the Authority to compensate for direct and indirect (within 250

feet) impacts on vernal pool crustacean habitat at a 1:1 ratio through the CMP developed under BIO-MM#10. These measures are expected to minimize direct and indirect impacts on federally listed vernal pool crustacean habitat and individuals and to offset the loss of habitat. Therefore, the impact would be less than significant.

Impact BIO#4: Removal or Pruning of Elderberry Plants Potentially Supporting Valley Elderberry Longhorn Beetle

The Authority would implement mitigation measures to reduce the impacts on federally listed valley elderberry longhorn beetle. The Authority would implement mitigation measures to reduce the impacts on special-status plants. BIO-MM#1 would involve preparation of an RRP that would identify and describe procedures for restoring temporarily disturbed habitat to its former state. BIO-MM#2 would require the project biologist to develop a WCP prior to ground-disturbing activity to minimize and avoid the spread of invasive weeds into the project footprint and adjacent areas. BIO-MM#3 would require the project biologist to establish ESAs and nondisturbance zones (including WEF, where applicable) that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#4 and BIO-MM#6 would require the project biologist to monitor construction activities for compliance with avoidance and minimization measures and established ESAs and nondisturbance zones and to document such monitoring through a compliance reporting program, respectively. BIO-MM#5 would require the project biologist to establish vehicle speed limits within the project footprint; restrict vehicle traffic to established roads, construction areas, and other permissible areas; and direct that routes be marked to prevent off-road traffic prior to ground-disturbing activity. BIO-MM#13 would give the project biologist authority to halt any construction activities that could injure or kill individuals belonging to species listed under the FESA or CESA. BIO-MM#21 would avoid direct impacts on shrubs potentially occupied by valley elderberry longhorn beetle outside permanent impact areas. BIO-MM#22 identifies minimum compensatory mitigation requirements for valley elderberry longhorn beetle that would be included in the CMP developed under BIO-MM#10. These measures would minimize direct and indirect impacts on valley elderberry longhorn beetle habitat and individuals within the project footprint and compensate for loss of habitat. Therefore, the impact would be less than significant.

Impact BIO#5: Permanent Conversion or Degradation of Habitat for and Mortality of Crotch Bumble Bee

The Authority would implement mitigation measures to reduce the impacts on Crotch bumble bee. BIO-MM#1 would involve preparation of an RRP that would identify and describe procedures for restoring temporarily disturbed habitat to its former condition. BIO-MM#2 would require the project biologist to develop a WCP prior to ground-disturbing activity to minimize and avoid the spread of invasive weeds into the project footprint and adjacent areas. BIO-MM#3 would require the project biologist to establish ESAs and nondisturbance zones (including WEF, where applicable) that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#4 and BIO-MM#6 would require the project biologist to monitor construction activities for compliance with avoidance and minimization measures and established ESAs and nondisturbance zones and to document such monitoring through a compliance reporting program, respectively. BIO-MM#5 would require the project biologist to establish vehicle speed limits within the project footprint; restrict vehicle traffic to established roads, construction areas, and other permissible areas; and direct that routes be marked to prevent off-road traffic prior to ground-disturbing activity. BIO-MM#12 would give the project biologist authority to halt any construction activities that could injure or kill individuals belonging to species listed under the FESA or CESA. BIO-MM#23 requires sampling surveys for Crotch bumble bee in the project footprint within 1 year of construction, helping to define areas for additional pre-construction surveys. If sampling identifies occupied Crotch bumble bee habitat within the project footprint, BIO-MM#23 also requires the project biologist to conduct pre-construction surveys of such habitat for active bee nest colonies just prior to construction so that they can be considered for avoidance through the use of no-work buffers. These measures are expected to minimize direct and indirect impacts on Crotch bumble

bee habitat and individuals. BIO-MM#24 would provide habitat of comparable quality to offset habitat loss. Therefore, the impact would be less than significant.

Impact BIO#6: Permanent Conversion of Habitat for and Direct Mortality of Steelhead and Pacific Lamprey, and Permanent Conversion of Essential Fish Habitat for Pacific Coast Salmon

The Authority would implement mitigation measures to reduce the impacts on special-status fish. BIO-MM#1 would involve preparation of an RRP that would identify and describe procedures for restoring temporarily disturbed habitat to its former state. BIO-MM#3 would require the project biologist to establish ESAs and nondisturbance zones (including WEF, where applicable) that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#4 and BIO-MM#6 would require the project biologist to monitor construction activities for compliance with avoidance and minimization measures and established ESAs and nondisturbance zones, and to document such monitoring through a compliance reporting program, respectively. BIO-MM#9 would involve preparation and implementation of a groundwater AMMP that would require monitoring of groundwater-dependent surface water resources (including those providing habitat for fish) within the tunnel groundwater study area, providing supplemental water where needed, and remediating or compensating for any adverse effects identified during monitoring. BIO-MM#13 would give the project biologist authority to halt any construction activities that could injure or kill individuals belonging to species listed under the FESA or CESA. BIO-MM#25 would require the preparation of a dewatering plan prior to construction in flowing water and monitoring of dewatering during construction. BIO-MM#26 and BIO-MM#27 would minimize direct impacts on individual special-status fish during construction by establishing procedures for rescuing stranded fish during stream dewatering and minimizing adverse impacts from in-water pile driving, respectively. BIO-MM#28 identifies minimum compensatory mitigation requirements for steelhead that would be included in the CMP developed under BIO-MM#10; such requirements would also be expected to benefit Pacific lamprey and EFH. These measures are expected to minimize direct and indirect impacts on special-status fish habitat and individuals. Therefore, the impact would be less than significant.

Impact BIO#7: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Tiger Salamander

The Authority would implement mitigation measures to reduce the impacts on California tiger salamander. BIO-MM#1 would involve preparation of an RRP that would identify and describe procedures for restoring temporarily disturbed habitat to its former state. BIO-MM#2 would require the project biologist to develop a WCP prior to ground-disturbing activity to minimize and avoid the spread of invasive weeds into the project footprint and adjacent areas. BIO-MM#3 would require the project biologist to establish ESAs and nondisturbance zones (including WEF, where applicable) that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#4 and BIO-MM#6 would require the project biologist to monitor construction activities for compliance with avoidance and minimization measures and established ESAs and nondisturbance zones and to document such monitoring through a compliance reporting program, respectively. BIO-MM#5 would require the project biologist to establish vehicle speed limits within the project footprint; restrict vehicle traffic to established roads, construction areas, and other permissible areas; and direct that routes be marked to prevent off-road traffic prior to ground-disturbing activity. BIO-MM#9 would involve preparation and implementation of a groundwater AMMP that would require monitoring of groundwater-dependent surface water resources (including those providing habitat for California tiger salamander) within the tunnel groundwater study area, providing supplemental water where needed, and remediating or compensating for any adverse effects identified during monitoring. BIO-MM#13 would give the project biologist authority to halt any construction activities that could injure or kill individuals belonging to species listed under the FESA or CESA. BIO-MM#29 would minimize direct impacts on individual California tiger salamanders during construction by requiring pre-construction surveys of habitat within the project footprint. BIO-MM#30 would also minimize direct impacts on individuals by

requiring WEF along the perimeter of the project footprint in suitable habitat to prevent individual salamanders from entering the work area and relocating salamanders from permanent impact areas to agency-approved habitat outside the project footprint. BIO-MM#31 identifies minimum compensatory mitigation requirements for California tiger salamander that would be included in the CMP developed under BIO-MM#10. These measures would minimize direct and indirect impacts on California tiger salamander habitat (including critical habitat) and individuals and would compensate for habitat loss. Therefore, the impact would be less than significant.

Impact BIO#8: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Red-Legged Frog

The Authority would implement mitigation measures to reduce the impacts on California red-legged frog. BIO-MM#1 would involve preparation of an RRP that would identify and describe procedures for restoring temporarily disturbed habitat to its former state. BIO-MM#2 would require the project biologist to develop a WCP prior to ground-disturbing activity to minimize and avoid the spread of invasive weeds into the project footprint and adjacent areas. BIO-MM#3 would require the project biologist to establish ESAs and nondisturbance zones (including WEF, where applicable) that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#4 and BIO-MM#6 would require the project biologist to monitor construction activities for compliance with avoidance and minimization measures and established ESAs and nondisturbance zones and to document such monitoring through a compliance reporting program, respectively. BIO-MM#5 would require the project biologist to establish vehicle speed limits within the project footprint; restrict vehicle traffic to established roads, construction areas, and other permissible areas; and direct that routes be marked to prevent off-road traffic prior to ground-disturbing activity. BIO-MM#9 would involve preparation and implementation of a groundwater AMMP that would require monitoring of groundwater-dependent surface water resources (including those providing habitat for California red-legged frog) within the tunnel groundwater study area, providing supplemental water where needed, and remediating or compensating for any adverse effects identified during monitoring. BIO-MM#13 would give the project biologist authority to halt any construction activities that could injure or kill individuals belonging to species listed under the FESA or CESA. BIO-MM#32 would minimize direct impacts on individual California red-legged frogs during construction by requiring pre-construction surveys of modeled habitat within the project footprint and implementing additional avoidance and minimization measures (e.g., relocating frogs from permanent impact areas to agency-approved habitat outside the project footprint). BIO-MM#33 identifies minimum compensatory mitigation requirements for California red-legged frog that would be included in the CMP developed under BIO-MM#10. These measures would minimize direct and indirect impacts on California red-legged frog habitat (including critical habitat) and individuals and would compensate for habitat loss. Therefore, the impact would be less than significant.

Impact BIO#9: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Foothill Yellow-Legged Frog

The Authority would implement mitigation measures to reduce the impacts on foothill yellow-legged frog. BIO-MM#1 would involve preparation of an RRP that would identify and describe procedures for restoring temporarily disturbed habitat to its former state. BIO-MM#2 would require the project biologist to develop a WCP prior to ground-disturbing activity to minimize and avoid the spread of invasive weeds into the project footprint and adjacent areas. BIO-MM#3 would require the project biologist to establish ESAs and nondisturbance zones (including WEF, where applicable) that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#4 and BIO-MM#6 would require the project biologist to monitor construction activities for compliance with avoidance and minimization measures and established ESAs and nondisturbance zones and to document such monitoring through a compliance reporting program, respectively. BIO-MM#5 would require the project biologist to establish vehicle speed limits within the project footprint; restrict vehicle traffic to established roads, construction areas, and other permissible areas; and direct that routes be marked to prevent off-road traffic prior to ground-

disturbing activity. BIO-MM#9 would involve preparation and implementation of a groundwater AMMP that would require monitoring of groundwater-dependent surface water resources (including those providing habitat for foothill yellow-legged frog) within the tunnel groundwater study area, providing supplemental water where needed, and remediating or compensating for any adverse effects identified during monitoring. BIO-MM#13 would give the project biologist authority to halt any construction activities that could injure or kill individuals belonging to species listed under the FESA or CESA. BIO-MM#34 would minimize direct impacts on individual foothill yellow-legged frogs during construction by requiring pre-construction surveys of modeled habitat within the project footprint and implementing additional avoidance and minimization measures (e.g., relocating frogs from permanent impact areas to agency-approved habitat outside the project footprint). BIO-MM#35 identifies minimum compensatory mitigation requirements for impacts on foothill yellow-legged frog that would be included in CMPs developed under BIO-MM#10. These measures would minimize direct and indirect impacts on foothill yellow-legged frog habitat and individuals and would compensate for habitat loss. Therefore, the impact would be less than significant.

Impact BIO#10: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Western Spadefoot

The Authority would implement mitigation measures to minimize impacts on western spadefoot and other nonlisted special-status reptiles and amphibians. BIO-MM#1 would involve preparation of an RRP that would identify and describe procedures for restoring temporarily disturbed habitat to its former state. BIO-MM#2 would require the project biologist to develop a WCP prior to ground-disturbing activity to minimize and avoid the spread of invasive weeds into the project footprint and adjacent areas. BIO-MM#3 would require the project biologist to establish ESAs and nondisturbance zones (including WEF, where applicable) that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#4 and BIO-MM#6 would require the project biologist to monitor construction activities for compliance with avoidance and minimization measures and established ESAs and nondisturbance zones and to document such monitoring through a compliance reporting program, respectively. BIO-MM#5 would require the project biologist to establish vehicle speed limits within the project footprint; restrict vehicle traffic to established roads, construction areas, and other permissible areas; and direct that routes be marked to prevent off-road traffic prior to ground-disturbing activity. BIO-MM#13 would give the project biologist authority to halt any construction activities that could injure or kill individuals belonging to species listed under the FESA or CESA. BIO-MM#36 and BIO-MM#37 would minimize direct impacts on individual western spadefoot and other nonlisted special-status reptiles and amphibians during construction by requiring pre-construction surveys of modeled habitat and avoidance or relocation and subsequent monitoring of observed individuals. Compensatory mitigation for impacts on aquatic resources (BIO-MM#74) is also expected to benefit western spadefoot because it breeds in vernal pools and seasonal wetlands. These measures would minimize direct and indirect impacts on western spadefoot habitat and direct impacts on individuals and would compensate for habitat loss. Therefore, the impact would be less than significant.

Impact BIO#11: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Western Pond Turtle

The Authority would implement mitigation measures to minimize impacts on western pond turtle and other nonlisted special-status reptiles and amphibians. BIO-MM#1 would involve preparation of an RRP that would identify and describe procedures for restoring temporarily disturbed habitat to its former state. BIO-MM#2 would require the project biologist to develop a WCP prior to ground-disturbing activity to minimize and avoid the spread of invasive weeds into the project footprint and adjacent areas. BIO-MM#3 would require the project biologist to establish ESAs and nondisturbance zones (including WEF, where applicable) that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#4 and BIO-MM#6 would require the project biologist to monitor construction activities for compliance with avoidance and minimization

measures and established ESAs and nondisturbance zones and to document such monitoring through a compliance reporting program, respectively. BIO-MM#5 would require the project biologist to establish vehicle speed limits within the project footprint; restrict vehicle traffic to established roads, construction areas, and other permissible areas; and direct that routes be marked to prevent off-road traffic prior to ground-disturbing activity. BIO-MM#9 would involve preparation and implementation of a groundwater AMMP that would require monitoring of groundwater-dependent surface water resources (including those providing habitat for western pond turtle) within the tunnel groundwater study area, providing supplemental water where needed, and remediating or compensating for any adverse effects identified during monitoring. BIO-MM#13 would give the project biologist authority to halt any construction activities that could injure or kill individuals belonging to species listed under FESA or CESA. BIO-MM#36 and BIO-MM#37 would minimize direct impacts on individual western pond turtles and other nonlisted special-status reptiles and amphibians during construction by requiring pre-construction surveys of modeled habitat and avoidance or relocation and subsequent monitoring of observed individuals. Compensatory mitigation for California tiger salamander (BIO-MM#31) and California red-legged frog (BIO-MM#33) is also expected to benefit western pond turtles because these species use very similar pond habitat, often co-occurring in the same ponds (pond turtles also occur in many of the same stream systems as California red-legged frogs). These measures would minimize direct and indirect impacts on western pond turtle habitat and direct impacts on individuals and would compensate for habitat loss. Therefore, the impact would be less than significant.

Impact BIO#12: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Blunt-Nosed Leopard Lizard

The Authority would implement mitigation measures to reduce the impacts on blunt-nosed leopard lizard. BIO-MM#1 would involve preparation of an RRP that would identify and describe procedures for restoring temporarily disturbed habitat to its former state. BIO-MM#2 would require the project biologist to develop a WCP prior to ground-disturbing activity to minimize and avoid the spread of invasive weeds into the project footprint and adjacent areas. BIO-MM#3 would require the project biologist to establish ESAs and nondisturbance zones (including WEF, where applicable) that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#4 and BIO-MM#6 would require the project biologist to monitor construction activities for compliance with avoidance and minimization measures and established ESAs and nondisturbance zones and to document such monitoring through a compliance reporting program, respectively. BIO-MM#5 would require the project biologist to establish vehicle speed limits within the project footprint; restrict vehicle traffic to established roads, construction areas, and other permissible areas; and direct that routes be marked to prevent off-road traffic prior to ground-disturbing activity. BIO-MM#13 would give the project biologist authority to halt any construction activities that could injure or kill individuals belonging to species listed under the FESA or CESA. BIO-MM#38 and BIO-MM#39 would minimize direct impacts on individual blunt-nosed leopard lizards during construction by requiring protocol-level surveys of suitable habitat to identify lizard presence within the project footprint and requiring avoidance of occupied habitat during construction. BIO-MM#40 identifies minimum compensatory mitigation requirements for blunt-nosed leopard lizard that would be included in the CMP developed under BIO-MM#10. These measures would avoid direct and indirect impacts on blunt-nosed leopard lizard individuals, would minimize loss of habitat, and would compensate for habitat loss. Therefore, the impact would be less than significant.

Impact BIO#13: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Joaquin Coachwhip, Northern California Legless Lizard, and Coast Horned Lizard

The Authority would implement mitigation measures to minimize impacts on these and other nonlisted special-status reptiles and amphibians. BIO-MM#1 would involve preparation of an RRP that would identify and describe procedures for restoring temporarily disturbed habitat to its former state. BIO-MM#2 would require the project biologist to develop a WCP prior to ground-disturbing activity to minimize and avoid the spread of invasive weeds into the project footprint

and adjacent areas. BIO-MM#3 would require the project biologist to establish ESAs and nondisturbance zones (including WEF, where applicable) that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#4 and BIO-MM#6 would require the project biologist to monitor construction activities for compliance with avoidance and minimization measures and established ESAs and nondisturbance zones and to document such monitoring through a compliance reporting program, respectively. BIO-MM#5 would require the project biologist to establish vehicle speed limits within the project footprint; restrict vehicle traffic to established roads, construction areas, and other permissible areas; and direct that routes be marked to prevent off-road traffic prior to ground-disturbing activity. BIO-MM#13 would give the project biologist authority to halt any construction activities that could injure or kill individuals belonging to species listed under the FESA or CESA. BIO-MM#36 and BIO-MM#37 would minimize direct impacts on individuals of these species during construction by requiring pre-construction surveys of modeled habitat and avoidance or relocation and subsequent monitoring of observed individuals. These measures would minimize direct impacts on individual San Joaquin coachwhips, northern California legless lizards, and coast horned lizards. Therefore, the impact would be less than significant.

Impact BIO#14: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Giant Garter Snake

The Authority would implement mitigation measures to reduce the impacts on giant garter snake. BIO-MM#1 would involve preparation of an RRP that would identify and describe procedures for restoring temporarily disturbed habitat to its former state. BIO-MM#2 would require the project biologist to develop a WCP prior to ground-disturbing activity to minimize and avoid the spread of invasive weeds into the project footprint and adjacent areas. BIO-MM#3 would require the project biologist to establish ESAs and nondisturbance zones (including WEF, where applicable) that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#4 and BIO-MM#6 would require the project biologist to monitor construction activities for compliance with avoidance and minimization measures and established ESAs and nondisturbance zones and to document such monitoring through a compliance reporting program, respectively. BIO-MM#5 would require the project biologist to establish vehicle speed limits within the project footprint; restrict vehicle traffic to established roads, construction areas, and other permissible areas; and direct that routes be marked to prevent off-road traffic prior to ground-disturbing activity. BIO-MM#13 would give the project biologist authority to halt any construction activities that could injure or kill individuals belonging to species listed under the FESA or CESA. BIO-MM#41 would minimize direct impacts on individual giant garter snakes during construction by requiring avoidance of modeled aquatic habitat outside permanent impact areas, conducting work during the active season (May 1 to September 30) when snakes are expected to actively avoid danger, and conducting pre-construction surveys and monitoring prior to any work within 200 feet of aquatic habitat. BIO-MM#42 identifies minimum compensatory mitigation requirements for giant garter snake that would be included in the CMP developed under BIO-MM#10. These measures would minimize direct and indirect impacts on giant garter snake habitat and individuals and would compensate for habitat loss. Therefore, the impact would be less than significant.

Impact BIO#15: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Short-Eared Owl and Grasshopper Sparrow

The Authority would implement mitigation measures to minimize impacts on these and other nonlisted special-status birds. BIO-MM#1 would involve preparation of an RRP that would identify and describe procedures for restoring temporarily disturbed habitat to its former state. BIO-MM#2 would require the project biologist to develop a WCP prior to ground-disturbing activity to minimize and avoid the spread of invasive weeds into the project footprint and adjacent areas. BIO-MM#3 would require the project biologist to establish ESAs and nondisturbance zones (including WEF, where applicable) that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#4 and BIO-MM#6 would require the project biologist to

monitor construction activities for compliance with avoidance and minimization measures and established ESAs and nondisturbance zones and to document such monitoring through a compliance reporting program, respectively. BIO-MM#5 would require the project biologist to establish vehicle speed limits within the project footprint; restrict vehicle traffic to established roads, construction areas, and other permissible areas; and direct that routes be marked to prevent off-road traffic prior to ground-disturbing activity. BIO-MM#13 would give the project biologist authority to halt any construction activities that could injure or kill individuals belonging to species listed under the FESA or CESA. BIO-MM#43 would require the project biologist to conduct pre-construction surveys for nesting non-raptor bird species within the project footprint and delineate no-work buffers around active nests. Compensatory mitigation for Bay checkerspot butterfly (BIO-MM#16), California tiger salamander upland habitat (BIO-MM#31), and San Joaquin kit fox (BIO-MM#61) is also expected to benefit short-eared owl and grasshopper sparrow because these species use very similar grassland habitat. These measures would minimize direct and indirect impacts on short-eared owl and grasshopper sparrow habitat and direct impacts on individuals and would compensate for habitat loss. Therefore, the impact would be less than significant.

Impact BIO#16: Permanent Conversion or Degradation of Habitat for Mountain Plover and Disturbance of Mountain Plover and Western Snowy Plover

The Authority would implement mitigation measures to minimize impacts on mountain plover and western snowy plover. BIO-MM#1 would involve preparation of an RRP that would identify and describe procedures for restoring temporarily disturbed habitat to its former state. BIO-MM#2 would require the project biologist to develop a WCP prior to ground-disturbing activity to minimize and avoid the spread of invasive weeds into the project footprint and adjacent areas. BIO-MM#3 would require the project biologist to establish ESAs and nondisturbance zones (including WEF, where applicable) that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#4 and BIO-MM#6 would require the project biologist to monitor construction activities for compliance with avoidance and minimization measures and established ESAs and nondisturbance zones and to document such monitoring through a compliance reporting program, respectively. BIO-MM#5 would require the project biologist to establish vehicle speed limits within the project footprint; restrict vehicle traffic to established roads, construction areas, and other permissible areas; and direct that routes be marked to prevent off-road traffic prior to ground-disturbing activity. BIO-MM#13 would give the project biologist authority to halt any construction activities that could injure or kill individuals belonging to species listed under the FESA or CESA. BIO-MM#43 would require the project biologist to conduct pre-construction surveys for nesting non-raptor bird species within the project footprint and delineate no-work buffers around active nests. BIO-MM#44 would avoid disturbance of wintering mountain plovers by requiring the Authority to identify wintering sites from October 1 to December 31 and maintaining a 250-foot buffer from such sites from January 1 to March 15 (alternatively, the Authority may prohibit all construction within 250 feet of modeled habitat from October 1 to March 15). These measures would minimize direct and indirect impacts on mountain plover and western snowy plover habitat and would avoid direct impacts on western snowy plover individuals. Therefore, the impact would be less than significant.

Impact BIO#17: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Burrowing Owl

The Authority would implement mitigation measures to minimize impacts on burrowing owl. BIO-MM#1 would involve preparation of an RRP that would identify and describe procedures for restoring temporarily disturbed habitat to its former state. BIO-MM#2 would require the project biologist to develop a WCP prior to ground-disturbing activity to minimize and avoid the spread of invasive weeds into the project footprint and adjacent areas. BIO-MM#3 would require the project biologist to establish ESAs and nondisturbance zones (including WEF, where applicable) that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#4 and BIO-MM#6 would require the project biologist to monitor construction activities for compliance

with avoidance and minimization measures and established ESAs and nondisturbance zones and to document such monitoring through a compliance reporting program, respectively. BIO-MM#5 would require the project biologist to establish vehicle speed limits within the project footprint; restrict vehicle traffic to established roads, construction areas, and other permissible areas; and direct that routes be marked to prevent off-road traffic prior to ground-disturbing activity. BIO-MM#45 and BIO-MM#46 would require habitat surveys of modeled habitat to confirm presence/absence of suitable burrows in the project footprint and subsequent pre-construction surveys for and avoidance of occupied burrows during construction. BIO-MM#47 identifies compensatory mitigation requirements for occupied breeding habitat that would be included in the CMP developed under BIO-MM#10. These measures would minimize direct and indirect impacts on burrowing owl habitat and individuals and would compensate for habitat loss. Therefore, the impact would be less than significant.

Impact BIO#18: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Golden Eagle and Bald Eagle

The Authority would implement mitigation measures to reduce the impacts on habitat for golden eagle and bald eagle and avoid direct impacts on individuals. BIO-MM#3 would require the project biologist to establish ESAs and nondisturbance zones (including WEF, where applicable) that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#4 and BIO-MM#6 would require the project biologist to monitor construction activities for compliance with avoidance and minimization measures and established ESAs and nondisturbance zones and to document such monitoring through a compliance reporting program, respectively. BIO-MM#5 would require the project biologist to establish vehicle speed limits within the project footprint; restrict vehicle traffic to establish roads, construction areas, and other permissible areas; and direct that routes be marked to prevent off-road traffic prior to ground-disturbing activity. BIO-MM#13 would give the project biologist authority to halt any construction activities that could injure or kill individuals belonging to species listed under the FESA or CESA. BIO-MM#48 and BIO-MM#49 would prevent destruction and disturbance of active nests during construction by requiring pre-construction surveys of modeled nesting habitat within the project footprint and establishing exclusion zones around active nests. BIO-MM#50 would compensate for the removal of any nests (if necessary) by requiring the preparation and implementation of a nest relocation or replacement plan for affected eagle pairs in consultation with the USFWS and local eagle experts. These measures would avoid direct and indirect impacts on golden eagle and bald eagle habitat and direct impacts on individuals. Therefore, the impact would be less than significant.

Impact BIO#19: Injury or Disturbance of California Condor

The Authority would implement mitigation measures to reduce the impacts on California condor. BIO-MM#5 would require the project biologist to restrict vehicle traffic to established roads, construction areas, and other permissible areas, and direct that routes be marked to prevent off-road traffic prior to ground-disturbing activity. BIO-MM#6 would require the project biologist to document compliance with all IAMFs and MMs through a compliance reporting program. BIO-MM#13 would give the project biologist authority to halt any construction activities that could injure or kill individuals belonging to species listed under the FESA or CESA. BIO-MM#51 would implement an array of avoidance and minimization measures during construction to prevent disturbance, injury, and mortality of condors. These measures would avoid direct and indirect impacts on California condor individuals. Therefore, the impact would be less than significant.

Impact BIO#20: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Special-Status Raptors (American Peregrine Falcon, Northern Harrier, White-Tailed Kite) and Other Raptors

The Authority would implement mitigation measures to reduce the impacts on special-status raptors. BIO-MM#3 would require the project biologist to establish ESAs and nondisturbance zones (including WEF, where applicable) that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#4 and BIO-MM#6 would require the project biologist to

monitor construction activities for compliance with avoidance and minimization measures and established ESAs and nondisturbance zones and to document such monitoring through a compliance reporting program, respectively. BIO-MM#5 would require the project biologist to establish vehicle speed limits within the project footprint; restrict vehicle traffic to establish roads, construction areas, and other permissible areas; and direct that routes be marked to prevent off-road traffic prior to ground-disturbing activity. BIO-MM#52 would prevent destruction and disturbance of active nests during construction by requiring pre-construction surveys of modeled nesting habitat within the project footprint and establishing exclusion zones around active nests. This measure would minimize direct impacts on individuals. Therefore, the impact would be less than significant.

Impact BIO#21: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Swainson's Hawks

The Authority would implement mitigation measures to reduce the impacts on Swainson's hawk. BIO-MM#3 would require the project biologist to establish ESAs and nondisturbance zones (including WEF, where applicable) that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#4 and BIO-MM#6 would require the project biologist to monitor construction activities for compliance with avoidance and minimization measures and established ESAs and nondisturbance zones and to document such monitoring through a compliance reporting program, respectively. BIO-MM#5 would require the project biologist to establish vehicle speed limits within the project footprint; restrict vehicle traffic to established roads, construction areas, and other permissible areas; and direct that routes be marked to prevent off-road traffic prior to ground-disturbing activity. BIO-MM#13 would give the project biologist authority to halt any construction activities that could injure or kill individuals belonging to species listed under the FESA or CESA. BIO-MM#53 and BIO-MM#54 would prevent destruction and disturbance of active nests during construction by requiring pre-construction surveys of modeled nesting habitat in and within 0.5 mile of the project footprint and establishing exclusion zones around and monitoring of active nests. BIO-MM#55 identifies minimum compensatory mitigation requirements for Swainson's hawk that would be included in the CMP developed under BIO-MM#10. These measures would minimize direct and indirect impacts on Swainson's hawk suitable habitat and direct impacts on individuals and would compensate for habitat loss. Therefore, the impact would be less than significant.

Impact BIO#22: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Purple Martin, Olive-Sided Flycatcher, and Loggerhead Shrike

The Authority would implement mitigation measures to minimize impacts on these and other nonlisted special-status birds. BIO-MM#3 would require the project biologist to establish ESAs and nondisturbance zones (including WEF, where applicable) that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#4 and BIO-MM#6 would require the project biologist to monitor construction activities for compliance with avoidance and minimization measures and established ESAs and nondisturbance zones and to document such monitoring through a compliance reporting program, respectively. BIO-MM#5 would require the project biologist to establish vehicle speed limits within the project footprint; restrict vehicle traffic to established roads, construction areas, and other permissible areas; and direct that routes be marked to prevent off-road traffic prior to ground-disturbing activity. BIO-MM#43 would require the project biologist to conduct pre-construction surveys for nesting non-raptor bird species within the project footprint and delineate no-work buffers around active nests. This measure would minimize or avoid direct impacts on individuals. Therefore, the impact would be less than significant.

Impact BIO#23: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Least Bell's Vireo, Yellow Warbler, and Yellow-Breasted Chat

The Authority would implement mitigation measures to minimize impacts on these species. BIO-MM#1 would involve preparation of an RRP that would identify and describe procedures for restoring temporarily disturbed habitat to its former state. BIO-MM#2 would require the project

biologist to develop a WCP prior to ground-disturbing activity to minimize and avoid the spread of invasive weeds into the project footprint and adjacent areas. BIO-MM#3 would require the project biologist to establish ESAs and nondisturbance zones (including WEF, where applicable) that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#4 and BIO-MM#6 would require the project biologist to monitor construction activities for compliance with avoidance and minimization measures and established ESAs and nondisturbance zones and to document such monitoring through a compliance reporting program, respectively. BIO-MM#5 would require the project biologist to establish vehicle speed limits within the project footprint; restrict vehicle traffic to established roads, construction areas, and other permissible areas; and direct that routes be marked to prevent off-road traffic prior to ground-disturbing activity. BIO-MM#9 would involve preparation and implementation of a groundwater AMMP that would require monitoring of groundwater-dependent surface water resources (including riparian habitat) within the tunnel groundwater study area, providing supplemental water where needed, and remediating or compensating for any adverse effects identified during monitoring. BIO-MM#13 would give the project biologist authority to halt any construction activities that could injure or kill individuals belonging to species listed under the FESA or CESA. BIO-MM#43 would require the project biologist to conduct pre-construction surveys for nesting non-raptor bird species within the project footprint and delineate no-work buffers around active nests. Compensatory mitigation for riparian habitat (BIO-MM#72) would benefit these species because it would require creating, preserving, restoring, or enhancing riparian plant communities in which they nest. These measures would minimize direct and indirect impacts on suitable habitat for these species and direct impacts on individuals. Therefore, the impact would be less than significant.

Impact BIO#24: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Tricolored Blackbird and Yellow-Headed Blackbird

The Authority would implement mitigation measures to minimize impacts on these species. BIO-MM#1 would involve preparation of an RRP that would identify and describe procedures for restoring temporarily disturbed habitat to its former state. BIO-MM#2 would require the project biologist to develop a WCP prior to ground-disturbing activity to minimize and avoid the spread of invasive weeds into the project footprint and adjacent areas. BIO-MM#3 would require the project biologist to establish ESAs and nondisturbance zones (including WEF, where applicable) that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#4 and BIO-MM#6 would require the project biologist to monitor construction activities for compliance with avoidance and minimization measures and established ESAs and nondisturbance zones and to document such monitoring through a compliance reporting program, respectively. BIO-MM#5 would require the project biologist to establish vehicle speed limits within the project footprint; restrict vehicle traffic to established roads, construction areas, and other permissible areas; and direct that routes be marked to prevent off-road traffic prior to ground-disturbing activity. BIO-MM#9 would involve preparation and implementation of a groundwater AMMP that would require monitoring of groundwater-dependent surface water resources (including those providing habitat for tricolored blackbird and yellow-headed blackbird) within the tunnel groundwater study area, providing supplemental water where needed, and remediating or compensating for any adverse effects identified during monitoring. BIO-MM#13 would give the project biologist authority to halt any construction activities that could injure or kill individuals belonging to species listed under the FESA or CESA. BIO-MM#56 would avoid direct impacts on nesting tricolored blackbirds during construction by requiring pre-construction surveys for and avoidance of nest colonies within 300 feet of work areas. BIO-MM#57 identifies minimum compensatory mitigation requirements for tricolored blackbird that would be included in the CMP developed under BIO-MM#10. Compensatory mitigation for aquatic resources (BIO-MM#74) is also expected to benefit these species because it would require creating, preserving, restoring, or enhancing freshwater marsh habitat in which they nest. These measures would minimize direct and indirect impacts on suitable habitat for these species and direct impacts on individuals and would compensate for habitat loss. Therefore, the impact would be less than significant.

Impact BIO#25: Permanent Conversion or Degradation of Habitat for and Disturbance of Sandhill Crane

The Authority would implement mitigation measures to minimize impacts on sandhill crane. BIO-MM#1 would involve preparation of an RRP that would identify and describe procedures for restoring temporarily disturbed habitat to its former state. BIO-MM#2 would require the project biologist to develop a WCP prior to ground-disturbing activity to minimize and avoid the spread of invasive weeds into the project footprint and adjacent areas. BIO-MM#3 would require the project biologist to establish ESAs and nondisturbance zones (including WEF, where applicable) that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#4 and BIO-MM#6 would require the project biologist to monitor construction activities for compliance with avoidance and minimization measures and established ESAs and nondisturbance zones and to document such monitoring through a compliance reporting program, respectively. BIO-MM#5 would require the project biologist to establish vehicle speed limits within the project footprint; restrict vehicle traffic to established roads, construction areas, and other permissible areas; and direct that routes be marked to prevent off-road traffic prior to ground-disturbing activity. BIO-MM#13 would give the project biologist authority to halt any construction activities that could injure or kill individuals belonging to species listed under the FESA or CESA. BIO-MM#44 would avoid disturbance of sandhill crane roosts by requiring the Authority to identify roost sites from October 1 to December 31 and maintain a 0.75-mile buffer from such sites in which no nighttime work would be conducted from January 1 to March 15 (alternatively, the Authority may prohibit all construction within 0.75 mile of modeled habitat from October 1 to March 15). BIO-MM#58 identifies minimum compensatory mitigation requirements for waterfowl, shorebird, and sandhill crane habitat that would be included in the CMP developed under BIO-MM#10. These measures would minimize direct disturbance impacts and avoid direct impacts on sandhill crane individuals and compensate for loss and degradation of roosting habitat. Therefore, the impact would be less than significant.

Impact BIO#26: Loss of Denning and Dispersal Habitat for and Direct Mortality or Disturbance of San Joaquin Kit Fox

The Authority would implement mitigation measures to reduce the impacts on San Joaquin kit fox. BIO-MM#1 would involve preparation of an RRP that would identify and describe procedures for restoring temporarily disturbed habitat to its former state. BIO-MM#2 would require the project biologist to develop a WCP prior to ground-disturbing activity to minimize and avoid the spread of invasive weeds into the project footprint and adjacent areas. BIO-MM#3 would require the project biologist to establish ESAs and nondisturbance zones (including WEF, where applicable) that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#4 and BIO-MM#6 would require the project biologist to monitor construction activities for compliance with avoidance and minimization measures and established ESAs and nondisturbance zones and to document such monitoring through a compliance reporting program, respectively. BIO-MM#5 would require the project biologist to establish vehicle speed limits within the project footprint; restrict vehicle traffic to established roads, construction areas, and other permissible areas; and direct that routes be marked to prevent off-road traffic prior to ground-disturbing activity. BIO-MM#13 would give the project biologist authority to halt any construction activities that could injure or kill individuals belonging to species listed under the FESA or CESA. BIO-MM#59 and BIO-MM#60 would minimize direct impacts on individual San Joaquin kit foxes during construction by identifying and avoiding occupied kit fox dens within the project footprint and requiring contractors to inspect construction site materials for kit foxes before burying, capping, or moving them. BIO-MM#61 identifies minimum compensatory mitigation requirements for San Joaquin kit fox that would be included in the CMP developed under BIO-MM#10. These measures would minimize direct and indirect impacts on San Joaquin kit fox suitable habitat and individuals and would compensate for habitat loss. Therefore, the impact would be less than significant.

Impact BIO#27: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Fresno Kangaroo Rat

The Authority would implement mitigation measures to reduce the impacts on Fresno kangaroo rat. BIO-MM#1 would involve preparation of an RRP that would identify and describe procedures for restoring temporarily disturbed habitat to its former state. BIO-MM#2 would require the project biologist to develop a WCP prior to ground-disturbing activity to minimize and avoid the spread of invasive weeds into the project footprint and adjacent areas. BIO-MM#3 would require the project biologist to establish ESAs and nondisturbance zones (including WEF, where applicable) that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#4 and BIO-MM#6 would require the project biologist to monitor construction activities for compliance with avoidance and minimization measures and established ESAs and nondisturbance zones and to document such monitoring through a compliance reporting program, respectively. BIO-MM#5 would require the project biologist to establish vehicle speed limits within the project footprint; restrict vehicle traffic to established roads, construction areas, and other permissible areas; and direct that routes be marked to prevent off-road traffic prior to ground-disturbing activity. BIO-MM#13 would give the project biologist authority to halt any construction activities that could injure or kill individuals belonging to species listed under the FESA or CESA. BIO-MM#62 would avoid direct impacts on individual Fresno kangaroo rats during construction by requiring surveys of modeled habitat to confirm presence/absence of suitable burrows in the project footprint and subsequent pre-construction surveys for and avoidance of occupied burrows. BIO-MM#63 identifies minimum compensatory mitigation requirements for Fresno kangaroo rat that would be included in the CMP developed under BIO-MM#10. These measures would minimize direct and indirect impacts on Fresno kangaroo rat suitable habitat and direct impacts on individuals and would compensate for habitat loss. Therefore, the impact would be less than significant.

Impact BIO#28: Permanent Conversion or Degradation of Habitat for and Direct Mortality of American Badger

The Authority would implement mitigation measures to reduce the impacts on American badger. BIO-MM#1 would involve preparation of an RRP that would identify and describe procedures for restoring temporarily disturbed habitat to its former state. BIO-MM#2 would require the project biologist to develop a WCP prior to ground-disturbing activity to minimize and avoid the spread of invasive weeds into the project footprint and adjacent areas. BIO-MM#3 would require the project biologist to establish ESAs and nondisturbance zones (including WEF, where applicable) that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#4 and BIO-MM#6 would require the project biologist to monitor construction activities for compliance with avoidance and minimization measures and established ESAs and nondisturbance zones and to document such monitoring through a compliance reporting program, respectively. BIO-MM#5 would require the project biologist to establish vehicle speed limits within the project footprint; restrict vehicle traffic to established roads, construction areas, and other permissible areas; and direct that routes be marked to prevent off-road traffic prior to ground-disturbing activity. BIO-MM#13 would allow the Project Biologist to halt work if any badgers are encountered that could be injured or killed by project activities. BIO-MM#64 would avoid direct impacts on individual American badgers during construction by requiring pre-construction surveys for and avoidance of occupied dens. These measures are expected to avoid direct impacts on individual American badgers. Therefore, the impact would be less than significant.

Impact BIO#29: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Francisco Dusky-Footed Woodrat and Ringtail

The Authority would implement mitigation measures to reduce the impacts on these species. BIO-MM#1 would involve preparation of an RRP that would identify and describe procedures for restoring temporarily disturbed habitat to its former state. BIO-MM#2 would require the project biologist to develop a WCP prior to ground-disturbing activity to minimize and avoid the spread of invasive weeds into the project footprint and adjacent areas. BIO-MM#3 would require the project

biologist to establish ESAs and nondisturbance zones (including WEF, where applicable) that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#4 and BIO-MM#6 would require the project biologist to monitor construction activities for compliance with avoidance and minimization measures and established ESAs and nondisturbance zones and to document such monitoring through a compliance reporting program, respectively. BIO-MM#5 would require the project biologist to establish vehicle speed limits within the project footprint; restrict vehicle traffic to established roads, construction areas, and other permissible areas; and direct that routes be marked to prevent off-road traffic prior to ground-disturbing activity. BIO-MM#13 would allow the Project Biologist to halt work if any woodrats or ringtails are encountered that could be injured or killed by project activities. BIO-MM#65 and BIO-MM#66 would avoid direct impacts on individual ringtails and dusky-footed woodrats, respectively, by requiring pre-construction surveys for and avoidance of ringtail dens and dusky-footed woodrat stick houses where modeled habitat overlaps with the project footprint. Compensatory mitigation for riparian habitat (BIO-MM#72) would benefit these species because they both occur in riparian plant communities with dense understory. These measures are expected to avoid direct and indirect impacts on ringtail and San Francisco dusky-footed woodrat habitat and direct impacts on individuals and to compensate for habitat loss. Therefore, the impact would be less than significant.

Impact BIO#30: Loss of Roost Sites for and Direct Mortality or Disturbance of Special-Status Bats

The Authority would implement mitigation measures to reduce the impacts on special-status bats. BIO-MM#3 would require the project biologist to establish ESAs and nondisturbance zones (including WEF, where applicable) that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#4 and BIO-MM#6 would require the project biologist to monitor construction activities for compliance with avoidance and minimization measures and established ESAs and nondisturbance zones, and to document such monitoring through a compliance reporting program, respectively. BIO-MM#5 would require the project biologist to establish vehicle speed limits within the project footprint; restrict vehicle traffic to establish roads, construction areas, and other permissible areas; and direct that routes be marked to prevent off-road traffic prior to ground-disturbing activity. BIO-MM#13 would allow the Project Biologist to halt work if any special-status bats are encountered that could be injured or killed or whose roosts could be disrupted by project activities. BIO-MM#67 to BIO-MM#69 would avoid direct impacts on individual special-status bats by requiring pre-construction surveys for and avoidance, exclusion, or relocation of active hibernacula, maternity roosts, or nurseries in or within 500 feet of the project footprint. These measures are expected to minimize or avoid direct impacts on individuals. Therefore, the impact would be less than significant.

Impact BIO#31: Intermittent Disturbance and Degradation of Habitat for Special-Status Plants during Operations

The Authority would implement BIO-MM#70 to reduce the impact on special-status plant habitat during operations. This measure would require the Authority to prepare an annual VCP to address vegetation removal for maintaining clear areas around facilities and controlling invasive weeds during the operational phase and would limit herbicide use to products approved by Caltrans. By establishing controls on the types of herbicides used for vegetation management and defining the situations in which herbicides are and are not an appropriate control method, VCPs are expected to minimize direct and indirect impacts on special-status plant habitat from herbicide drift. Combined with the intermittent and widely dispersed nature of effects from inspection and maintenance activities, the impact on plant habitat would be less than significant.

Impact BIO#32: Intermittent Disturbance or Degradation of Habitat for Special-Status Wildlife during Operations

The Authority would implement BIO-MM#70 to reduce the impact on special-status wildlife habitat during operations. This measure would require the Authority to prepare an annual VCP to address vegetation removal for maintaining clear areas around facilities and controlling invasive weeds during the operational phase and would limit herbicide use to products approved by Caltrans. By establishing controls on the types of herbicides used for vegetation management and defining the situations in which herbicides are and are not an appropriate control method, VCPs are expected to minimize direct and indirect impacts on special-status wildlife habitat from herbicide drift. Combined with the intermittent and widely dispersed nature of effects from inspection and maintenance activities, the impact would be less than significant.

Impact BIO#34: Removal or Degradation of Habitat for and Disturbance of Waterfowl and Shorebirds

The Authority would implement mitigation measures to reduce the impacts on waterfowl and shorebirds. BIO-MM#1 would involve preparation of an RRP that would identify and describe procedures for restoring temporarily disturbed habitat to its former state. BIO-MM#2 would require the project biologist to develop a WCP prior to ground-disturbing activity to minimize and avoid the spread of invasive weeds into the project footprint and adjacent areas. BIO-MM#3 would require the project biologist to establish ESAs and nondisturbance zones (including WEF, where applicable) that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#4 and BIO-MM#6 would require the project biologist to monitor construction activities for compliance with avoidance and minimization measures and established ESAs and nondisturbance zones and to document such monitoring through a compliance reporting program, respectively. BIO-MM#5 would require the project biologist to establish vehicle speed limits within the project footprint; restrict vehicle traffic to established roads, construction areas, and other permissible areas; and direct that routes be marked to prevent off-road traffic prior to ground-disturbing activity. BIO-MM#58 identifies minimum compensatory mitigation requirements for waterfowl and shorebird habitat that would be included in CMPs developed under BIO-MM#10. These measures would minimize direct and indirect impacts on waterfowl and shorebird individuals and habitat and would compensate for habitat loss. Therefore, the impact would be less than significant.

Impact BIO#35: Permanent Conversion or Degradation of Special-Status Plant Communities

The Authority would implement mitigation measures to reduce the impacts on special-status plant communities. BIO-MM#1 would involve preparation of an RRP that would identify and describe procedures for restoring temporarily disturbed habitat to its former state. BIO-MM#2 would require the project biologist to develop a WCP prior to ground-disturbing activity to minimize and avoid the spread of invasive weeds into the project footprint and adjacent areas. BIO-MM#3 would require the project biologist to establish ESAs and nondisturbance zones (including WEF, where applicable) that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#4 and BIO-MM#6 would require the project biologist to monitor construction activities for compliance with avoidance and minimization measures and established ESAs and nondisturbance zones and to document such monitoring through a compliance reporting program, respectively. BIO-MM#5 would require the project biologist to establish vehicle speed limits within the project footprint; restrict vehicle traffic to established roads, construction areas, and other permissible areas; and direct that routes be marked to prevent off-road traffic prior to ground-disturbing activity. BIO-MM#7 would require the project biologist to conduct presence/absence surveys for special-status plant species and special-status plant communities within the project footprint to be avoided during construction prior to any ground-disturbing activity. HYD-MM#1 would reduce groundwater flows associated with tunnel construction. BIO-MM#9 would involve preparation and implementation of a groundwater AMMP that would require monitoring of

groundwater-dependent surface water resources (including those providing habitat for special-status plant communities) within the tunnel groundwater study area, providing supplemental water where needed, and remediating or compensating for any adverse effects identified during monitoring. Under BIO-MM#71, the RRP would require contractors to begin revegetation of temporarily affected riparian areas within 90 days of construction completion. BIO-MM#72 identifies minimum compensatory mitigation requirements for riparian habitat. These measures are expected to minimize temporary impacts and compensate for permanent impacts on special-status plant communities by restoring, preserving, creating, or enhancing riparian communities of equivalent or greater ecological integrity than those affected. Therefore, the impact would be less than significant.

Impact BIO#36: Intermittent Disturbance or Degradation of Special-Status Plant Communities during Operations

The Authority would implement BIO-MM#70 to reduce the impact on special-status plant communities during operations. This measure would require the Authority to prepare an annual VCP to address vegetation removal for maintaining clear areas around facilities and controlling invasive weeds during the operational phase and would limit herbicide use to products approved by Caltrans. By establishing controls on the types of herbicides used for vegetation management and defining the situations in which herbicides are and are not an appropriate control method, VCPs are expected to minimize direct and indirect impacts on special-status plant communities from herbicide drift. Combined with the intermittent and widely dispersed nature of effects from inspection and maintenance activities, the impact would be less than significant.

Impact BIO#37: Permanent Conversion or Degradation of Aquatic Resources Considered Jurisdictional under Clean Water Act Section 404 or by the State

The Authority would implement mitigation measures to reduce the impacts on aquatic resources. BIO-MM#1 would involve preparation of an RRP that would identify and describe procedures for restoring temporarily disturbed habitat to its former state. BIO-MM#2 would require the project biologist to develop a WCP prior to ground-disturbing activity to minimize and avoid the spread of invasive weeds into the project footprint and adjacent areas. BIO-MM#3 would require the project biologist to establish ESAs and nondisturbance zones (including WEF, where applicable) that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#4 and BIO-MM#6 would require the project biologist to monitor construction activities for compliance with avoidance and minimization measures and established ESAs and nondisturbance zones and to document such monitoring through a compliance reporting program, respectively. BIO-MM#5 would require the project biologist to establish vehicle speed limits within the project footprint; restrict vehicle traffic to established roads, construction areas, and other permissible areas; and direct that routes be marked to prevent off-road traffic prior to ground-disturbing activity. BIO-MM#9 would involve preparation and implementation of a groundwater AMMP that would require monitoring of groundwater-dependent surface water resources within the tunnel groundwater study area, providing supplemental water where needed, and remediating or compensating for any adverse effects identified during monitoring. Under BIO-MM#71, the RRP would require contractors to begin revegetation of temporarily affected riparian areas within 90 days of construction completion. BIO-MM#72 identifies minimum compensatory mitigation requirements for riparian habitat. BIO-MM#73 would minimize temporary impacts on aquatic resources by requiring contractors to begin restoration of temporarily disturbed features within 90 days of completing construction. BIO-MM#25 would require the Authority to prepare a dewatering plan that incorporates measures to minimize turbidity and siltation of downstream waters. BIO-MM#74 requires preparation and implementation of a CMP for impacts on aquatic resources under CWA Section 404 jurisdiction. These measures are expected to avoid or minimize temporary impacts and compensate for permanent impacts on aquatic resources. Therefore, the impact would be less than significant.

Impact BIO#38: Permanent Conversion or Degradation of Resources Regulated under California Fish and Game Code Section 1600 et seq.

The Authority would implement mitigation measures to reduce the impacts on fish and wildlife resources protected under Section 1600 et seq. BIO-MM#1 would involve preparation of an RRP that would identify and describe procedures for restoring temporarily disturbed habitat to its former state. BIO-MM#2 would require the project biologist to develop a WCP prior to ground-disturbing activity to minimize and avoid the spread of invasive weeds into the project footprint and adjacent areas. BIO-MM#3 would require the project biologist to establish ESAs and nondisturbance zones (including WEF, where applicable) that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#4 and BIO-MM#6 would require the project biologist to monitor construction activities for compliance with avoidance and minimization measures and established ESAs and nondisturbance zones and to document such monitoring through a compliance reporting program, respectively. BIO-MM#5 would require the project biologist to establish vehicle speed limits within the project footprint; restrict vehicle traffic to established roads, construction areas, and other permissible areas; and direct that routes be marked to prevent off-road traffic prior to ground-disturbing activity. BIO-MM#9 would involve preparation and implementation of a groundwater AMMP that would require monitoring of groundwater-dependent surface water resources within the tunnel groundwater study area, providing supplemental water where needed, and remediating or compensating for any adverse effects identified during monitoring. Under BIO-MM#71, the RRP would require contractors to begin revegetation of temporarily affected riparian areas within 90 days of construction completion. BIO-MM#72 identifies minimum compensatory mitigation requirements for riparian habitat. BIO-MM#73 would minimize temporary impacts on aquatic resources by requiring contractors to begin restoration of temporarily disturbed features within 90 days of completing construction. BIO-MM#25 would require the Authority to prepare a dewatering plan that incorporates measures to minimize turbidity and siltation of downstream waters. BIO-MM#74 requires preparation and implementation of a CMP for impacts on aquatic resources under CWA Section 404 jurisdiction, which would also benefit fish and wildlife resources under Cal. Fish and Game Code Section 1600 et seq. where they overlap with CWA Section 404 resources and waters of the state. These measures are expected to minimize temporary impacts and compensate for permanent impacts on aquatic and other related resources. Therefore, the impact would be less than significant.

Impact BIO#39: Intermittent Disturbance or Degradation of Aquatic Resources during Operations

The Authority would implement BIO-MM#70 to reduce the impact on aquatic resources during operations. This measure would require the Authority to prepare an annual VCP to address vegetation removal for maintaining clear areas around facilities and controlling invasive weeds during the operational phase and would limit herbicide use to products approved by Caltrans. By establishing controls on the types of herbicides used for vegetation management and defining the situations in which herbicides are and are not an appropriate control method, VCPs are expected to minimize direct and indirect impacts on aquatic resources from herbicide drift. Combined with the intermittent and widely dispersed nature of effects from inspection and maintenance activities, the impact would be less than significant.

Impact BIO#40: Removal or Mortality of Trees Protected under Municipal Tree Ordinances

The Authority would implement mitigation measures to reduce the impacts on protected trees. BIO-MM#75 would avoid or minimize direct and indirect impacts on protected trees during construction by requiring the identification and avoidance of protected trees in and adjacent to the project footprint prior to construction. This measure would also compensate for removal of protected trees by requiring the Authority to prepare and implement a transplanted tree monitoring and maintenance plan. BIO-MM#9 would involve preparation and implementation of a groundwater AMMP that would require monitoring of groundwater-dependent surface water resources within the tunnel groundwater study area, providing supplemental water where needed,

and remediating or compensating for any adverse effects identified during monitoring. These measures would minimize and compensate for impacts on protected trees. Therefore, the impact would be less than significant.

Impact BIO#42: Temporary Disruption of Wildlife Movement

The Authority would implement mitigation measures to reduce temporary impacts on wildlife movement during construction. BIO-MM#3 would require the project biologist to establish ESAs and nondisturbance zones (including WEF, where applicable) that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#25 would require the Project Biologist to conduct pre-activity surveys for and relocate (consistent with regulatory authorizations) any special-status wildlife occurring in waterbodies affected by dewatering or water diversion activities. BIO-MM#76would require the Authority to avoid placing temporary fencing within known wildlife corridors in portions of the project footprint where the tracks are elevated and would require the design to consider methods that would facilitate wildlife use of crossings. It would also minimize the effects of noise, light, and vibration on individuals moving through or near the project footprint. This measure would minimize direct and indirect impacts on wildlife moving near or across the project footprint during construction. Therefore, the impact would be less than significant.

Impact BIO#43: Permanent Impacts on Wildlife Movement

The Authority would implement mitigation measures to reduce permanent impacts on wildlife movement. BIO-MM#78 would require the Authority to create dedicated wildlife crossing structures in portions of the project footprint where wildlife movement would be significantly reduced. BIO-MM#77 would also provide for extended viaducts for wildlife movement and dedicated wildlife underpasses that meet design specifications for the species affected. BIO-MM#79 would partially compensate for permanent impacts on wildlife movement by requiring the Authority to protect lands in perpetuity within the Santa Cruz to Gabilan Wildlife Linkage or Soap Lake floodplain. These measures are expected to minimize and compensate for direct and indirect impacts on wildlife corridor connectivity and individuals moving near or across the rail alignment. Therefore, the impact would be less than significant.

Impact BIO#44: Intermittent Noise Disturbance of Wildlife Using Corridors during Operations

The Authority would implement BIO-MM#58 to compensate for noise impacts on shorebirds and wintering waterbirds, BIO-MM#80 to avoid and minimize impacts from noise, or some combination of the two measures if necessary. These measures would avoid or minimize noise impacts on habitat or provide for the preservation and enhancement of waterbird habitat in the GEA and UPR IBAs to compensate for the reduction in caloric uptake experienced in habitat close to the railroad. These measures are expected to reduce or eliminate effects on wildlife using corridors. Therefore, the impact would be less than significant.

Impact BIO#46: Intermittent Visual Disturbance of Wildlife Using Corridors during Operations

The Authority would implement mitigation measures to compensate for visual disturbance impacts on wintering waterbirds and some species of nesting raptors. BIO-MM#58 would provide for the preservation and enhancement of waterbird habitat in the GEA and UPR IBAs to compensate for the reduction in caloric uptake experienced in habitat close to the railroad, although this measure would not eliminate disturbance of wintering waterbirds in the GEA or UPR IBAs. BIO-MM#80 would require construction of a noise barrier in the UPR EBA and an enclosure in the GEA IBA. These measures are expected to reduce or eliminate effects on wildlife using corridors. Therefore, the impact would be less than significant.

Impact BIO#48: Mortality Resulting from Train Strike during Operations

The Authority would implement mitigation measures to reduce mortality of wildlife using corridors. BIO-MM#77 would require implementation of an array of design features pertaining to wildlife

crossings to minimize mortality of terrestrial wildlife. BIO-MM#80 would require the implementation of a noise barrier within the UPR IBA and an enclosure within the GEA IBA. These measures would substantially reduce the potential for train strike within the UPR IBA, and would eliminate the risk of train strike within the GEA IBA. BIO-MM#81 would require the installation of a barrier (e.g., flashing, fine-mesh fencing, slats, or other feature buried at least 12 inches below-ground and 12 inches aboveground) along portions of the permanent security fencing adjacent to natural habitats to prevent reptiles, amphibians, and mammals from moving through or underneath the fencing to access the right-of-way where they could be killed by moving trains. BIO-MM#82 would implement features to minimize or avoid mortality of birds and bats. BIO-MM#83 would involve carcass removal from the guideway to reduce risk of attracting eagles and condors. These measures are expected to minimize or avoid direct impacts on wildlife movement during project operations. Therefore, the impact would be less than significant.

Impact BIO#49: Injury and Mortality Resulting from Power Line Strike during Operations

The Authority would implement mitigation measures to reduce mortality of wildlife using corridors. BIO-MM#80 would require installation of an enclosure in the GEA IBA and installation of noise barriers in the UPR IBA to reduce or avoid the potential for power line strike during operations. BIO-MM#82 would also specify design features for the OCS that would minimize or avoid power line strike during operations. These measures are expected to minimize direct impacts on wildlife movement during project operations. Therefore, the impact would be less than significant.

Impact BIO#51: Permanent Conversion or Degradation of Conservation Areas

The Authority would implement BIO-MM#84, which would provide compensatory habitat to replace the permanent loss of habitat commensurate with the land cover type and ecological function of the lands lost. This measure would require the Authority to consult with the USFWS, CDFW, and other organizations that hold conservation easements affected by the project when developing the CMP under BIO-MM#10. BIO-MM#9 would involve preparation and implementation of a groundwater AMMP that would require monitoring of groundwater-dependent surface water resources within the tunnel groundwater study area, providing supplemental water where needed, and remediating or compensating for any adverse effects identified during monitoring. In addition, per BIO-MM#84, the Authority would compensate affected organizations for any temporal complications resulting from the permanent loss of a conservation area. These measures would offset the loss of habitat and ecological function in conservation areas, including the conversion of lands to HSR track and systems. Therefore, the impact would be less than significant.

Impact BIO#53: Conflict with Santa Clara Valley Habitat Plan

The Authority would implement BIO-MM#85 to reduce impacts on the SCVHP. This measure would require the Authority to partner with the SCVHA to identify and conserve the additional acres of central California sycamore woodland necessary to meet the goals of the SCVHP when developing the CMP under BIO-MM#10 and to address the impacts on the Pacheco Creek Reserve. These measures are expected to compensate for the potential conflict at the Pacheco Creek Reserve by replacing habitat lost at the reserve with habitat in an appropriate similarly sized patch size. Therefore, the impact would be less than significant.

3.7.11 Preliminary Federal Endangered Species Act Findings

In addition to various technical reports prepared for the project, a BA will be prepared and submitted to the USFWS and NMFS for review in early 2020. The BA will evaluate the potential adverse effects of the project (i.e., proposed action) on species listed as endangered or threatened under FESA, as well as potential effects on designated critical habitat.

Based on a preliminary evaluation of potential effects of the proposed action prior to implementation of IAMFs and mitigation measures, the Authority has determined that the project could have effects on species and critical habitat as shown in Table 3.7-28.

Table 3.7-28 Summary of Effects for Federally Listed Species and their Critical Habitat

Scientific Name Common Name	Federal Status	Species Determination	Critical Habitat Determination
Plants			
Castilleja affinis var. *neglecta* Tiburon paintbrush	FE	May affect, and is likely to adversely affect	N/A
Ceanothus ferrisiae Coyote ceanothus	FE	May affect, and is likely to adversely affect	N/A
Chloropyron palmatum Palmate-bracted bird's-beak	FE	May affect, and is likely to adversely affect	N/A
Dudleya abramsii ssp. setchellii Santa Clara Valley dudleya	FE	May affect, and is likely to adversely affect	N/A
Euphorbia hooveri Hoover's spurge	FT	May affect, and is likely to adversely affect	No Effect
Neostapfia colusana Colusa grass	FT	May affect, and is likely to adversely affect	No Effect
Orcuttia inaequalis San Joaquin Orcutt grass	FT	May affect, and is not likely to adversely affect	No Effect
Orcuttia pilosa Hairy Orcutt grass	FE	May affect, and is not likely to adversely affect	No Effect
Streptanthus albidus ssp. albidus Metcalf Canyon jewelflower	FE	May affect, and is likely to adversely affect	N/A
Tuctoria greenei Greene's tuctoria	FE	May affect, and is not likely to adversely affect	No Effect
Invertebrates			
Euphydryas editha bayensis Bay checkerspot butterfly	FT	May affect, and is likely to adversely affect	Likely to Adversely Affect
Branchinecta conservatio Conservancy fairy shrimp	FE	May affect, and is likely to adversely affect	No Effect
Branchinecta longiantenna Longhorn fairy shrimp	FE	May affect, and is likely to adversely affect	No Effect
Branchinecta lynchi Vernal pool fairy shrimp	FT	May affect, and is likely to adversely affect	No Effect
Lepidurus packardi Vernal pool tadpole shrimp	FT	May affect, and is likely to adversely affect	No Effect
Desmocerus californicus dimorphus Valley elderberry longhorn beetle	FT	May affect, and is likely to adversely affect	N/A

Scientific Name Common Name	Federal Status	Species Determination	Critical Habitat Determination
Fish			
Oncorhynchus mykiss Steelhead—central California coast DPS	FT	May affect, and is likely to adversely affect	Likely to Adversely Affect
Oncorhynchus mykiss Steelhead—south-central California coast DPS	FT	May affect, and is likely to adversely affect	Likely to Adversely Affect
Oncorhynchus mykiss Steelhead—California Central Valley DPS	FT	May affect, and is not likely to adversely affect	No Effect
Amphibians			
Rana draytonii California red-legged frog	FT	May affect, and is likely to adversely affect	Likely to Adversely Affect
Ambystoma californiense California tiger salamander	FT	May affect, and is likely to adversely affect	Likely to Adversely Affect
Reptiles			
Gambelia sila Blunt-nosed leopard lizard[1]	FE	May affect, and is likely to adversely affect	N/A
Thamnophis gigas Giant garter snake	FT	May affect, and is likely to adversely affect	N/A
Birds			
Gymnogyps californianus California condor[1]	FE	May affect, and is likely to adversely affect	No Effect
Vireo bellii pusillus Least Bell's vireo	FE	May affect, and is likely to adversely affect	No Effect
Mammals			
Dipodomys nitratoides exilis Fresno kangaroo rat	FE	May affect, and is likely to adversely affect	No Effect
Vulpes macrotis mutica San Joaquin kit fox	FE	May affect, and is likely to adversely affect	N/A

DPS = distinct population segment
FE = federally endangered
FT = federally threatened
[1] California Fish and Game Code Fully Protected Species

In light of the finding that the project may affect, and is likely to adversely affect federally listed species, the Authority will request initiation of formal consultation with the USFWS in accordance with Section 7 of FESA, which could result in an Incidental Take Statement for the following species: Colusa grass, Coyote ceanothus, Hoover's spurge, Metcalf Canyon jewelflower, palmate-bracted bird's-beak, Santa Clara Valley dudleya, Tiburon paintbrush (only on federal lands for this and the previous six plant species), Bay checkerspot butterfly, Conservancy fairy shrimp, longhorn fairy shrimp, vernal pool fairy shrimp, vernal pool tadpole shrimp, valley elderberry longhorn beetle, California red-legged frog, California tiger salamander, giant garter snake, least Bell's vireo, Fresno kangaroo rat, and San Joaquin kit fox. Although project impacts during construction and operations may remain likely to adversely affect blunt-nosed leopard lizard, the Authority has incorporated IAMFs into project design and would implement mitigation measures to completely avoid occupied habitat, or to wait until animals have moved outside an active work area before beginning construction in occupied habitat that cannot be avoided. With implementation of the conservation measures discussed in the BA, the Authority intends to request concurrence from the USFWS regarding the determination that the proposed action would have no effect on critical habitat for Hoover's spurge, Colusa grass, San Joaquin Orcutt grass, hairy Orcutt grass, Greene's tuctoria, Conservancy fairy shrimp, vernal pool fairy shrimp, vernal pool tadpole shrimp, valley elderberry longhorn beetle, California condor, and least Bell's vireo.

In light of the finding of may affect, and is likely to adversely affect, the Authority will request initiation of formal consultation with NMFS in accordance with Section 7 of FESA, which could result in an Incidental Take Statement for the central California coast and south central California coast steelhead distinct population segments. With implementation of the conservation measures discussed in the BA, the Authority intends to request concurrence from NMFS regarding the determination that the proposed action would have no effect on critical habitat for, and is not likely to adversely affect the California Central Valley steelhead distinct population segment.