

EXHIBIT A: DRAFT RECORD OF DECISION

California High-Speed Rail Authority

San Francisco to San Jose Project Section

Draft Record of Decision

August 2022



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.

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Acronyms and Abbreviations

Acronym	Definition
Authority	California High-Speed Rail Authority
BA	biological assessment
BAAQMD	Bay Area Air Quality Management District
BART	Bay Area Rapid Transit
Bay Area	San Francisco Bay Area
BMP	best management practice
BO	biological opinion
C.F.R.	Code of Federal Regulations
CAAQs	California ambient air quality standards
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CWA	Clean Water Act
DPS	distinct population segment
Draft EIR/EIS	<i>San Francisco to San Jose Project Section Draft Environmental Impact Report/Environmental Impact Statement</i>
EFH	essential fish habitat
EIR	environmental impact report
EIS	environmental impact statement
EIS Documents	Draft EIS, Supplemental Draft EIS, and Final EIS
FAA	Federal Aviation Administration
Fed. Reg.	<i>Federal Register</i>
FESA	federal Endangered Species Act
Final EIR/EIS	<i>San Francisco to San Jose Project Section Final Environmental Impact Report/Environmental Impact Statement</i>
FRA	Federal Railroad Administration
GHG	greenhouse gas
HSR	high-speed rail
IAMF	impact avoidance and minimization feature
LEDPA	least environmentally damaging practicable alternative
LMF	light maintenance facility
MMEP	Mitigation Monitoring and Enforcement Plan
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MTC	Metropolitan Transportation Commission

Acronym	Definition
NEPA	National Environmental Policy Act
NEPA/404/408 MOU	<i>Memorandum of Understanding—National Environmental Policy Act (42 U.S.C. 4321 et seq) and Clean Water Act Section 404 (33 U.S.C. 1344) and Rivers and Harbors Act Section 14 (33 U.S.C. 408)—Integration Process for the California High-Speed Train Program</i>
NEPA Assignment MOU	<i>Memorandum of Understanding between the Federal Railroad Administration and the State of California, Acting through its California State Transportation Agency and its California High-Speed Rail Authority, for the State of California's Participation in the Surface Transportation Project Delivery Program Pursuant to 23 U.S.C. 327</i>
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NO _x	nitrogen oxides
PAA	<i>Preliminary Alternatives Analysis Report for the San Francisco to San Jose Section</i>
PJD	Preliminary Jurisdictional Determination
PM _{2.5}	particulate matter 2.5 microns or less in diameter
PM ₁₀	particulate matter 10 microns or less in diameter
Project Section, or project	San Francisco to San Jose Project Section
Prop 1A	Proposition 1A, The Safe, Reliable, High-Speed Passenger Train Bond Act
Revised/Supplemental Draft EIR/EIS	<i>San Francisco to San Jose Project Section Revised Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement</i>
ROD	Record of Decision
RSA	resource study area
RSP Design Variant	Millbrae Station Reduced Site Plan Design Variant
SAA	<i>Supplemental Alternatives Analysis Report for the San Francisco to San Jose Section</i>
Section 106 PA	<i>First Amendment to the Programmatic Agreement among the Federal Railroad Administration, the Advisory Council on Historic Preservation, the California State Historic Preservation Officer, and the California High-Speed Rail Authority Regarding Compliance with Section 106 of the National Historic Preservation Act as it Pertains to the California High-Speed Train Project</i>
SFBAAB	San Francisco Bay Area Air Basin
SFO	San Francisco International Airport
STC	Salesforce Transit Center
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SJC	Norman Y. Mineta San Jose International Airport
SPRR	Southern Pacific Railroad
STB	Surface Transportation Board

Acronym	Definition
U.S.C.	United States Code
USDOT	U.S. Department of Transportation
USACE	U.S. Army Corps of Engineers
USEO	U.S. Presidential Executive Order
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service

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CALIFORNIA HIGH-SPEED RAIL AUTHORITY SAN FRANCISCO TO SAN JOSE PROJECT SECTION

DRAFT RECORD OF DECISION

APPROVAL OF ALTERNATIVE A BETWEEN 4TH AND KING STREET STATION IN SAN FRANCISCO AND SCOTT BOULEVARD IN SANTA CLARA

1 INTRODUCTION

This document is the California High-Speed Rail Authority's (Authority) Record of Decision (ROD), under the National Environmental Policy Act (NEPA), for the California High-Speed Rail (HSR) San Francisco to San Jose Project Section (Project Section, or project), which is part of the statewide HSR System. The Authority is the NEPA federal lead agency under what is commonly referred to as NEPA Assignment. More specifically, 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 United States Code (U.S.C.) Section 327 and a Memorandum of Understanding (MOU) effective July 23, 2019, and executed by the Federal Railroad Administration (FRA) and the State of California (NEPA Assignment MOU) (FRA and State of California 2019). The Authority is also the lead agency for state environmental reviews under the California Environmental Quality Act (CEQA).

This ROD approves the portion of Alternative A between the 4th and King Street Station in San Francisco and Scott Boulevard in Santa Clara (including modified Caltrain stations for HSR at the 4th and King Street and Millbrae Stations, the East Brisbane light maintenance facility [LMF], and associated project elements), as described in the *San Francisco to San Jose Project Section Final Environmental Impact Report (EIR)/Environmental Impact Statement (EIS)* (Final EIR/EIS) dated June 10, 2022. The portion of Alternative A from Scott Boulevard in Santa Clara to West Alma Avenue in San Jose (including the San Jose Diridon Station) has been approved by the Authority Board of Directors as part of the San Jose to Merced Project Section approvals, as described in that Project Section's final Record of Decision dated June 1, 2022. As set forth in this ROD, Alternative A best serves the Purpose and Need for this project and minimizes economic, social, and environmental impacts. It is therefore the Selected Alternative.

The Authority proposes to construct and operate the project after receiving the required approvals from the appropriate federal agencies. These agencies include the federal cooperating agencies—the U.S. Army Corps of Engineers (USACE) and the Surface Transportation Board (STB). Multiple other federal agencies that are not cooperating agencies have been involved in and have contributed to the environmental review including the FRA, U.S. Environmental Protection Agency (USEPA), the U.S. Fish and Wildlife Service (USFWS), the National Marine Fisheries Service (NMFS), and the Federal Aviation Administration (FAA). Refer to Table 1 for a list of major milestones related to compliance with NEPA and other federal environmental laws.

To comply with NEPA and CEQA, the Authority issued the *San Francisco to San Jose Project Section Draft Environmental Impact Report/Environmental Impact Statement* (Draft EIR/EIS) for the project on July 10, 2020, and the *San Francisco to San Jose Project Section Revised Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement* (Revised/Supplemental Draft EIR/EIS) on July 21, 2021, containing new biological resource analysis for monarch butterfly and analysis of a design variant for the Millbrae Station. Following public review of the Draft EIR/EIS and the Revised/Supplemental Draft EIR/EIS, the Authority considered and responded to public comments; revised the EIR/EIS to address public comments as appropriate; incorporated minor design refinements to further reduce environmental impacts and improve safety; and published the Final EIR/EIS on June 10, 2022. Consistent with 40 Code of

Federal Regulations (C.F.R.) Section 1506.2,¹ the Final EIR/EIS is one document that covers both state and federal environmental requirements. However, because this ROD contains only the decision of the Authority under its assigned responsibilities for NEPA, the documents are henceforth referred to in this ROD as the “Draft EIS,” “Supplemental Draft EIS,” and “Final EIS.” In making its decision, the Authority considered the information and analysis contained in the 2020 Draft EIS, the 2021 Supplemental Draft EIS, and the 2022 Final EIS (collectively, “EIS Documents”). The Authority also considered public and agency comments received on the EIS Documents. Table 1 summarizes major NEPA milestones and completion dates for the EIS Documents.

Table 1 Summary of Major Milestones for Compliance with Federal Environmental Laws

Milestone	Date
NOI published in <i>Federal Register</i> (rescinded in 2016)	December 29, 2008
Public Scoping Meetings (3)	January 2009
Public and Agency Meetings	September 2009–February 2016 ¹
NOI published in <i>Federal Register</i>	May 9, 2016
Public Scoping Meetings (3)	May 2016
Public and Agency Meetings	July 2016–August 2022 ²
SHPO concurrence with Section 106 Finding of Effect Report	May 18, 2020
USEPA and USACE Concurrence on the Preliminary Least Environmentally Damaging Practicable Alternative	June 26, 2020 (USEPA) June 29, 2020 (USACE)
NOA published and issuance of Draft EIS and Draft Section 4(f) Evaluation	July 10, 2020
Public Hearing on Draft EIS and Draft Section 4(f) Evaluation	August 19, 2020
NOA published and issuance of Supplemental Draft EIS	July 23, 2021
National Marine Fisheries Service Biological Opinion	March 18, 2022
U.S. Fish and Wildlife Service Biological Opinion	April 22, 2022
Publication of Draft General Conformity Determination	May 2, 2022
NOA published and issuance of Final EIS and Section 4(f) Evaluation	June 10, 2022
Section 106 MOA executed by Authority and SHPO	June 22, 2022
End of waiting period for Final EIS	July 11, 2022
FRA approval of Final General Conformity Determination	July 22, 2022

Authority = California High-Speed Rail Authority

EIS = Environmental Impact Statement

FRA = Federal Railroad Administration

MOA = Memorandum of Agreement

NEPA = National Environmental Policy Act

NOA = Notice of Availability

NOI = Notice of Intent

SHPO = California State Historic Preservation Officer

USACE = U.S. Army Corps of Engineers

USEPA = U.S. Environmental Protection Agency

¹ See Chapter 9, Table 9-1, in the Final EIS for certain organizational/individual meetings and dates held.

² See Chapter 9, Table 9-2, in the Final EIS for certain organizational/individual meetings and dates held.

¹ The Council on Environmental Quality (CEQ) issued new regulations, effective September 14, 2020, updating the NEPA implementing procedures at 40 C.F.R. Parts 1500–1508. However, because this project initiated the NEPA process before September 14, 2020, it is not subject to the new regulations. The Authority is relying on the regulations as they existed prior to September 14, 2020. Therefore, all citations to CEQ regulations in this document refer to the 1978 regulations, pursuant to 40 C.F.R. Section 1506.13 (2020) and the preamble at 85 *Federal Register* 43340.

The San Francisco to San Jose Project Section will connect to the already approved portions of the HSR system between the southern San Francisco Bay Area (Bay Area) and Los Angeles County. This ROD outlines all relevant information used by the Authority, as the NEPA lead agency, for approval of the Selected Alternative (the portion of Alternative A between the 4th and King Street Station in San Francisco and Scott Boulevard in Santa Clara, with modified Caltrain stations for HSR at the 4th and King Street and Millbrae Stations, the East Brisbane LMF, and associated project elements). The portion of Alternative A from Scott Boulevard in Santa Clara to West Alma Avenue in San Jose (including the San Jose Diridon Station) has been approved by the Authority Board of Directors as part of the San Jose to Merced Project Section in April 2022, and accordingly it is not included in this ROD. As described further in Section 4.2, Alternatives Carried Forward for Study in the EIS Documents, of this ROD, the Authority also considered Alternative B, with modified Caltrain stations for HSR at the 4th and King Street and Millbrae Stations, the West Brisbane LMF, and additional passing tracks. The Authority also considered the Millbrae Station Reduced Site Plan Design Variant (RSP Design Variant), which could apply to either Alternative A or Alternative B.

As depicted in Figure 1 and described in further detail in Chapter 2, Alternatives, of the Final EIS, the Selected Alternative extends approximately 43 miles from 4th and King Street Station in San Francisco to Scott Boulevard in Santa Clara. The Selected Alternative consists of a predominantly two-track blended system including modifications to approximately 14.5 miles of existing Caltrain track and platform modifications to 6 of the existing 25 Caltrain stations between San Francisco and Santa Clara to accommodate HSR trains passing through or stopping at the stations. HSR service would be provided at two existing Caltrain stations proposed to be shared by HSR and Caltrain—4th and King Street and Millbrae—which would require more extensive modifications to tracks, platforms, and station facilities to accommodate HSR trains and additional passenger services. The Selected Alternative also includes an approximately 100-acre East Brisbane LMF, which would provide storage capacity for trains and accommodate light maintenance activities. More detail on the San Francisco to San Jose Project Section is provided in Chapter 2 of the Final EIS.

In making its decision, the Authority considered the information and analysis contained in the EIS Documents and the associated administrative record and input received from the public, tribes, and other agencies.

The Authority has prepared this ROD in accordance with the NEPA Assignment MOU dated July 23, 2019; the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 C.F.R. §§ 1505.2 and 1506.10), and FRA's Procedures for Considering Environmental Impacts (64 *Federal Register* [Fed. Reg.] 28545, May 26, 1999), as modified by 78 Fed. Reg. 2713 (January 14, 2013).

Specifically, this ROD:

- Provides background on the NEPA process leading to the Final EIS, including a summary of public involvement and agency coordination
- States and reaffirms the project's Purpose and Need
- Summarizes the process that led to the development of the alternatives for study in the Draft EIS, Supplemental Draft EIS, and Final EIS
- Discusses agency roles and responsibilities
- Identifies the project alternatives considered in the EIS Documents
- Identifies Alternative A (with modified Caltrain stations for HSR at the 4th and King Street and Millbrae Stations, the East Brisbane LMF, and associated project elements) as the Selected Alternative
- Identifies the environmentally preferable alternative
- Summarizes environmental benefits and adverse effects of the Selected Alternative

- Discusses and makes determinations required under other relevant laws and guidance, including:
 - Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA) (54 U.S.C. §§ 306101–307106 et seq.)
 - Section 4(f) of the Department of Transportation Act of 1966 (49 U.S.C. § 303)
 - Section 7 of the Endangered Species Act of 1973 (16 U.S.C. §§ 1531–1544)
 - Section 404 of the Clean Water Act (CWA) (33 U.S.C. §§ 1251–1387)
 - U.S. Presidential Executive Order (USEO) 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, February 11, 1994)
 - USEO 11990 (Protection of Wetlands, May 24, 1977)
 - USEO 11988 (Floodplain Management, May 24, 1977)
 - FRA’s General Conformity Determination pursuant to the Clean Air Act (42 U.S.C. §§ 7401–7671q)
- Summarizes the comments received on the Final EIS and responds to substantive comments that have not been previously addressed
- Imposes impact avoidance and minimization features (IAMF) and mitigation measures that will avoid, minimize, and mitigate environmental harm and sets forth a binding monitoring and enforcement program for all such features and measures
- Presents the Authority’s decision, determinations, and findings on the proposed project and identifies and discusses the factors that were balanced by the Authority in making its decision
- Summarizes the status of compliance with permitting and other environmental requirements

The ROD also includes the following appendices:

- Appendix A: Final General Conformity Determination, July 22, 2022
- Appendix B: U.S. Fish and Wildlife Service Biological Opinion, April 22, 2022
- Appendix C: National Marine Fisheries Service Biological Opinion, March 18, 2022
- Appendix D: Mitigation Monitoring and Enforcement Plan
- Appendix E: State Historic Preservation Officer Section 106 Concurrence Letter, May 18, 2020, and Memorandum of Agreement, June 22, 2022
- Appendix F: U.S. Army Corps of Engineers LEDPA Concurrence Letter, June 29, 2020, and U.S. Environmental Protection Agency LEDPA Concurrence Letter, June 26, 2020
- Appendix G: Comments Received after Publication of the Final EIS
- Appendix H: Errata



HSR = high-speed rail

Figure 1 Selected Alternative for the San Francisco to San Jose Project Section

1.1 California High-Speed Rail System

The Authority is responsible for planning, designing, constructing, and operating the California HSR System. Its state statutory mandate is to develop an HSR system that coordinates with the state's existing transportation network, which includes intercity rail and bus lines, regional commuter rail lines, urban rail and bus transit lines, highways, and airports.

The California HSR System would provide intercity, high-speed service on more than 800 miles of track throughout California, connecting the major population centers of Sacramento, the San Francisco Bay Area, the southern Central Valley, Los Angeles, the Inland Empire, Orange County, and San Diego, as shown in Figure 2. The Authority and FRA prepared two programmatic (Tier 1) EIR/EIS documents to select preferred alignments and station locations to advance for project-level analysis in Tier 2 EIR/EISs. See Chapter 1, Project Purpose, Need, and Objectives, of the Final EIS for a detailed description of the HSR system and the history of Tier 1 documents. The HSR system would use state-of-the-art, electrically powered, high-speed, steel-wheel-on-steel-rail technology, including contemporary safety, signaling, and automatic train-control systems that would incorporate positive train control infrastructure and be compliant with the requirements of 49 C.F.R. Part 236 Subpart I, with trains capable of operating up to 220 miles per hour in HSR project sections that are fully grade separated and on a dedicated guideway alignment.

The Authority plans two phases of California HSR System development. The California High-Speed Rail Program 2022 Business Plan (Authority 2022) describes in detail how the California HSR System would be implemented and recognizes current budgetary and funding realities. The California HSR System Phase 1, as approved through Tier 1 decisions, has been divided into eight individual sections for site-specific, Tier 2 analysis. The Authority and FRA defined HSR project sections such that they would have independent utility or independent significance (i.e., be usable even if later sections of the HSR system are not completed). As of August 2022, the following project sections are under construction:

- Merced to Fresno
- Fresno to Bakersfield

The Tier 2 environmental reviews (Final EIR/EIS and ROD) have been completed for the following project sections:

- Bakersfield to Palmdale (ROD issued September 2021)
- Burbank to Los Angeles (ROD issued March 2022)
- San Jose to Merced (ROD issued June 2022)



ARTIC = Anaheim Regional Transportation Intermodal Center; HSR = high-speed rail; SFO = San Francisco International Airport

Figure 2 Statewide California High Speed Rail System

1.2 San Francisco to San Jose Project Section

With the completion of the statewide Tier 1 programmatic environmental review of the California HSR system in 2005, the Authority and FRA, as joint lead agencies for NEPA, commenced the Tier 2 environmental review process for the project in late 2008. The programmatic Tier 1 decisions established the broad framework for the HSR system that serves as the foundation for the Tier 2 environmental review of individual projects. In 2008, the Authority and FRA selected a Pacheco Pass connection between the Bay Area and the Central Valley, with corridors and station locations, for further examination in Tier 2 environmental reviews (Authority and FRA 2008). Between San Francisco and San Jose, the Authority and FRA advanced shared HSR and Caltrain use of the Caltrain corridor. The station locations advanced for Tier 2 study included a station in downtown San Francisco, a San Francisco International Airport (SFO) station at Millbrae, a potential mid-Peninsula station in either Redwood City or Palo Alto, and a station at the San Jose Diridon Station.

The FRA began the Tier 2 environmental review process for the San Francisco to San Jose Project Section by publishing a Notice of Intent (NOI) on December 29, 2008. The Authority held scoping meetings for a fully grade-separated four-track system in January 2009. The proposed four-track system generated concerns from communities along the Caltrain corridor because of the perceived magnitude of impacts on environmental and community resources. In response to these concerns, the Authority and FRA suspended further work on the Draft EIS in mid-2011 so that they could consider the potential to blend HSR and Caltrain operations within a smaller project footprint. In May 2016, the FRA rescinded the prior 2008 NOI and issued a new NOI to evaluate a predominantly two-track blended system for the Project Section. The Authority reinitiated scoping for the blended system in 2016, and continued alternatives refinement from 2016 to 2021. During the development of the Draft EIS, between 2016 and 2020, input was solicited from the public, stakeholders, and agencies on the development and refinement of feasible and practicable alternatives to carry forward for environmental review and evaluation in the Draft EIS. The San Francisco to San Jose Project Section Draft EIS, Supplemental Draft EIS, and Final EIS analyzed the environmental impacts and benefits of the project in the more geographically limited area from the 4th and King Street Station in San Francisco to Diridon Station in San Jose and was based upon more detailed project planning and engineering. The Tier 2 analysis therefore builds on the earlier decisions and Tier 1 program EISs and provides more site-specific and detailed analysis.

As detailed in Chapter 9, Public and Agency Involvement, of the Final EIS, the Authority and FRA held more than 500 meetings, briefings, and conversations to date with community stakeholders, businesses, local agencies, and elected officials to gather, confirm, and understand key community concerns so that these concerns were incorporated both into the development of alternatives and during the environmental review process. These meetings were advertised in Mandarin, Vietnamese, Spanish, Tagalog, and English; materials were available in these languages on the Authority's website; and interpreters were available at the meetings.

At its September 17, 2019, meeting, the Authority Board of Directors concurred with Authority staff that Alternative A was the Authority's Preferred Alternative for the San Francisco to San Jose Project Section. Resolution #HSRA 19-08 can be found on the Authority's website (<https://hsr.ca.gov/about/board/resolutions.aspx>). This identification was based on balancing the beneficial and adverse impacts of the project alternatives on the natural environment and community resources in the context of CEQA, NEPA, stakeholder input, and feasibility considerations. The Authority worked closely with federal, state, and regional agencies to meet regulatory requirements by refining the Selected Alternative to avoid and minimize impacts and, where necessary, to reach agreement on mitigation measures for impacts that cannot be avoided.

The Draft EIS was released on July 10, 2020, for an initial 45-day public comment period that closed on August 24, 2020. On July 31, 2020, the Authority notified USEPA that the review and comment period was being extended to end on September 9, 2020, and USEPA published the revised notice in the Federal Register on August 7, 2020. The Authority held a virtual public

hearing on August 19, 2020, to receive oral testimony on the project and the Draft EIS. The traditional in-person format of the public hearing was changed to a virtual public hearing held online and via telephone to comply with the Governor of California's directives and to protect public health during the COVID-19 pandemic. The Draft EIS presented the Purpose and Need for the project; a reasonable range of alternatives for the rail alignment, station sites, and maintenance facilities; the existing setting; effects (both beneficial and adverse) from construction and operation of the alternatives; and project design features and mitigation measures to avoid, reduce, or mitigate adverse environmental effects.

Following public review of the Draft EIS, the Authority published the Supplemental Draft EIS on July 23, 2021. The Supplemental Draft EIS contained a new biological resource analysis for monarch butterfly and an analysis of a design variant for the Millbrae Station. The Supplemental Draft EIS was available for a 45-day public review period that ended on September 8, 2021.

On June 10, 2022, the Authority published the Final EIS.

The Authority received 151 comment submissions on the Draft EIS and 25 comment submissions on the Supplemental Draft EIS. The Authority considered the information presented in the comments received, and the Final EIS includes responses to all substantive comments on the Draft EIS and Supplemental Draft EIS. The Final EIS also includes minor design refinements to the project alternatives since publication of the Draft EIS to respond in part to concerns raised by stakeholders.

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2 AGENCY ROLES AND RESPONSIBILITIES

The Authority is the NEPA lead agency, pursuant to the NEPA Assignment MOU. The STB and the USACE are NEPA cooperating agencies. Multiple other federal agencies that are not cooperating agencies have been involved with and contributed to the environmental review, including the FRA, USEPA, USFWS, NMFS, and FAA. The specific roles and responsibilities of the federal agencies involved in the San Francisco to San Jose Project Section including lead, cooperating, and permitting agencies, are further described below.

2.1 Federal Railroad Administration

The FRA's responsibilities for environmental review, consultation, and other actions required by applicable federal environmental laws, including NEPA, for the proposed project are being carried out by the Authority, acting on behalf of the State of California, pursuant to 23 U.S.C. Section 327 and the NEPA Assignment MOU. Under the NEPA Assignment MOU, the FRA assigned federal environmental review responsibilities for the project to the State of California.

As required by law and the NEPA Assignment MOU, the FRA has retained responsibility for making air quality conformity determinations under the Clean Air Act (42 U.S.C. § 7506(c)) and conducting government-to-government consultation with Indian tribes (23 C.F.R. § 773.105(b)(4)). FRA issued the final air quality General Conformity Determination on July 22, 2022 (see Appendix A).

Additionally, FRA maintains authority over railroad safety under 49 U.S.C. Section 20103. As such, FRA may exercise certain regulatory authority over the project. FRA also administers certain grant funds provided to the Authority under the American Recovery and Reinvestment Act of 2009 (Public Law 111-5) and oversees the Authority's compliance with a grant agreement for the HSR system.

2.2 Surface Transportation Board

The STB has authority over construction and operation of new rail lines (49 U.S.C. § 10901). As the STB explained in its June 13, 2013, decision authorizing construction of the 65-mile section of the California HSR System between Merced and Fresno (Docket No. FD_35724_0), 49 U.S.C. Section 10501(a)(2)(A) gives the STB jurisdiction over transportation by rail carrier in one state, as long as that intrastate transportation is carried out "as part of the interstate rail network." The STB determined that the California HSR System would be constructed as part of the interstate rail network in California and therefore concluded that it has jurisdiction over the California HSR System. The STB has participated as a cooperating agency in the environmental review process for the Project Section.

2.3 U.S. Army Corps of Engineers and U.S. Environmental Protection Agency

USACE is responsible for issuing permits under CWA Section 404 (33 U.S.C. § 1344) (Section 404) and the Rivers and Harbors Act of 1899, Section 14 (33 U.S.C. § 408) (Section 408). USACE is required to comply with NEPA and issue its own NEPA decision before it can issue a permit under Section 404 or grant permission under Section 408.

As an initial step in the environmental review and permitting processes for the project, the Authority, the FRA, USACE, and USEPA executed an MOU (NEPA/404/408 MOU) in November 2010 (FRA et al. 2010). The MOU outlines a process to coordinate the NEPA environmental review process with certain steps in the Section 404 and Section 408 permitting processes. The purpose of the MOU is to facilitate USACE decision making under Section 404, Section 408, and NEPA.

The Authority conducted biological studies and an aquatic resources delineation in the resource study area (RSA) for the construction and operation of the Selected Alternative. This analysis of the Project Section between 4th and King Street Station in San Francisco and Scott Boulevard in Santa Clara was prepared in two reports that documented its findings: the *San Francisco to San*

Jose Project Section Aquatic Resources Delineation Report (Authority 2020b) and the San Francisco to San Jose Project Section Biological and Aquatic Resources Technical Report (Authority 2020c). These reports provide additional details on biological and aquatic resources and serve as sources for the analysis presented in the EIS Documents and were submitted to USACE for review with the Draft EIS.

The project alternatives that were considered in the EIS Documents incorporated various combinations of a range of design options for each of the four subsections of the Project Section between 4th and King Street Station in San Francisco and Scott Boulevard in Santa Clara. On July 26, 2019, and August 14, 2019, USEPA and USACE concurred with the decision to carry forward the two project alternatives presented in the Final EIS.

Pursuant to CWA Section 404, USACE and USEPA concurred in June 2020 that the Authority's Selected Alternative is the preliminary least environmentally damaging practicable alternative (LEDPA).

USACE is required to comply with NEPA and issue its own NEPA decision before it can issue a permit under Section 404 or grant permission under Section 408. USACE will use the Final EIS to integrate requirements of NEPA and its permitting responsibilities (including under the Section 404(b)(1) Guidelines). The information contained in the Final EIS will provide information that will facilitate USACE's consideration and issuance of any necessary permits and approvals.

2.4 U.S. Fish and Wildlife Service and National Marine Fisheries Service

Concurrently with the NEPA process, the Authority initiated consultations under the federal Endangered Species Act (FESA) Section 7 (16 U.S.C. § 1536), pursuant to 50 C.F.R. Part 402, and regarding essential fish habitat (EFH) pursuant to 50 C.F.R. Part 600. Section 7 of FESA requires federal agencies to consult with USFWS and/or NMFS, depending on the type of species or habitat affected, to ensure 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. Impacts associated with threatened and endangered species and habitat are addressed through a consultation process with USFWS and/or NMFS that is outlined under Section 7 of FESA and the implementing regulations. The Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. § 1801 et seq.) requires federal agencies to consult with NMFS on activities that may adversely affect EFH for species that are managed under federal fishery management plans in U.S. waters. Impacts associated with EFH are addressed through a coordination process with NMFS that may be combined with FESA Section 7 consultation.

Because the project may affect threatened or endangered species subject to USFWS and NMFS jurisdiction, the Authority prepared a biological assessment (BA) for the project and consulted with USFWS and NMFS, as required under Section 7 of FESA. The Authority submitted a draft BA and initiated formal Section 7 consultation with USFWS in June 2021 and with NMFS in September 2021. The BA evaluates the potential adverse effects of the project on federally listed species and designated critical habitat. USFWS issued a biological opinion (BO) on April 22, 2022 and NMFS issued its BO on March 18, 2022. Appendices B and C of this ROD contain the USFWS and NMFS BOs, respectively.

3 PURPOSE AND NEED

3.1 Purpose of the High-Speed Rail System

The *Final Program EIR/EIS for the Proposed California High-Speed Train System* (Statewide Program EIS) established the purpose of the statewide HSR system, and identified and evaluated alternative HSR corridor alignments and stations as part of a statewide HSR system (Authority and FRA 2005).

The purpose of the statewide HSR system is to provide a reliable high-speed electrified train service that links the major metropolitan areas of the state and delivers predictable and consistent travel times. A further objective is to provide an interface with commercial airports, mass transit, and the highway network and relieve capacity constraints of the existing transportation system as increases in intercity travel demand in California occur, in a manner sensitive to and protective of California's unique natural resources.

3.2 Purpose of the San Francisco to San Jose Project Section

The project's purpose is to implement the California HSR System to provide the public with electric-powered HSR service that offers predictable and consistent travel times between San Francisco and San Jose, facilitates connectivity to SFO and Norman Y. Mineta San Jose International Airport (SJC), mass transit, the Bay Area highway network, and the statewide HSR system to:

- Achieve HSR service that meets Proposition 1A, The Safe, Reliable, High-Speed Passenger Train Bond Act (Prop 1A) travel time requirements in the Caltrain corridor
- Provide blended system infrastructure that supports commercially feasible HSR, while also minimizing environmental impacts and maximizing compatibility with communities along the rail corridor
- Establish an HSR connection to the economic center of Northern California

A further purpose of the Project Section is to construct, maintain, and operate an electrified high-speed train system, which includes the construction, improvement, upgrade, operation, and maintenance of new and existing facilities and infrastructure necessary to support the system connecting the STC in San Francisco to Diridon Station in San Jose. Consistent with state law and to minimize environmental impacts by providing a reduced HSR project footprint, the system would "blend" with the existing Caltrain system through the primary use of a two-track configuration. The Project Section would also incorporate "common-level"² boarding platforms at stations shared with Caltrain³ and use existing transportation corridors and rights-of-way. The system would be designed and operated to provide consistent and predictable travel, capable of achieving a nonstop service travel time of 30 minutes between San Francisco and San Jose.

3.3 Statewide and Regional Need for the High-Speed Rail System in the San Francisco to San Jose Project Section

The approximately 43-mile-long portion of the Project Section between 4th and King Street Station in San Francisco and Scott Boulevard in Santa Clara is an essential component of the statewide HSR system. As the northern Bay Area terminus of the HSR system, it would provide

² "Common-level" boarding platforms are level with the interior doors of trains such that a passenger transferring from one train to a second train is not required to climb up or down steps to gain access to the second train on the same platform.

³ Where the Final EIS describes platforms at 4th and King Street and Millbrae Stations as "dedicated" for HSR, this refers to the current understanding of scheduling and timetabling at those stations. The schedules currently developed jointly with Caltrain enable HSR and Caltrain to use separate platforms at 4th and King Street and Millbrae Stations, which supports more reliable and resilient operations. However, in the event that Caltrain is unable to access its scheduled platforms, it would be able to share the high-level HSR platforms through the use of high-level doors fitted on new Caltrain trains.

access to a new transportation mode; contribute to increased mobility along the Caltrain corridor and throughout California; and connect the Bay Area to the rest of the statewide HSR system via three counties—San Francisco, San Mateo, and Santa Clara—as illustrated on Figure 1. As a major population and economic center for California, the Bay Area contributes significantly to the statewide need for a new intercity transportation service that would connect San Francisco with Los Angeles and other regions of the state, as illustrated on Figure 2.

The capacity of California’s intercity transportation system, including San Francisco, the Peninsula, and the South Bay, is insufficient to meet existing and future travel demand. The current and projected future system congestion will continue to result in deteriorating air quality, reduced reliability, increased travel times, more highway accidents, and increasing greenhouse gas (GHG) emissions. The current statewide and regional transportation system has not kept pace with significant increases in population, economic activity, and tourism in the state, including in the Bay Area.

The interstate highway system, commercial airports, and the conventional passenger rail system serving the intercity travel market are operating at or near capacity and will require large public investments for maintenance and expansion to meet existing demand and future growth over the next 25 years and beyond. Moreover, the feasibility of expanding many major highways and key airports is uncertain; some needed expansions may be impractical or may be constrained by physical, regulatory, environmental, political, and other factors.

The need for improvements to intercity travel in California, including intercity travel between San Francisco, the Peninsula, and San Jose, relates to the following issues:

- Future growth in demand for intercity travel, including the growth in demand in the Bay Area
- Capacity constraints that will result in increasing congestion and travel delays, including those in the Bay Area, particularly in the Peninsula and South Bay
- Unreliability of travel modes stemming from congestion and delays, weather conditions, accidents, and other factors that affect the quality of life and economic well-being of residents, businesses, and tourists in California, including the Peninsula and South Bay
- Reduced mobility as a result of increasing demand on limited modal connections among major airports, transit systems, and passenger rail in the state, including the Peninsula and South Bay
- Poor and deteriorating air quality and pressure on natural resources due to expanding highways and airports as well as continued urban development, including those in the Bay Area
- Legislative mandates to moderate the effects of transportation on climate change, including required reductions in GHG emissions caused by vehicles powered by the combustion of carbon-based fuels

4 ALTERNATIVES CONSIDERED

This section summarizes the alternatives analysis process, describes the alternatives evaluated in the EIS Documents, and identifies the Selected Alternative and environmentally preferable alternative.

4.1 Alternatives Analysis Process and Alternatives Considered but Eliminated from Detailed Study

The Authority undertook an extensive, public screening process to identify and refine alternatives for study in the project-level EIS. The Authority and FRA began the project-level environmental review process for the Project Section in 2008. At that time, the proposed project was a fully grade-separated four-track system between San Francisco and San Jose with HSR sharing the corridor with Caltrain express commuter trains and accommodating continued Union Pacific Railroad freight train use of the corridor. Based on the project's purpose and need and the public and agency comments received during the planning and initial scoping processes, the Authority and FRA considered various alternatives for HSR alignment, stations, and LMF sites, as detailed in the *Preliminary Alternatives Analysis Report for the San Francisco to San Jose Section* (PAA) (Authority and FRA 2010a), and the subsequent *Supplemental Alternatives Analysis Report for the San Francisco to San Jose Section* (SAA) (Authority and FRA 2010b). The proposed four-track system generated concerns from communities along the Caltrain corridor because of the perceived magnitude of impacts on environmental and community resources. In response to these concerns, the Authority and FRA suspended further work on the project-level EIS in mid-2011 so that they could consider the potential to blend HSR and Caltrain operations within a smaller project footprint. In November 2011, in the Draft 2012 Business Plan, the Authority proposed blended operations for the Project Section, which would provide HSR service between San Francisco and San Jose on a predominantly two-track system shared with Caltrain.

In 2012, the Authority adopted the *California High-Speed Rail Program Revised 2012 Business Plan: Building California's Future* (2012 Business Plan), which concluded that, as allowed by law, the HSR project to be studied in the Project Section would operate as a blended system (Authority 2012). Other actions establishing the framework for blended operations along the Caltrain corridor included adoption of the Metropolitan Transportation Commission (MTC) Resolution No. 4056 MOU: High-Speed Rail Early Investment Strategy for a Blended System on the Peninsula Corridor⁴ (MTC 2012) and passage of Senate Bills (SB) 1029⁵ and 557.⁶ In May 2016, the FRA rescinded the prior 2008 NOI and issued a new NOI to evaluate a predominantly two-track blended system.

The framework for pursuing a blended system in the Project Section provided the foundation for a new Tier 2 planning effort focusing on a predominantly two-track blended system utilizing existing Caltrain track and remaining substantially within the existing Caltrain right-of-way. This framework, combined with the spatial constraints of integrating with existing passenger and freight rail in an existing right-of-way, limited the range of potential alignment alternatives for the Project Section. Consequently, the alternatives development process for the blended system focused largely on blended system operations, including the utility of passing tracks,⁷ and

⁴ This MOU is a nine-party agreement adopted in March 2012 to establish a funding framework for a blended system on the Caltrain corridor. Signatories include the Authority, MTC, Peninsula Corridor Joint Powers Board, San Francisco County Transportation Authority, San Mateo County Transportation Authority, Santa Clara Valley Transportation Authority, City of San Jose, City and County of San Francisco, and Transbay Joint Powers Authority.

⁵ SB 1029, approved July 2012, amended the Budget Act of 2012 to appropriate funds for HSR projects in the San Francisco to San Jose corridor, consistent with the blended system strategy identified in the Authority's 2012 Business Plan, and the MTC MOU.

⁶ SB 557, passed by the Legislature and signed by the Governor in 2013, provided that any bond funds appropriated pursuant to SB 1029 would be used solely to implement a blended system approach.

⁷ Passing tracks allow faster-moving trains to bypass slower-moving trains, and have the potential to provide operational benefits associated with faster recovery from incidents or disruption events on the railway. Figure 2-26 in Chapter 2 of the Final EIS illustrates the locations of the passing track options evaluated between 2013 and 2016.

achieving the objectives of predictable and consistent operational service travel times for both HSR and Caltrain service, while also providing consistency with Prop 1A travel time requirements for system design.⁸

The alternatives development and consideration process was iterative from 2009 to 2021, as described in detail in Chapter 2 and Chapter 9 of the Final EIS. The Authority and FRA solicited public and agency comments on the range of alternatives that should be studied in the EIS Documents multiple times, including the initial scoping period in 2009 and during PAA and SAA document preparation in 2010. After the blended system framework was established in 2012, the Authority and FRA engaged the public again in 2015, reinitiated scoping for the blended system project in 2016, and continued alternatives refinement from 2016 to 2021. After identifying the initial group of potential alternatives, the Authority developed plans, concepts, and cross sections as necessary to support early consideration. Alternatives that were not carried forward by the Authority and FRA failed to adequately meet the project Purpose and Need/project objectives; failed to offer a substantial environmental advantage over other alternatives studied; and/or were deemed to not be feasible from a cost, technical, or engineering perspective. These potential alternatives were eliminated from analysis in the EIS Documents.

4.2 Alternatives Carried Forward for Study in the EIS Documents

As a result of a comprehensive alternatives analysis process, the EIS Documents evaluated two alignment alternatives and a design variant—Alternatives A and B (see Figure 2-1 in Chapter 2 of the Final EIS) and the RSP Design Variant. Alternative A is a predominantly two-track blended system in the existing Caltrain corridor with no additional passing track and includes service at two existing Caltrain stations to be shared by HSR and Caltrain (4th and King Street [an interim HSR station only] and Millbrae)⁹ and the East Brisbane LMF. Alternative B also is a predominantly blended system in the existing Caltrain corridor, but Alternative B includes the West Brisbane LMF and a 6-mile-long, four-track passing track segment between San Mateo and Redwood City. The Authority developed the RSP Design Variant (which could apply to either Alternative A or B) to address stakeholder concerns and minimize impacts, to the degree feasible, on existing and planned development in Millbrae. Compared to Alternatives A and B, the RSP Design Variant would reconfigure station facilities, parking, and station access within a smaller footprint and would not include the majority of surface parking lots west of the existing Millbrae Bay Area Rapid Transit (BART)/Caltrain Intermodal Station.

Figure 2-1 in Chapter 2 of the Final EIS illustrates the alignments of the two project alternatives. Table 2 summarizes the design features of the two project alternatives. The No Project Alternative (synonymous with the No Action Alternative) was also analyzed in the EIS Documents. The alternatives analyzed in the EIS Documents are the alternatives that the Authority identified as reasonable and feasible and capable of meeting the project Purpose and Need.

The following sections describe the two alternatives and associated maintenance facilities and the design variant evaluated in the EIS Documents, which are described in detail in Chapter 2 of the Final EIS. As explained in Section S.1.1, Modifications since the Draft EIR/EIS, in the Final EIS Summary, the Authority considered and incorporated a few minor engineering and design refinements after the publication of the Draft EIS. The refinements were considered and incorporated for several reasons, including (1) in response to comments on the Draft EIS from agencies, stakeholders, and the public; and (2) to further minimize environmental impacts.

⁸ Prop 1A states that the high-speed train system eligible for its bond funds be designed to be capable of achieving a 30-minute nonstop service travel time between San Francisco and San Jose (California Streets and Highways Code § 2704.09(b)(3)).

⁹ The Salesforce Transit Center (STC) in San Francisco would serve as an HSR station after the Transbay Joint Powers Authority completes its Downtown Rail Extension Project. The existing Caltrain 4th and King Street Station would serve as the interim San Francisco terminal station for the HSR project until the Downtown Rail Extension Project is completed.

Table 2 Summary of Design Features for Project Alternatives between 4th and King Street Station in San Francisco and Scott Boulevard in Santa Clara

Design Features	Project Alternative	
	Alternative A	Alternative B
Length of existing Caltrain track (miles) ¹	42.9	42.9
Length of modified track (miles) ¹	14.5	17.4
Length of track modification <1 foot (miles) ¹	5.1	4.3
Length of track modification >1 foot and <3 feet (miles)	2.2	1.9
Length of track modification >3 feet (miles) ¹	7.2	11.2
Length of OCS pole relocation (miles) ^{1,2}	9.4	13.1
Includes additional passing tracks	No	Yes
Light maintenance facility (LMF)	East Brisbane LMF	West Brisbane LMF
Modified stations		
Adding HSR to Caltrain stations	4th and King Street, Millbrae	4th and King Street, Millbrae
Modifications to Caltrain stations due to the LMF	Bayshore	Bayshore
Modifications to Caltrain stations due to track shifts	San Bruno, Hayward Park	San Bruno
Modifications to Caltrain stations to remove hold-out rule	Broadway	Broadway
Modifications to Caltrain stations due to the passing tracks	N/A	Hayward Park; Hillsdale; Belmont; San Carlos (relocated)
Number of modified or new structures ³	14	35
New structures	2	3
Modified structures	7	18
Replaced structures	2	7
Affected retaining walls	3	7
Number of at-grade crossings with safety modifications (e.g., four-quadrant gates, median barriers)	38	38
Length of new perimeter fencing (miles)	7.3	8.7
Communication radio towers	20	20

Sources: Authority 2019

LMF = light maintenance facility

N/A = not applicable

OCS = overhead contact system

¹ Lengths shown are guideway mileages, rather than the length of the northbound and southbound track.

² OCS pole relocations are assumed for areas with track shifts greater than 1 foot.

³ Structures include bridges, grade separations such as pedestrian underpasses and overpasses, tunnels, retaining walls, and culverts.

4.2.1 Alternative A

Alternative A would modify approximately 14.5 miles of existing Caltrain track predominantly within the existing Caltrain right-of-way, construct the East Brisbane LMF, modify six existing Caltrain stations or platforms to accommodate HSR, and install safety improvements and communication radio towers. The existing Caltrain corridor has several locations of four-track segments where trains can pass; no additional passing tracks would be constructed under Alternative A.

The existing 4th and King Street Station would serve as the interim San Francisco terminal station for the Project Section until the Transbay Joint Powers Authority's Downtown Rail Extension Project provides HSR access to the STC. Station improvements would include the installation of a booth in the existing station for HSR ticketing and support services, HSR fare gates, and modifications to existing tracks and platforms, as further described in Chapter 2 and Volume 3, Preliminary Engineering Plans, of the Final EIS.

The East Brisbane LMF would be built south of the San Francisco Caltrain tunnels on approximately 100 acres east of the Caltrain corridor. The mainline track would be shifted up to 48 feet, and new yard leads connecting to the East Brisbane LMF would be built west of the existing tracks, then cross over the realigned four-track mainline on an aerial flyover at the north end to avoid blended train operations on the mainline track. Approximately 1,400-foot-long transition tracks would allow trains to reduce or increase speed when entering or exiting the East Brisbane LMF. The track modifications associated with the East Brisbane LMF would require modifying the Bayshore Caltrain Station, demolishing and relocating the Tunnel Avenue overpass, widening the bridge crossing Guadalupe Valley Creek in Brisbane, relocating the Brisbane Fire Station, and relocating control point Geneva. The reconstructed Tunnel Avenue overpass would connect to Bayshore Boulevard north of its existing connection, at its intersection with Valley Drive.

At the Millbrae Station, new HSR station facilities including a station hall for ticketing and support services would be built on the west side of the existing Caltrain corridor. A new overhead crossing would extend from the HSR station hall to the existing station concourse, providing access to the new HSR tracks and platforms. California Drive would be extended north from Linden Avenue to El Camino Real. Multimodal station access improvements, including curbside pick-up and drop-off areas, would be provided along El Camino Real and the extension of California Drive. Replacement parking for 288 displaced Caltrain and BART commuter parking spaces would be located west of the station along El Camino Real, and 37 parking spaces for HSR passengers would be located at the northwest corner of Murchison Drive and California Drive. The historic Southern Pacific Railroad (SPRR) Depot/Millbrae Station (which has previously been relocated to accommodate station improvements) would be relocated to accommodate track modifications.

Alternative A would continue south from the Millbrae Station in the existing Caltrain corridor, which is predominantly two tracks at grade or on retained fill, through San Mateo, Belmont, San Carlos, Redwood City, Atherton, Menlo Park, Palo Alto, Mountain View, Sunnyvale, and to Scott Boulevard in Santa Clara. In addition to minor track modifications and the installation of four-quadrant gates and communication radio towers in this section, Alternative A would modify the platforms at the existing Hayward Park Caltrain Station to accommodate curve straightening.

4.2.2 Alternative B

Alternative B would modify approximately 17.4 miles of existing Caltrain track predominantly within the existing Caltrain right-of-way, construct the West Brisbane LMF, construct 6 miles of passing track, modify nine existing Caltrain stations or platforms to accommodate HSR, and install safety improvements and communication radio towers.

The 4th and King Street and Millbrae Station modifications, site layout, and reconfigured track and platforms would be the same as described under Alternative A. The West Brisbane LMF would be built south of the San Francisco Caltrain tunnels on approximately 110 acres west of the Caltrain corridor. Direct mainline track access would be along double-ended yard leads to enable north and south movements. The four existing mainline tracks would be shifted west by up to 16.5 feet, and new yard leads connecting to the West Brisbane LMF would be built east and west of the existing tracks. The yard leads east of the existing tracks would cross over the realigned four-track alignment on an aerial flyover to avoid train operations on the mainline track, converging with the yard leads on the west side of the track alignment. Approximately 1,400-foot-long transition tracks would allow trains to reduce or increase speed when entering or exiting the LMF. Track modifications associated with the West Brisbane LMF also would require demolishing and relocating the Tunnel Avenue overpass, widening the bridge crossing Guadalupe Valley Creek in

Brisbane, relocating the Brisbane Fire Station, and relocating control point Geneva at its intersection with Valley Drive.

Alternative B would include an approximately 6-mile-long four-track passing track segment that would extend through San Mateo and San Carlos and into the northern portion of Redwood City. South of Ninth Avenue in San Mateo, the two-track alignment would diverge to four tracks that would continue on at-grade and retained-fill profiles. The existing tracks would be realigned within the existing right-of-way to accommodate the new four-track configuration. Although the realigned tracks would remain predominantly within the existing right-of-way, additional right-of-way acquisition would be required in some areas with particularly narrow existing rights-of-way or where curve straightening would be necessary to achieve higher speeds. Constructing the passing tracks would modify the Hayward Park, Hillsdale, Belmont, and San Carlos Caltrain Stations. In northern Redwood City, Alternative B would descend to grade and converge back to a two-track configuration. Alternative B would continue south from the passing track in the existing Caltrain corridor, which is predominantly two tracks at grade or on retained fill through Redwood City, Atherton, Menlo Park, Palo Alto, Mountain View, Sunnyvale, and to Scott Boulevard in Santa Clara.

4.2.3 Millbrae Station Reduced Site Plan Design Variant

The Authority developed the RSP Design Variant to address stakeholder concerns with the design of the Millbrae Station evaluated in the Draft EIS as part of Alternatives A and B (Millbrae Station Design). The RSP Design Variant preserves HSR track and platform right-of-way needs but reconfigures station facilities, parking, and station access to reduce impacts on existing and planned development. The RSP Design Variant differs from the Millbrae Station Design by:

- Eliminating four surface parking lots on the west side of the alignment that would have served as replacement parking for 288 displaced Caltrain and BART parking spaces
- Relocating the new HSR station entrance hall to the northeast corner of El Camino Real and Millbrae Avenue
- Eliminating lane modifications to El Camino Real
- Eliminating the California Drive extension north of Linden Avenue to El Camino Real from the HSR project (this extension is anticipated to be constructed by others [the City of Millbrae or the developer of TOD on the west side of the station] before the RSP Design Variant would be constructed)

The RSP Design Variant could apply to either Alternative A or Alternative B.

4.3 Description of the Selected Alternative

The Authority has identified Alternative A—which consists of a predominantly two-track blended system including modifications to approximately 14.5 miles of existing Caltrain track, modified Caltrain stations for HSR at the 4th and King Street and Millbrae Stations, the East Brisbane LMF, and associated project elements—from the 4th and King Street Station in San Francisco to Scott Boulevard in Santa Clara as the Selected Alternative. The Selected Alternative extends approximately 43 miles from 4th and King Street Station in San Francisco to the centerline of Scott Boulevard in Santa Clara, as shown on Figure 1. A summary of the Selected Alternative’s design features by geographic subsection follows.

4.3.1 San Francisco to South San Francisco Subsection

Within the San Francisco to South San Francisco Subsection, the Selected Alternative would modify the existing 4th and King Street and Bayshore Caltrain Stations, build the East Brisbane LMF and associated track modifications, reconfigure Tunnel Avenue, relocate the Tunnel Avenue overpass, install four-quadrant gates at three existing at-grade crossings, and install six communication radio towers. Additional right-of-way would be required in San Francisco and Brisbane to accommodate track modification, the East Brisbane LMF, Tunnel Avenue and the Tunnel Avenue overpass, four-quadrant gates, and communication radio towers.

4th and King Street Station

The existing 4th and King Street Station would serve as the interim terminal station for the project until the Transbay Joint Powers Authority's Downtown Rail Extension Project provides HSR access to the STC. Station improvements would include installing a booth for HSR ticketing and support services, adding HSR fare gates, and modifying existing tracks and platforms. Until the Downtown Rail Extension Project can provide service to the STC, passengers would be required to use alternate methods of transportation to get from 4th and King Street Station to the STC (e.g., San Francisco Municipal Railway, ride-share program, walking). To support HSR operations, two existing Caltrain platforms in the center of the station yard would be raised and lengthened to serve four northbound and southbound HSR tracks. The HSR platforms would be approximately 4.25 feet high, with lengths of 1,000 feet for the platform on the east and 1,400 feet for the platform on the west. Ramps would be installed to provide pedestrian access from the station building to the raised platforms. Four existing Caltrain platforms, 600 feet long, would remain on either side of the HSR platforms to serve eight Caltrain tracks.

East Brisbane Light Maintenance Facility

The East Brisbane LMF would be built south of the San Francisco Caltrain tunnels on approximately 100 acres east of the Caltrain corridor. The mainline track would be shifted up to 48 feet, and new yard leads connecting to the East Brisbane LMF would be built west of the existing tracks, then cross over the realigned four-track mainline on an aerial flyover at the north end to avoid blended train operations on the mainline track. Approximately 1,400-foot-long transition tracks would allow trains to reduce or increase speed when entering or exiting the East Brisbane LMF. The track modifications associated with the East Brisbane LMF would require modifying the Bayshore Caltrain Station, demolishing and relocating the Tunnel Avenue overpass, widening the bridge crossing Guadalupe Valley Creek in Brisbane, relocating the Brisbane Fire Station, and relocating control point Geneva. The reconstructed Tunnel Avenue overpass would connect to Bayshore Boulevard north of its existing connection, at its intersection with Valley Drive. The East Brisbane LMF would require placing a portion of Visitacion Creek into an underground culvert along its current alignment, such that the maintenance yard, maintenance building, and other associated facilities would be built above the underground culvert.

The Selected Alternative includes the East Brisbane LMF because it would have less environmental impacts and less impact on planned mixed-use development (where residential is permitted), than the West Brisbane LMF (Alternative B). The Selected Alternative would construct the East Brisbane LMF adjacent to existing vacant and industrial uses in an area mostly designated for planned development (residential prohibited). Unlike the West Brisbane LMF under Alternative B, the East Brisbane LMF would have less impact on areas where residential development is planned and would avoid grading of Icehouse Hill, which is a prominent area for biological resource habitat and which the City of Brisbane's General Plan Amendment identifies to be preserved. Compared to the West Brisbane LMF under Alternative B, the East Brisbane LMF would affect fewer aquatic resources, would generate fewer air quality emissions during construction and would be located farther from existing and planned residential development.

4.3.2 San Bruno to San Mateo Subsection

The Selected Alternative within this subsection would modify the existing San Bruno, Millbrae, and Broadway Caltrain Stations; modify track; install four-quadrant gates at 16 existing at-grade crossings; and install three communication radio towers. Additional right-of-way would be required in Millbrae, Burlingame, and San Mateo associated with communication radio towers, the Millbrae Station modifications to accommodate HSR service, track modifications, roadway relocations, and four-quadrant gates.

Millbrae Station

New HSR infrastructure would be built at the existing Millbrae BART/Caltrain Intermodal Station. New HSR station facilities on the west side of the existing Caltrain corridor would include a new station entrance hall with ticketing and support services along El Camino Real. The station area

design provides intermodal connectivity with Caltrain and BART via an overhead pedestrian crossing that would extend from the new station entrance over the extension of California Drive, connecting to the existing station concourse with vertical circulation elements (stairs, escalators, and elevators) providing access to HSR, Caltrain, and BART platforms.

Enhanced automobile access would be provided on the west side of the station through the extension of California Drive to Victoria Avenue. Curbside passenger pick-up and drop-off facilities west of the station would be located along the new extension of California Drive and El Camino Real; facilities east of the station would be on the first level of the BART parking structure. Replacement parking for 288 displaced Caltrain and BART parking spaces would be provided at four surface parking lots on the west side of the alignment, with a fifth parking area at Murchison Drive with 37 parking spots for HSR passengers.

The San Mateo County Transit District bus stops would be along El Camino Real at the new signalized intersection and pedestrian crossings at Chadbourne Avenue, with direct access to the station. A new dedicated bicycle path would provide west side bicycle access to the station.

Track modifications extending approximately 1 mile north and south of the station would require additional right-of-way along the west side of the Caltrain corridor and modification of existing Caltrain tracks, station platforms, and structures. Constructing two new tracks would require widening the Hillcrest Boulevard underpass north of the Millbrae Station. At the station, the existing BART tracks and platforms and the easternmost Caltrain track and platform would remain unchanged. The westernmost Caltrain track would be shifted west by up to 40 feet for construction of two new tracks serving an 800-foot-long center HSR platform and a new Caltrain outboard platform. The historic SPRR Depot/Millbrae Station (which has been previously relocated to accommodate station improvements) and associated surface parking along California Drive would be relocated to accommodate these track modifications.

The Selected Alternative includes the Millbrae Station Design because it has substantial operational benefits over the RSP Design Variant in that multimodal and pedestrian access to and within the Millbrae Station are more efficient and effective as follows:

- The Millbrae Station Design would have shorter walking distances from the station hall to the main station concourse and platforms than the RSP Design Variant.
- The Millbrae Station Design would separate pedestrian and vehicular access routes, whereas the RSP Design Variant would not fully separate them.
- The Millbrae Station Design assures effective emergency egress, whereas emergency egress with the RSP Design Variant will depend on the future design of California Drive by others.
- The Millbrae Station Design includes configuration of California Drive consistent with Authority station design criteria for station access, whereas the effectiveness of HSR station access relative to California Drive with the RSP Design Variant will depend on its future design and construction by others.
- The Millbrae Station Design provides direct vehicular access to the station for southbound vehicles on El Camino Real, whereas access for this vehicular movement with the RSP Design Variant will depend on the future design of California Avenue by others.
- The Millbrae Station Design includes transit bus bulbouts along El Camino Real supporting efficiency for El Camino Real running transit buses, whereas the RSP Design Variant would not and would result in transit drop-off further from the station.

As the City of Millbrae objected to both station designs, the Authority chose the design that was operationally superior.

4.3.3 San Mateo to Palo Alto Subsection

Within the San Mateo to Palo Alto Subsection, the Selected Alternative would modify platforms at the existing Hayward Park Station, modify tracks, install four-quadrant gates at 15 existing

at-grade crossings, and install seven communication radio towers. Minor amounts of additional right-of-way would be required in San Mateo, Belmont, San Carlos, Redwood City, Menlo Park, and Palo Alto for the siting of four-quadrant gates and communication radio towers.

The Selected Alternative does not include the 6-mile-long, four-track passing track segment between San Mateo and Redwood City, unlike Alternative B. Construction of the passing tracks under Alternative B would have greater environmental and community impacts (including greater noise, air quality, traffic, transit, emergency vehicle access and response, visual quality impacts during construction, and more residential and business displacements) compared to Alternative A. Most local residents and other stakeholders preferred Alternative A because it would have fewer environmental and community impacts. Construction of the passing tracks under Alternative B would also cost more than Alternative A without the passing tracks. Based on consideration of these factors, the Selected Alternative does not include passing tracks.

4.3.4 Mountain View to Santa Clara Subsection

Within the Mountain View to Santa Clara Subsection, the Selected Alternative would make minor track modifications, install four-quadrant gates at four at-grade crossings, and install four communication radio towers. Minor amounts of additional right-of-way would be required in Palo Alto, Mountain View, and Sunnyvale for communication radio towers.

4.4 Environmentally Preferable Alternative

The CEQ NEPA regulations require that the ROD identify all alternatives that were considered, "...specifying the alternative or alternatives which were considered to be environmentally preferable" (40 C.F.R. § 1505.2).

In determining an environmentally preferable alternative, the Authority considered both project alternatives/build alternatives as well as the No Project (no build) Alternative. The Authority weighed and balanced the physical environmental effects associated with the project alternatives/build alternatives as well as those associated with the No Project (no build) Alternative. The Authority determined that the adverse environmental effects associated with the project alternatives/build alternatives would be less substantial than the adverse environmental effects associated with the No Project (no build) Alternative in terms of air quality and transportation, and thus the Authority identified a project/build alternative as environmentally preferable. The Authority identified the environmentally preferable alternative by balancing the adverse and beneficial impacts of the alternatives on the human and natural environment.

As discussed in Section 2.3, U.S. Army Corps of Engineers and U.S. Environmental Protection Agency, of this ROD, USACE and USEPA concurred in June 2020 that the Authority's Selected Alternative is the preliminary LEDPA, consistent with USACE's permit program (33 C.F.R. Parts 320–331) and USEPA's Section 404(b)(1) Guidelines (40 C.F.R. Parts 230–233). Additionally, the Authority identified Alternative A as the environmentally preferable alternative for the following reasons:

- Compared to Alternative B, Alternative A would result in fewer residential and business displacements, would have fewer visual quality impacts, would have less impact on planned mixed-use development (where residential is permitted) in Brisbane, and would have fewer temporary road closures that could result in emergency vehicle delays during construction. This conclusion is supported by stakeholder outreach, which has identified a preference for Alternative A because it minimizes impacts on communities.
- Compared to Alternative B, Alternative A would have fewer permanent impacts on jurisdictional aquatic resources and would avoid impacts on Icehouse Hill, an area identified for protection by the City of Brisbane because of its biological resource habitat. Alternative A would have fewer impacts on habitat for special-status species.

Table 8-1 and Section 8.4, Preferred Alternative, in the Final EIS provide a detailed comparison of the various criteria evaluated for the project alternatives. As described in Section 8.4 of the

Final EIS, and in accordance with 40 C.F.R. Section 1505.2, Alternative A is the environmentally preferable alternative.

The RSP Design Variant does not offer substantial environmental benefits compared to the Millbrae Station Design in Alternatives A and B. While the RSP Design Variant would lessen impacts on bus transit during construction and impacts on existing and planned land uses, the RSP Design Variant would result in a somewhat greater degree of impact on construction-related air quality, construction- and operational-period noise and vibration, and construction-related visual quality. Section 3.20, Millbrae Station Reduced Site Plan Design Variant, of the Final EIR/EIS includes a comparison of impacts for the Millbrae Station Design and RSP Design Variant. As discussed in Section 4.3.2, San Bruno to San Mateo Subsection, of this document, the Millbrae Station Design has substantial operational benefits over the RSP Design Variant in that multimodal and pedestrian access to and within the Millbrae Station are more efficient and effective. As the City of Millbrae objected to both station designs, the Authority chose the design that was operationally superior.

5 SUMMARY OF POTENTIAL EFFECTS

Construction and operation of the Selected Alternative has the potential to affect a variety of environmental and social resources. Impacts on these resources could be adverse or beneficial. NEPA impact determination requires consideration of both context and intensity. Chapter 3, Affected Environment, Environmental Consequences, and Mitigation Measures, of the Final EIS includes a full discussion of the potential impacts of the project, organized by resource area. To fully understand the potential range of impacts of the Selected Alternative, the Final EIS analyzed all reasonably foreseeable environmental impacts resulting from construction and operation of the project.

The Selected Alternative will not result in unavoidable adverse impacts in the following resource areas: electromagnetic fields and electromagnetic interference; public utilities and energy; hydrology and water resources; biological and aquatic resources; geology, soils, seismicity, and paleontology; hazardous materials and wastes; socioeconomics and communities; parks, recreation, and open space; and regional growth. Additionally, Alternative B, but not the Selected Alternative, would have adverse impacts on aesthetics and visual quality. In determining that the Selected Alternative will not result in impacts on these resources, the Authority considered IAMFs and mitigation measures that will be required as part of the project as described further in Section 6, Mitigation Commitments and Monitoring, of this ROD. Impacts on these resources are fully evaluated in Chapter 3 of the Final EIS and are not discussed further in this ROD.

The following sections summarize the adverse and beneficial impacts that may occur with construction and operation of the Selected Alternative and, where relevant, Alternative B between 4th and King Street Station in San Francisco and Scott Boulevard in Santa Clara.

5.1 Transportation

As discussed in Section 3.2, Transportation, of the Final EIS, potential construction-related impacts of the Selected Alternative include temporary roadway disruptions affecting automobiles, buses, and nonmotorized travel; the displacement of parking along the Caltrain corridor and at Caltrain stations; and temporary interference with passenger rail transit and freight rail. There would be fewer impacts under the Selected Alternative relative to Alternative B because the Selected Alternative would require fewer roadway modifications and temporary road closures, would displace fewer parking spaces at Caltrain stations, and would require less track modification within the Caltrain corridor.

During operations, increased traffic and increased gate-down events at at-grade crossings from added HSR trains would adversely affect roadway intersections. Operation of the Selected Alternative and Alternative B would both result in 72 permanent adverse effects on intersection operations after mitigation. Increased traffic and increased gate-down events at at-grade crossings would also result in permanent delays to bus services along three high-frequency bus routes under both project alternatives after mitigation. Further, operation of the Selected Alternative and Alternative B would result in increased pedestrian volumes around the 4th and King Street Station, exacerbating pedestrian crowding concerns around limited sidewalk capacity along the Fourth Street station frontage between Townsend Street and King Street.

Additionally, the Selected Alternative would provide the following operation benefits:

- Reduction of vehicle miles traveled regionally, which would reduce congestion
- Improved access to the Millbrae Station and improved intersection level of service on El Camino Real near the station due to circulation improvements on the west side of the Caltrain corridor
- Improved intersection level of service at the intersection of Bayshore Boulevard/Old County Road due to the relocation of the Tunnel Avenue overpass.

To minimize potential effects on transportation, the Selected Alternative includes numerous strategies and design features (set forth in IAMFs) that will avoid or minimize effects during construction, such as the adoption of a construction transportation plan and contractor

requirements to avoid or minimize circulation impacts due to road closures and impacts due to construction within existing railroad rights-of-way. Project features to address nonmotorized travel impacts include providing and maintaining pedestrian and bicycle accessibility across the HSR corridor, to and from stations, and on station property.

In addition to these IAMFs, the Authority will require numerous mitigation measures that will further reduce, mitigate, and/or compensate for adverse effects of the Selected Alternative. These mitigation measures include site-specific mitigation measures to address adverse traffic congestion on intersections (e.g., standard vehicle capacity enhancements such as signal retiming or additions, lane restriping, road/intersection widening and turn pocket additions/increases); transit signal priority treatments at key intersections to address both construction and operational effects on transit delay; a railway disruption control plan; and pedestrian improvements at the 4th and King Street Station. The Selected Alternative's overall impact on transportation resources in the region and state will be beneficial through substantial reductions in vehicle miles traveled, increased transit connectivity, and reduction in the need to expand freeways and airports.

5.2 Air Quality and Greenhouse Gases

As discussed in Section 3.3, Air Quality and Greenhouse Gases, of the Final EIS, construction emissions of the Selected Alternative will be less than the applicable General Conformity *de minimis* thresholds for criteria pollutants and precursor pollutants.¹⁰ In contrast, construction emissions of nitrogen oxides (NO_x) under Alternative B would exceed the General Conformity *de minimis* threshold in the San Francisco Bay Area Air Basin (SFBAAB). Construction emissions under Alternative B would be somewhat higher than under Alternative A, primarily because Alternative B includes construction of the passing tracks and a larger number of truck trips for LMF construction.

Construction of the Selected Alternative, as well as Alternative B, would contribute to existing exceedances of the 24-hour and annual California ambient air quality standards (CAAQS) for particulate matter 10 microns or less in diameter (PM₁₀), as well as contribute to existing PM₁₀ violations through exceedances of the USEPA significant impact levels. Construction of the Selected Alternative will not lead to new exceedances of the CAAQS or national ambient air quality standards.

Construction of the Selected Alternative, as well as Alternative B, would also generate direct and indirect GHG emissions during construction. However, these emissions would be temporary and would be offset from the emissions benefit that would occur during the operations period. As a result, the Selected Alternative would not result in global climate change impacts from GHG emissions.

To reduce impacts on the environment, construction of the Selected Alternative includes project features to avoid and minimize impacts on air quality. For example, the Selected Alternative will employ measures to reduce fugitive dust emissions, use renewable diesel fuel in construction diesel equipment and on-road diesel trucks, and reduce criteria exhaust emissions from both on-road construction vehicles and heavy-duty off-road construction equipment.

Operation of the Selected Alternative, as well as Alternative B, would provide statewide and regional air quality benefits and GHG emissions reductions. This would result in a permanent net benefit to air quality and GHG during operations because it would lower air pollutant and GHG

¹⁰ Although Table 3.3-12 of the Final EIS shows that Alternative A in 2025 would have nitrogen oxides emissions of 104 tons, which is greater than the General Conformity *de minimis* threshold of 100 tons, Table 3.3-12 includes emissions associated with construction of the San Jose Diridon Station Approach Subsection. The Final General Conformity Determination in Appendix A to this ROD does not include the San Jose Diridon Station Approach Subsection, which was analyzed as part of the general conformity determination for the San Jose to Merced Project Section. When the emissions in the San Jose Diridon Station Approach Subsection are excluded for purposes of the General Conformity evaluation (see Table 6 of the Final General Conformity Determination), all emissions under Alternative A are less than the applicable General Conformity thresholds.

emissions by diverting trips from travel modes with higher emissions (e.g., commercial air flights and automobile trips) to HSR, which has lower emissions.

5.3 Noise and Vibration

As discussed in Section 3.4, Noise and Vibration, of the Final EIS, construction of the Selected Alternative will generate noise and vibration from the use of equipment and activities associated with construction, modification, and relocation of existing tracks, stations, and platforms; modification of existing roadways and structures; construction of the East Brisbane LMF; installation of four-quadrant gates at at-grade crossings and perimeter fencing at the edge of the right-of-way; utility relocation; site preparation including demolition, excavation, and grading; and installation of systems components. The Selected Alternative would require less construction activity than Alternative B because it would not require construction of additional passing tracks.

Operation of the Selected Alternative would generate noise levels above ambient levels from train passbys and train horns, resulting in adverse impacts from the exposure of sensitive receptors to severe noise. With the mitigation identified in the MMEP, the Selected Alternative would result in lesser noise effects. The Selected Alternative would result in 458 residual severe noise impacts with implementation of noise barrier mitigation, which is slightly greater than the 452 residual severe noise impacts under Alternative B. Operation of the Selected Alternative and Alternative B would generate additional traffic and traffic-related noise increases greater than or equal to 3 decibels at two roadway segments near the 4th and King Street Station in 2029.

Operation of the Selected Alternative would generate ground-borne vibration impacts at sensitive receptors in all four subsections. The Selected Alternative would result in slightly more vibration impacts than Alternative B.

To avoid or minimize potential noise and vibration effects associated with construction, the Authority will adhere to FRA and Federal Transit Administration guidelines for minimizing construction noise and vibration impacts. Additionally, the Authority has developed project-specific design strategies that will further reduce the potential for adverse effects associated with construction and operation of the Selected Alternative to levels below those that will be achieved through regulatory compliance alone. However, even with regulatory requirements and these project-specific design strategies, the Selected Alternative will still have the potential to result in adverse impacts. To further reduce project-related operation noise, the Authority has developed mitigation measures that include requiring preparation of and adherence to a construction noise mitigation and monitoring program; conducting subsequent noise and vibration environmental analysis during and following final design; ensuring that train vehicle procurement meets pertinent federal noise regulations for locomotives and rail cars; and building noise barriers, installing building sound insulation, or acquiring noise easements consistent with the Authority's Noise and Vibration Mitigation Guidelines. In addition, where local jurisdictions decide to apply to the FRA for establishment of a quiet zone, the Authority will support that effort, which may result in reduction of horn sounding at the at-grade crossings within any established quiet zones.

5.4 Safety and Security

Of the safety and security topics described in Section 3.11, Safety and Security, of the Final EIS, only emergency vehicle response delays would have adverse effects after the implementation of IAMFs and mitigation measures. The design of the project includes safety improvements at at-grade crossings (e.g., four-quadrant gates, median barriers) and the completion of perimeter fencing along the existing Caltrain right-of-way, which will reduce the potential for train conflicts with motor vehicles, pedestrians, and cyclists and discourage trespassing. The project will also include safety improvements to platforms at some existing Caltrain stations, improving the safety of passengers during train operations.

As discussed in Section 3.11 of the Final EIS, potential construction-related impacts of the Selected Alternative include temporary road and lane closures, which have the potential to result in delays in emergency vehicle access and response times. Alternative B would have more temporary road and lane closures during construction, which would have greater delays in

emergency vehicle access and response times than the Selected Alternative. For the Selected Alternative, temporary road closures will be limited in extent and duration and emergency response delays will be minimized through coordination with local jurisdictions and procedures for implementing or maintaining emergency vehicle access during construction.

Operation of the Selected Alternative will result in added traffic at the 4th and King Street and Millbrae Stations, as well as increased gate-down events at the at-grade crossings from added HSR trains, resulting in increased delays at adjacent intersections. These activities will cause permanent delays in fire station/first responder response times near the 4th and King Street and Millbrae Stations, and near at-grade crossings in Burlingame, Redwood City, Menlo Park, Palo Alto, and Mountain View. Available mitigation includes installing emergency vehicle priority treatments near HSR stations and at-grade crossings and traffic delay/congestion mitigation measures.

Identified mitigation will fully mitigate the Selected Alternative's impacts on emergency vehicle response time, if implemented. While the Authority can provide funding for these improvements, it cannot compel the local jurisdictions to construct and operate the improvements. If local jurisdictions do not implement emergency vehicle response improvements with the Authority's funding for construction, site-specific traffic mitigation measures that address peak-hour delays at intersections adjacent or nearby to locations with significant emergency vehicle response time effects due to gate-down time (TR-MM#1a.2, TR-MM#1a.3, TR-MM#1a.5, TR-MM#1h, and TR-MM#1i) will reduce congestion near at-grade crossings but will not eliminate delays at the at-grade crossings themselves.

5.5 Station Planning, Land Use, and Development

As discussed in Section 3.13, Station Planning, Land Use, and Development, of the Final EIS, construction of the Selected Alternative will result in the temporary alteration of existing land use patterns, the permanent conversion of existing and planned land uses to transportation uses, and potential disruptions to planned developments.

Construction of the Selected Alternative will result in the temporary alteration of existing land use patterns and the permanent conversion of existing and planned land uses to transportation uses. The Selected Alternative would temporarily use less land outside the permanent footprint during construction and would permanently convert less land than Alternative B.

Construction of the HSR modifications at the Millbrae Station will result in a substantial change in existing land uses due to the conversion of commercial buildings to transportation uses. Construction of the Millbrae Station modifications will also result in a substantial change in planned land use patterns by conflicting with the planned Millbrae Serra Station development project.

The Selected Alternative will construct the East Brisbane LMF adjacent to existing vacant and industrial uses in an area mostly designated for planned development (residential prohibited), resulting in a substantial alteration of planned land use patterns. However, the Selected Alternative (unlike Alternative B) would substantially avoid the area designated for planned development (residential permitted)—where up to 2,200 residential units are permitted—on the west side of the Caltrain tracks. The Selected Alternative (unlike Alternative B) would also avoid the grading of Icehouse Hill, which is a prominent area for biological resource habitat and which the City of Brisbane's General Plan Amendment identifies to be preserved (City of Brisbane 2018).

Project operations along the guideway and at stations would not generate substantial increases in noise or light and glare that would result in the alteration of existing land use patterns. However, increased train service will result in noise levels in Brisbane that exceed the City of Brisbane General Plan noise compatibility standards and could result in an alteration of planned land use patterns. Operation of the East Brisbane LMF will not substantially change planned land use patterns due to light and glare because project light and glare impacts will be controlled by project lighting design features.

IAMFs pertaining to noise and air quality controls, construction-related traffic, HSR station area planning, and context-sensitive design will minimize or avoid impacts of the Selected Alternative on station planning, land use, and development. A mitigation measure that includes several options to reduce noise levels for future planned land use will meet the City of Brisbane's General Plan noise compatibility standards.

5.6 Cumulative Impacts

As discussed in Section 3.18, Cumulative Impacts, of the Final EIS, IAMFs and mitigation measures will avoid or minimize most impacts associated with construction and operation of the Selected Alternative. However, when combined with other past, present, and reasonably foreseeable projects, construction of the Selected Alternative will result in cumulative impacts on transportation, air quality, biological and aquatic resources, and aesthetics and visual quality. In addition, operation of the Selected Alternative, in combination with other past, present, and reasonably foreseeable projects, will result in cumulative impacts on transportation, air quality, noise and vibration, and safety and security.

6 MITIGATION COMMITMENTS AND MONITORING

The Authority will supervise construction and require implementation of mitigation measures for the Selected Alternative. The Authority is responsible for ensuring that these commitments are met, and the Authority has a full oversight role for this project. It is also expected that other federal and state resource agencies will make frequent compliance reviews to ensure that all conditions of their respective permits are satisfied. Consistent with 40 C.F.R. Section 1505.2(c), all practicable means to avoid or minimize environmental harm caused by the Selected Alternative have been identified and incorporated as IAMFs. Further means to reduce, mitigate, or compensate for environmental impacts have been identified and included as mitigation measures in the Mitigation Monitoring and Enforcement Plan (MMEP), provided as Appendix D. The Authority will monitor the environmental commitments in the MMEP consistent with the NEPA Assignment MOU and applicable NEPA regulations and guidance.

The MMEP describes mitigation measures that will avoid, minimize, or compensate for reasonably foreseeable environmental impacts that result from constructing and operating the San Francisco to San Jose Project Section of the California HSR System. These measures were developed by the Authority, pursuant to its responsibilities under the NEPA Assignment MOU, in consultation with appropriate agencies, as well as with input received from the public.

The Selected Alternative incorporates the applicable IAMFs identified in Volume 2, Appendix 2-E, Project Impact Avoidance and Minimization Features, of the Final EIS. As part of the EIS, the Authority identified these IAMFs to avoid and minimize potential project impacts. The Authority will apply these IAMFs (including BMPs) to avoid impacts in many resource areas. Regulatory requirements (such as hazardous material disposal and various mandatory safety strategies) provide additional assurance that impacts on the environment would not occur or would be minimized to the fullest extent practicable. The applicable regulatory requirements and the IAMFs and mitigation measures that are part of the Selected Alternative are described in more detail in the MMEP. The IAMFs are a condition of project approval and must be implemented by the Authority during design, construction, and operation of the Selected Alternative approved by this ROD.

All IAMFs and mitigation measures are included within the MMEP. The Authority is required to comply with all mitigation measures adopted with this ROD. The MMEP, as incorporated into this ROD, is a formal commitment by the Authority to carry out all of the measures identified therein as a condition of project approval. Therefore, in designing, constructing, and operating the Selected Alternative, the Authority is required to adhere to and provide appropriate funding for all IAMFs and mitigation measures in the MMEP.

The Authority will use an Environmental Management System consisting of strategic planning, policies, and procedures; organizational structure; staffing and responsibilities; milestones; schedule; and resources devoted to achieving the Authority's environmental commitments. The Environmental Management System will also track the implementation of environmental requirements and compliance reports. This system will rely on data from the Authority's contractor, regional consultants, permitting activities, monitoring, inspections, and other compliance activities. This database will be managed by the Authority. Agency partners, including FRA, will receive regular updates from meetings and reports that will demonstrate compliance and progress relevant to their regulatory requirements.

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7 SUMMARY OF COMMENTS ON THE FINAL EIS AND RESPONSES

During the 30-day waiting period following publication of the Final EIS, the Authority received 14 written comment submittals. The range and types of comments received by the Authority during the waiting period included concerns and questions on the following topics:

- General opposition to the project
- General support of the project
- Suggested project alternatives
- Project impacts and mitigation for traffic congestion, bus transit impacts, and emergency vehicle delay at the 16th Street and Mission Bay Drive at-grade crossings in San Francisco
- Project impacts on planned development in the Brisbane Baylands area

Summaries of and responses to all correspondence received are included in Appendix G, Comments Received after Publication of the Final EIR/EIS. The Authority determined that these comments did not raise any significant new information or circumstances that would require preparation of a supplemental EIS.

In issuing this ROD, the Authority has considered all responsible and substantive comments received on the Final EIS, as well as the comments previously received on the Draft EIS and Supplemental Draft EIS.

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8 REVISIONS TO THE FINAL EIS

As a part of the Authority's review of the Final EIS, several minor corrections, clarifications, and updates were identified, which are identified in the Errata to the Final EIS in Appendix H of this ROD. The corrections, clarifications, and updates are not considered significant new information and do not change the analysis or conclusions of the Final EIS. These corrections, clarifications, and updates address items already covered in the Final EIS and do not trigger the need to prepare a supplemental EIS, per the CEQ NEPA regulations (40 C.F.R. § 1502.9(c)(1)). The Final EIS is herewith revised as described in the Errata to the Final EIS in Appendix H.

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9 DECISION

The Authority decides that Alternative A, as described in Chapter 2 of the Final EIS, is the Selected Alternative for the San Francisco to San Jose Project Section between 4th and King Street Station in San Francisco and Scott Boulevard in Santa Clara. In making this decision, the Authority concludes that among the alternatives considered, the Selected Alternative best fulfills the Purpose and Need and objectives for the project while balancing impacts on the natural and human environment.

In reaching this decision, the Authority considered the physical and operational characteristics and potential environmental consequences associated with all considered alternatives for the Project Section. In reaching this decision, the Authority, as lead agency, consulted with the cooperating agencies and considered the analysis of the No Project Alternative and the project alternatives in the EIS Documents, and all public and agency comments received.

The federal cooperating agencies may issue their own decision documents, as appropriate, consistent with their statutory and regulatory responsibilities.

9.1 Section 106

Section 106 of the NHPA (54 U.S.C. § 306108) requires that any federal agency having direct or indirect jurisdiction over a proposed federal or federally assisted undertaking take into account the effect of the undertaking on any district, site, building, structure, or other object that is listed or eligible for listing on the National Register of Historic Places. The California State Historic Preservation Officer (SHPO), the Authority, and the Advisory Council on Historic Preservation are signatories to the *First Amendment to the Programmatic Agreement among the Federal Railroad Administration, the Advisory Council on Historic Preservation, the California State Historic Preservation Officer, and the California High-Speed Rail Authority Regarding Compliance with Section 106 of the National Historic Preservation Act, As It Pertains to the California High-Speed Train Project* (Section 106 PA) effective July 21, 2021 (FRA et al. 2021). The FRA and STB are invited signatories to the Section 106 PA. In accordance with the Section 106 PA, a Memorandum of Agreement (MOA) for the treatment of adverse effects on historic properties in the portion of the Project Section between the 4th and King Street Station in San Francisco and Scott Boulevard in Santa Clara was executed by the SHPO and the Authority on June 22, 2022. STB is an invited signatory to the MOA. Consulting parties include:

- Amah Mutsun Tribal Band of Mission San Juan Bautista
- Indian Canyon Mutsun Band of Costanoan (Costanoan Indian Research, Inc.)
- The Ohlone Tribe
- North Valley Yokuts Tribe
- Tamien Nation
- Burlingame Historical Society
- Redwood City Historic Resources Advisory Committee
- City and County of San Francisco Planning Department
- City of Brisbane

The MOA is based on the SHPO Finding of Effect concurrence and the Final EIS conclusions that the identified historic built resources will not be adversely affected by the Selected Alternative and that the phased application of the criteria of adverse effect on identified archaeological resources is appropriate. The MOA further summarizes the results of the Section 106 process and includes treatment measures for both above- and below-ground cultural resources.

The assessment of adverse effects required under Section 106 of the NHPA was documented in the *San Francisco to San Jose Project Section, Section 106 Finding of Effect Report*, and the SHPO concurred with the Authority's findings on May 18, 2020. The SHPO concurrence letter and the MOA are provided in Appendix E to this ROD.

9.2 Section 4(f)

Projects that are undertaken by an operating administration of the U.S. Department of Transportation (USDOT) or that may receive federal funding or discretionary approvals from such an operating administration must demonstrate compliance with Section 4(f) of the USDOT Act of 1966 (49 U.S.C. § 303). Section 4(f) protects publicly owned parks, recreational areas, and wildlife and waterfowl refuges of national, state, or local significance. Section 4(f) also protects historic sites (including archaeological resources) of national, state, or local significance that are on public or private land.

Under the NEPA Assignment MOU, the Authority has been delegated the FRA's responsibility to comply with Section 4(f) for the project. The NEPA Assignment MOU stipulates that the Authority must consult with the FRA prior to making any constructive use determination, but otherwise delegates all responsibilities under Section 4(f) to the Authority. As further detailed below, there is no constructive use determination associated with the Project Section.

As described in Chapter 4, Section 4(f)/Section 6(f) Evaluation, of the Final EIS, the Authority has considered Section 4(f) properties throughout the planning and alternatives development and analysis process to avoid and minimize impacts on resources protected by Section 4(f). Chapter 4 of the Final EIS contains the Authority's evaluation of whether the project alternatives would result in any of the following "uses" of properties projected under Section 4(f):

- Permanent use
- Temporary occupancy
- Constructive use

The Authority evaluated any uses to determine if the criteria for a *de minimis* impact determination were met, and conducted appropriate coordination with officials having jurisdiction over each resource. One hundred forty-eight Section 4(f) properties are present in the Selected Alternative's RSA for recreational and cultural resources. Of the 148 properties evaluated, two historic resources (SPRR Depot/Millbrae Station and SPRR/Menlo Park Railroad Station) were determined to have *de minimis* impacts. The remaining 146 properties were determined to not have a Section 4(f) use. The Authority issued its Draft Section 4(f) Evaluation in the Draft EIS and finalized that Section 4(f) Evaluation in the Final EIS. The analysis and information in the Section 4(f) Evaluation included with the Final EIS is incorporated herein by reference.

9.2.1 Measures to Minimize Harm/Mitigation

The Authority developed measures to minimize harm to the Section 4(f) resources during project planning to avoid or minimize impacts, as well as mitigation measures to compensate for unavoidable project impacts as described in Table 4-12 in the Final EIS. The measures identified in these tables are now incorporated into the Selected Alternative. The Authority is continuing ongoing coordination, as appropriate, with the officials with jurisdiction over the Section 4(f) properties.

9.2.2 Section 4(f) Determination

Section 4(f) requires the selection of an alternative that avoids the use of a Section 4(f) property if that alternative is deemed feasible and prudent and the use does not qualify for a finding of *de minimis* impact. If there is no prudent and feasible avoidance alternative and there is more than one alternative that results in the use of a Section 4(f) property that is not a *de minimis* impact, the Authority must select the alternative that has the potential to cause the least overall harm in light of the preservationist purpose of the statute.

The Selected Alternative would not result in the use of any Section 4(f) property that is not a *de minimis* impact. As described above and in Chapter 4 of the Final EIS, the Authority finds that the Selected Alternative's impacts on two historic properties, the SPRR Depot/Millbrae Station and SPRR/Menlo Park Railroad Station, would be *de minimis*. The SHPO, the official with jurisdiction over the SPRR Depot/Millbrae Station and SPRR/Menlo Park Railroad Station, also concurred in writing with these findings.

9.3 General Conformity Determination

As part of the environmental review of the Project Section, the Authority conducted and the FRA approved a general conformity evaluation pursuant to 40 C.F.R. Part 51, Subpart W, and 40 C.F.R. Part 93, Subpart B. The Authority conducted the general conformity evaluation following all regulatory criteria and procedures and in coordination with any relevant jurisdictional agencies. As a result of this review, the FRA concluded, because project-generated emissions would either be less than General Conformity *de minimis* thresholds or, if in exceedance of General Conformity *de minimis* thresholds, would either be offset (for construction phase) or would be less than zero (for operational phase), that the Selected Alternative's emissions can be accommodated in the State Implementation Plan (SIP) for the SFBAAB.

Based on the FRA's evaluation, the FRA concluded that the Selected Alternative, as designed, conforms to the purpose of the approved SIP and is consistent with all applicable requirements. The Final General Conformity Determination is included in this ROD as Appendix A.

9.4 Section 7 Endangered Species Finding

The proposed action (construction and operation of the Selected Alternative) is in compliance with Section 7 of FESA. Because the proposed action is likely to affect threatened or endangered species subject to USFWS and NMFS jurisdiction, the Authority prepared a BA for the project and consulted with USFWS and NMFS, as required under Section 7 of FESA. After evaluating the potential effects of the proposed action, and after additional informal consultation with the USFWS and NMFS, the Authority determined that the San Francisco to San Jose Project Section may affect, and is likely to adversely affect, the following species:

- Callippe silverspot butterfly (*Speyeria callippe callippe*) (endangered)
- Mission blue butterfly (*Icaricia icarioides missionensis*) (endangered)
- San Francisco garter snake (*Thamnophis sirtalis tetrataenia*) (endangered)
- Bay checkerspot butterfly (*Euphydryas editha bayensis*) (threatened)
- California red-legged frog (*Rana draytonii*) (threatened)
- Central California coast steelhead (*Oncorhynchus mykiss*) distinct population segment (DPS) (threatened)
- North American green sturgeon (*Acipenser medirostris*) southern DPS (threatened)

The Authority developed a draft BA for USFWS and NMFS that evaluated direct, indirect, and cumulative effects of the project on federally listed species and their designated critical habitat. The Authority submitted the draft BA to the USFWS on June 24, 2021, for review. Following USFWS review and additional consultation and coordination in June through October 2021, the Authority submitted additional information and requested formal consultation on December 2, 2021. On April 22, 2022, USFWS issued a BO for the San Francisco to San Jose Project Section (included as Appendix B to this ROD). In the BO, USFWS determined that the project is not likely to jeopardize the continued existence of the five listed wildlife species above that occur in the action area. Consistent with Section 7 requirements, the BO also stipulates several reasonable and prudent measures to avoid or minimize potential incidental take. The Authority will implement the measures identified in the USFWS BO.

The Authority submitted the draft BA to NMFS for initial review in November 2020. Following additional consultation and coordination with NMFS throughout 2021 and early 2022, the Authority revised and resubmitted the draft BA and initiated formal Section 7 consultation with NMFS in September 2021. The Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. § 1801 et seq.) requires federal agencies to consult with NMFS on activities that may adversely affect EFH for species that are managed under federal fishery management plans in U.S. waters. Impacts associated with EFH are addressed through a coordination process with NMFS that may be combined with ESA Section 7 consultation. The BA therefore also addressed

EFH. NMFS issued a BO on March 18, 2022, concluding that the project is not likely to jeopardize the continued existence of the central California coast steelhead DPS and the southern DPS of North American green sturgeon, nor destroy or adversely modify their designated critical habitat. NMFS also reviewed the proposed action for its effects on EFH for Pacific Coast salmon, Pacific Coast groundfish, and coastal pelagic species, concluding the project would adversely affect the EFH of these fisheries in the action area and included EFH conservation recommendations. The Authority will adopt all practicable EFH conservation recommendations. With adoption, the project would likely no longer have an adverse effect on the identified EFH. The NMFS BO is included as Appendix C to this ROD.

9.5 Wetlands Finding

In addition to NEPA and other environmental laws, the federal lead agency is also required to make findings pursuant to USEO 11990, Protection of Wetlands (May 24, 1977), and the USDOT Wetlands Order, USDOT Order 5660.1A, Preservation of the Nation's Wetlands (August 24, 1978).

Construction of Selected Alternative would result in the conversion and/or degradation of aquatic resources by culverting a portion of Visitacion Creek, filling several wetlands, and constructing and modifying new bridges or culverts for the railbed, roadways, and other infrastructure to cross over watercourses. Aquatic resources within the Project Section were identified during the jurisdictional delineation (see the *San Francisco to San Jose Project Section Aquatic Resources Delineation Report* [Authority 2020b]). In April 2020, the USACE issued the preliminary jurisdictional determination (PJD) concurring with the Authority's delineation. In April 2021, the USACE requested additional edits to the *San Francisco to San Jose Project Section Aquatic Resources Delineation Report* due to a field verification conducted for another project corresponding to the LMF area. Consequently, the USACE revised the PJD based on the result of the field verification. The Selected Alternative will require a permit from the USACE pursuant to Section 404 of the CWA.

In June 2020, USEPA and USACE provided letters on the preliminary LEDPA determination by the Authority. Both agencies concurred that the Selected Alternative represents the preliminary LEDPA for the San Francisco to San Jose Project Section. Design requirements and permit conditions will require contractors to avoid impacts on jurisdictional waters wherever feasible. The requirements identified in the MMEP, incorporated as part of this document (Appendix D), will minimize the destruction, loss, or degradation of wetlands and preserve and enhance the natural and beneficial values of wetlands.

To the maximum extent practicable, the Authority will use pre- and post-construction BMPs for sediment and erosion control. The measures and features included in the MMEP will reduce and offset impacts on wetlands to a level sufficient to achieve no net loss. However, if determined to be necessary by USACE and the State Water Resources Control Board, these measures can be increased through their respective permitting processes, or additional measures may be recommended and reflected in other project permits and authorizations.

Based upon USACE findings and the Authority's evaluation, the Authority determines that the Selected Alternative is consistent with USEO 11990 and USDOT Order 5660.1A.

9.6 Floodplains Finding

USDOT Order 5650.2, Floodplain Management and Protection (April 23, 1979), implements USEO 11988, Floodplain Management (May 24, 1977). These orders state that the federal lead agency may not approve an alternative involving a significant encroachment unless the agency can make a finding that the proposed encroachment is the only practicable alternative. The major purposes of USEO 11988 are to avoid federal support for floodplain development; to prevent uneconomic, hazardous, or incompatible use of floodplains; to restore and preserve the natural and beneficial floodplain values; and to be consistent with the standards and criteria of the National Flood Insurance Program.

As indicated in Section 3.8, Hydrology and Water Resources, of the Final EIS, the Authority, as the federal lead agency under the NEPA Assignment MOU, concludes that the Selected Alternative would not result in any substantial adverse impacts on natural and beneficial values of the floodplains and would not result in a substantial change in flood risks or damage. Design of the Selected Alternative includes effective measures to avoid or minimize the potential for exposure of HSR passengers and employees to flooding; new or additional exposure to flooding risks and hazards from the failure of a levee or dam would not occur.

Based upon these findings, the Authority determines that the Selected Alternative is consistent with requirements of USEO 11988 and USDOT Order 5650.2.

9.7 Environmental Justice Finding

USDOT Order 5610.2C, U.S. Department of Transportation Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (May 14, 2021) (USDOT 2021) implements USEO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (February 16, 1994), which requires that each federal agency make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.

As documented in Chapter 5, Environmental Justice, of the Final EIS, concentrations of minority populations or low-income populations in the resource study area are greater than the reference community in portions of San Francisco, Daly City, South San Francisco, San Bruno, San Mateo, Redwood City, North Fair Oaks, Mountain View, Sunnyvale, and Santa Clara. Outreach activities for minority populations and low-income populations and businesses within the project corridor have been conducted since 2016. Volume 2, Appendix 5-A, Environmental Justice Engagement Summary Report, of the Final EIS documents how minority populations and low-income populations have been engaged in project planning activities.

The Selected Alternative will result in local and regional benefits to minority populations and low-income populations. These benefits include improvements in mobility within the region, air quality improvements, safety improvements for vehicles and pedestrians along the Caltrain corridor, and new employment opportunities during construction and operations.

The design of the Selected Alternative between the 4th and King Street Station in San Francisco and Scott Boulevard in Santa Clara minimizes or avoids adverse impacts related to health risks associated with air quality during operations; electromagnetic fields and electromagnetic interference; public utilities and energy; geology, soils, seismicity, and paleontological resources; biological and aquatic resources; water quality; community safety and security; community cohesion; station planning, land use, and development; parks, recreation, and school district play areas; and aesthetics and visual quality. The project would not adversely affect low-income populations and minority populations in these areas (see discussion of these resource topics in Chapter 5 of the Final EIS).

Project effects associated with emergency vehicle access during construction; hazardous materials and wastes; and disturbance or destruction of cultural resources were determined to have adverse effects on populations, including minority populations and low-income populations, which were addressed through resource-specific mitigation.

Overall, the Selected Alternative will result in a limited set of adverse impacts on minority populations and low-income populations residing or conducting business in the project corridor. These adverse impacts relate to traffic congestion/delay, impacts on bus transit, emergency response times, noise and vibration, displacements, and air quality impacts. These impacts are expected to be similar in kind and magnitude as those that would be experienced by the general population living or working along the corridor, and would be offset by the project's benefits. Project benefits, including safety improvements along the Caltrain corridor, increased transit connectivity, jobs, and air quality improvements, will accrue to minority populations and low-income populations and to the general population within the corridor. Economic benefits include

job creation and regional employment growth that will result from construction and operation of the Selected Alternative. These benefits will accrue equally to minority populations and low-income populations and to the general population.

With the proposed design measures, BMPs, off-setting benefits, and mitigation commitments, the Authority has concluded that the Selected Alternative will not result in disproportionately high and adverse human health or environmental effects on minority populations and low-income populations.

10 CONCLUSION

The Authority, as the federal lead agency, and as authorized by the NEPA Assignment MOU, has reached a decision that most closely aligns with the Authority's statutory mission and the responsibilities assigned to it by the FRA pursuant to NEPA Assignment, considering economic, environmental, technical, and other factors and based on the information contained within the Final EIS and the project record.

For the San Francisco to San Jose Project Section between the 4th and King Street Station in San Francisco and Scott Boulevard in Santa Clara, the Authority approves Alternative A as the Selected Alternative, including the 4th and King Street and Millbrae Stations, the East Brisbane LMF, and associated project elements. The Authority has selected this alternative because: (1) it best satisfies the Purpose and Need and objectives for the proposed action; and (2) it minimizes impacts on the natural and human environment by utilizing an existing transportation corridor where practicable and incorporating mitigation measures.

Brian P. Kelly
Chief Executive Officer
California High-Speed Rail Authority

Date

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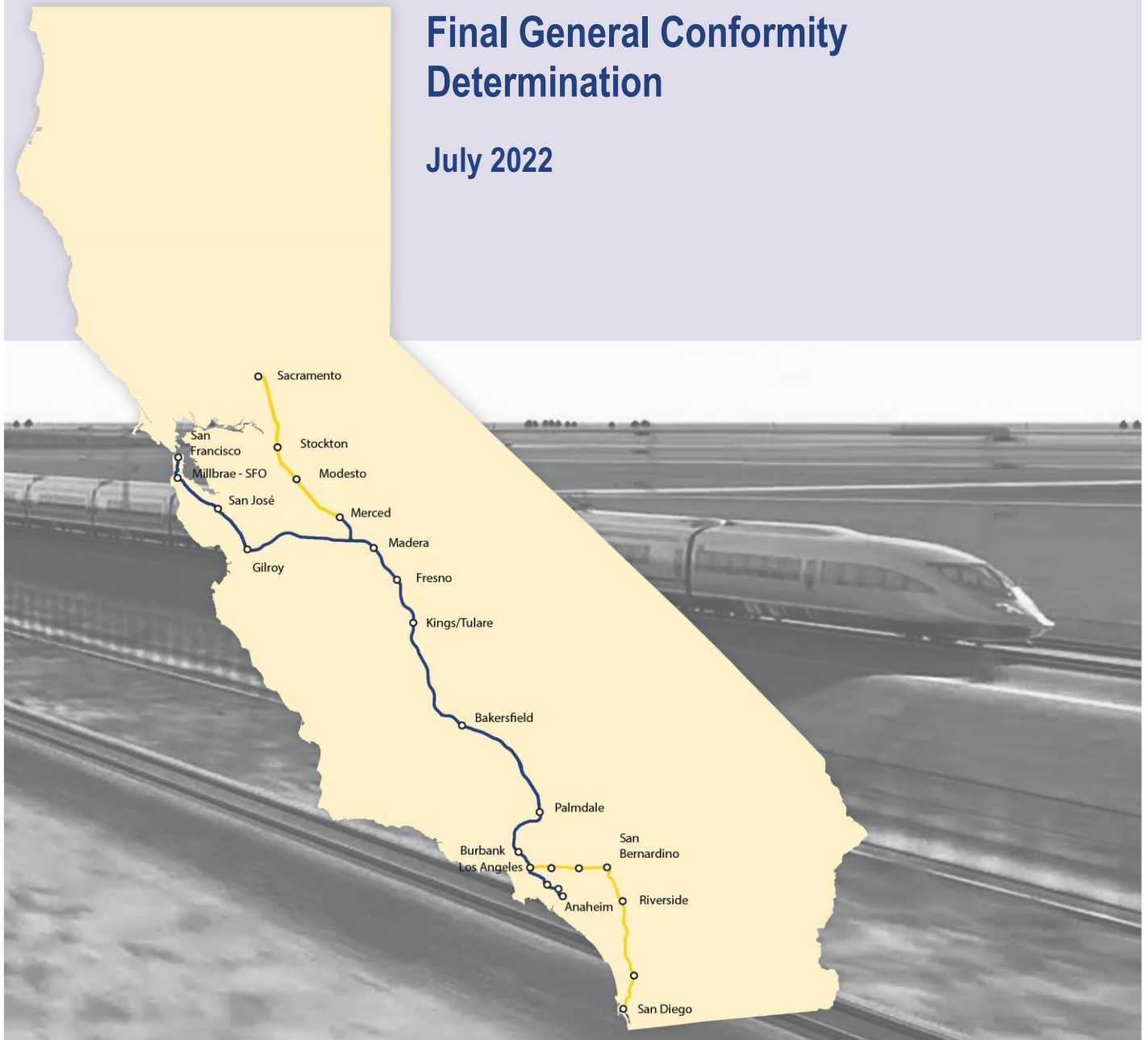
APPENDIX A: FINAL GENERAL CONFORMITY DETERMINATION

California High-Speed Rail Authority

San Francisco to San Jose Project Section

Final General Conformity Determination

July 2022



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.

California High-Speed Rail System, San Francisco to San Jose Section
Final General Conformity Determination


Prepared by:

U.S. Department of Transportation
Federal Railroad Administration

This Final General Conformity Determination has been prepared by the Federal Railroad Administration (FRA), pursuant to Section 176(c) of the Federal Clean Air Act, 42 U.S.C. 7506(c)(1), and its implementing regulations (“General Conformity Rule”). Specifically, this Final General Conformity Determination documents FRA’s finding that the California High-Speed Rail System, San Francisco to San Jose Section will comply with the General Conformity Rule, provided that any construction emissions exceeding *de minimis* levels will be offset through agreements between the California High-Speed Rail Authority and the Bay Area Air Quality Management District.

7/22/2022

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OSTERHUES

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Date of Approval

Marlys Osterhues
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EXECUTIVE SUMMARY

The California High-Speed Rail (HSR) System, proposed by the California High-Speed Rail Authority (Authority), will provide intercity, high-speed service on more than 800 miles of guideway throughout California, connecting the major population centers of Sacramento, the San Francisco Bay Area (Bay Area), the Central Valley, Los Angeles, the Inland Empire, Orange County, and San Diego. The San Francisco to San Jose Project Section (Project Section, or Project), which is the focus of this General Conformity Determination, is a critical link connecting San Francisco to San Jose, which in turn connects to the San Jose to Central Valley Wye Project Extent and the Central Valley portion of the HSR system in Merced County, which ultimately connects to the portion of the system running north to Merced and south to Fresno and Southern California.¹

The General Conformity Rule, as codified in Title 40 Code of Federal Regulations Part 93, Subpart B, establishes the process by which federal agencies determine conformance of proposed projects that are federally funded or require federal approval with applicable air quality standards. This determination must demonstrate that the Project would not cause or contribute to new violations of air quality standards, exacerbate existing violations, or interfere with timely attainment or required interim emissions reductions towards attainment.

FRA prepared a Draft General Conformity Determination, pursuant to 40 C.F.R. part 93, subpart B, which establishes the process for complying with the General Conformity requirements of the Clean Air Act. FRA published a notice in the Federal Register on May 2, 2022 advising the public of the availability of the Draft Conformity Determination for a 30-day review and comment period. The Draft Conformity Determination was published at <http://www.regulations.gov>, Docket No. FRA-2022-0026. The comment period of the Draft Conformity Determination closed on June 2, 2022. FRA received one comment on the Draft General Conformity Determination on behalf of the City of Brisbane. The commenter stated “the Draft GCD findings are erroneous because it is based upon the Project’s EIR/EIS, which provides inaccurate and incomplete information.” The commenter also identified specific statements in the Draft General Conformity Determination where the commenter believed the analysis was deficient. FRA prepared a response to the City’s comment, which is included as Attachment B, Comments and Responses, to this Final General Conformity Determination.

This Final General Conformity Determination documents the FRA’s finding that the Project complies with the General Conformity Rule and that it conforms to the purposes of the area’s approved State Implementation Plan and is consistent with all applicable requirements. The Final General Conformity Determination is available at <http://www.regulations.gov>, Docket No. FRA-2022-0026, and on FRA’s website at <https://railroads.dot.gov/environment/environmental-reviews/clean-air-act-california-general-conformity-determinations>. This Final General Conformity Determination is based on the impact avoidance and minimization features and mitigation measures described in Volume 2, Appendix 2-E, Project Impact Avoidance and Minimization Features, and Section 3.3.7, Mitigation Measures, respectively, of the San Francisco to San Jose Project Section Final Environmental Impact Report/Environmental Impact Statement (Authority 2022) and that will be implemented for the Project. This compliance is demonstrated as follows:

- Operations of the Project would result in a reduction of regional emissions of all applicable air pollutants and would not cause a localized exceedance of an air quality standard.
- While emissions generated during construction of the Project would exceed the General Conformity thresholds for nitrogen oxides in the San Francisco Bay Area Air Basin, these emission increases would be offset through an agreement with the Bay Area Air Quality Management District. See Attachment A. The Authority has committed to fully offset all construction emissions (to net zero) for every year of construction in which emissions exceed the General Conformity thresholds.

¹ As part of its first phase, the California HSR System is planned as seven distinct sections from San Francisco in the north to Los Angeles and Anaheim in the south.

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Attachments

_Toc105405003Attachment A: BAAQMD Letter(s) of Agreement

ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
AP-42	USEPA's AP-42 Compilation of Air Pollutant Emission Factors
Authority	California High-Speed Rail Authority
BAAQMD	Bay Area Air Quality Management District
Bay Area	San Francisco Bay Area
C.F.R.	Code of Federal Regulations
CAA	Clean Air Act
CalEEMod	California Emissions Estimator Model
CARB	California Air Resources Board
CEQA	California Environmental Quality Act
CO	carbon monoxide
EIR	environmental impact report
EIS	environmental impact statement
EMFAC2017	EMission FACtors 2017
EMMA	Environmental Mitigation Management and Application
FRA	Federal Railroad Administration
GHG	greenhouse gas
HSIPR	High-Speed Intercity Passenger Rail
HSR	high-speed rail
I-	Interstate
IAMF	impact avoidance and minimization feature
MBARD	Monterey Bay Air Resources District
MOU	memorandum of understanding
mph	miles per hour
MPO	metropolitan planning organization
NAAQS	national ambient air quality standards
NCCAB	North Central Coast Air Basin
NEPA	National Environmental Policy Act
NO ₂	nitrogen dioxide
NO _x	nitrogen oxide
NZE	near-zero emission (vehicle)
O ₃	ozone
PM	particulate matter
PM ₁₀	particulate matter less than or equal to 10 microns in diameter
PM _{2.5}	particulate matter less than or equal to 2.5 microns in diameter

Project Section, Project	San Francisco to San Jose Project Section
Prop 1A	Proposition 1A
ROD	record of decision
ROG	reactive organic gases
RSA	resource study area
SFBAAB	San Francisco Bay Area Air Basin
SAFE	Safer Affordable Fuel-Efficient
SIP	State Implementation Plan
SJVAB	San Joaquin Valley Air Basin
SJVAPCD	San Joaquin Valley Air Pollution Control District
SO ₂	sulfur dioxide
SO _x	sulfur oxide
tpy	tons per year
SR	State Route
U.S.C.	United States Code
USEPA	U.S. Environmental Protection Agency
VMT	vehicles miles traveled
VOC	volatile organic compound
ZE	zero emission (vehicle)

1 INTRODUCTION

This Final General Conformity Determination for the San Francisco to San Jose Project Section (Project Section, or Project) of the California High-Speed Rail (HSR) System was prepared consistent with the implementing regulations of Section 176 of the Clean Air Act (CAA). Section 176(c)(1) of the CAA prohibits federal agencies from engaging in, supporting, providing financial assistance for, licensing, permitting, or approving any activities that do not conform to an applicable CAA implementation plan. That applicable plan may be a federal, state, or tribal implementation plan.

The CAA defines nonattainment areas as geographic regions that have been designated as not meeting one or more of the national ambient air quality standards (NAAQS). The CAA requires that each state prepare a State Implementation Plan (SIP) for each nonattainment area. A maintenance plan must be prepared for each former nonattainment area that subsequently demonstrated compliance with the standards. The SIP is a state's plan for how it will meet the NAAQS by the deadlines established by the CAA.

The General Conformity Rule is codified in Title 40 Code of Federal Regulations (C.F.R.) Part 93, Subpart B, "Determining Conformity of General Federal Actions to State or Federal Implementation Plans." Conformity to an implementation plan means "conformity to an implementation plan's purpose of eliminating or reducing the severity and number of violations of the NAAQS and achieving expeditious attainment of such standards; and that such activities will not cause or contribute to any new violation of any standard in any area, increase the frequency or severity of any existing violation of any standard in any area; or delay timely attainment of any standard or any required interim emission reductions or other milestones in any area" (42 U.S.C. 7506(c)(1)). 40 C.F.R. Part 93 also establishes the process by which federal agencies determine conformity. This determination must demonstrate that the federal action would not cause or contribute to new violations of air quality standards, exacerbate existing violations, or interfere with timely attainment or required interim emissions reductions towards attainment. Since the Project is receiving federal funds through grants from the Federal Railroad Administration (FRA) and may also receive safety approvals from the FRA, it is an action that may be subject to the General Conformity Rule.

FRA prepared this Final General Conformity Determination after release of the *San Francisco to San Jose Project Section Final Environmental Impact Report (EIR)/Environmental Impact Statement (EIS)*, which complies with the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA). Because the analysis used for the EIR/EIS also generated the information necessary for the General Conformity Determination, specific analysis may be incorporated herein by reference.

1.1 Regulatory Status of Resource Study Area

In November 1993, the U.S. Environmental Protection Agency (USEPA) promulgated two sets of regulations to implement section 176(c) of the CAA. The final transportation conformity regulations address transportation plans, programs, and projects developed, funded, or approved under title 23 United States Code (U.S.C.) or the Federal Transit Act, 49 U.S.C. Section 1601 et seq. (40 C.F.R. Part 93 Subpart A). These regulations have been revised several times since they were first issued. Though the Transportation Conformity regulations do not apply to the Project (see Section 1.2, General Conformity Regulations), many of the transportation planning documents developed under those regulations are helpful in understanding the regional air quality and planning status of the resource study area (RSA). The final general conformity regulations were approved on November 30, 1993, and revised on April 5, 2010. Because of the federal funding and potential safety and other approvals by FRA, the Project is subject to the general conformity regulations.

The RSA for the Project is the San Francisco Bay Area Air Basin (SFBAAB). Figure 1 shows the Project footprint as it is situated in the air basin. Planning documents for pollutants for which the SFBAAB is classified as federal nonattainment or maintenance are developed by the Bay Area Air Quality Management District (BAAQMD), and California Air Resources Board (CARB) and approved by the USEPA.



Sources: Authority 2019a, 2019b; CARB 2012

MARCH 2019

Note: The portion of the RSA corresponding to the truck route in the NCCAB and SJVAB is not shown.

Figure 1 Resource Study Area Air Basins

Table 1 Planning Documents Relevant to the Resource Study Area

Plan	Status
2001 San Francisco Bay Area Ozone Attainment Plan for the 1-Hour National Ozone Standard	<p>In a March 30, 2001, <i>Federal Register</i> notice (66 Fed. Reg. 17379), the USEPA proposed to make a finding that the Bay Area has not attained the national 1-hour O₃ standard. The USEPA proposed partial approval and partial disapproval of the 1999 Ozone Attainment Plan. On August 28, 2001, the USEPA took final action on its March 2001 notice, triggering a CAA requirement that a new plan be submitted within 1 year of the effective date of the USEPA’s final action.</p> <p>The revised 2001 Ozone Attainment Plan included the necessary changes to address the USEPA’s disapproval of the prior plan. In addition, to address the requirements triggered by the USEPA’s finding of failure to attain, the plan included a new emissions inventory and commitments to adopt and implement additional control measures to attain the standard by 2006, the attainment deadline. It also included additional contingency measures in the event the Bay Area did not attain the standard by 2006.</p>
2017 Clean Air Plan	<p>Although not a federal planning document, the Bay Area 2017 <i>Spare the Air, Cool the Climate</i> (Clean Air Plan) provided a comprehensive plan to improve Bay Area air quality and protect public health. The Clean Air Plan defined a control strategy that the BAAQMD and its partners is implementing to: (1) attain all state and national ambient air quality standards; (2) eliminate disparities among Bay Area communities in cancer health risk from toxic air contaminants; and (3) reduce GHG emissions to protect the climate.</p>

Sources: BAAQMD 2001, 2017a
 BAAQMD = Bay Area Air Quality Management District
 Bay Area = San Francisco Bay Area
 CAA = Clean Air Act
 GHG = greenhouse gases
 O₃ = ozone
 SIP = State Implementation Plan
 USEPA = U.S. Environmental Protection Agency

1.2 General Conformity Regulations

On November 30, 1993, the USEPA promulgated final General Conformity regulations at 40 C.F.R. Part 93 Subpart B for all federal activities except highways and transit programs covered by Transportation Conformity. The regulations in Subpart B were subsequently amended in April 2010. Because the Project requires approval by the FRA will not be funded or require approval(s) under Title 23 U.S.C. or the Federal Transit Act, 49 U.S.C. Section 1601 et seq., the General Conformity requirements are applicable, rather than Transportation Conformity. In general terms, unless a Project is exempt under 40 C.F.R. Section 93.153(c) or is not on the agency’s presumed-to-conform list pursuant to 40 C.F.R. Section 93.153(f), a General Conformity Determination is required where a federal action in a nonattainment or maintenance area causes an increase in the total of direct and indirect emissions of the relevant criteria pollutants and precursor pollutants that is equal to or exceeds certain *de minimis* rates.

During the applicability analysis, the federal agency determines the following:

- Whether the action will occur in a nonattainment or maintenance area
- Whether one or more of the specific exemptions apply to the action
- Whether the federal agency has included the action on its list of presumed-to-conform actions
- Whether the total direct and indirect emissions are below or above the *de minimis* levels
- Where a facility has an emissions budget approved by the state or tribe as part of the SIP or Tribal Implementation Plan, the federal agency determines whether the emissions from the proposed action are within the budget.

The USEPA's *General Conformity Guidance: Questions and Answers* (USEPA Guidance) (USEPA 1994) states that the applicability analysis can be, but is not required to be, completed concurrently with any analysis required under the NEPA. The applicability analysis for this Project is described in Chapter 7, Applicability Analysis. If, after the applicability analysis, the Federal agency concludes it should conduct a conformity determination, it may demonstrate conformity by one or more of several prescribed methods. These methods include:

- Demonstrating that the direct and indirect emissions are specifically identified in the relevant implementation plan
- Obtaining a written statement from the entity responsible for the implementation plan that the total indirect and direct emissions from the action, along with other emissions in the area, will not exceed the total implementation plan emission budget
- Fully offsetting the total direct and indirect emissions by reducing emissions of the same pollutant in the same nonattainment or maintenance area

2 CALIFORNIA HIGH-SPEED RAIL PROJECT

2.1 California High-Speed Rail System

The Authority is responsible for planning, designing, constructing, and operating the HSR system. Its mandate is to develop an HSR system connecting the state's major population centers and coordinate with the state's existing transportation network, which includes intercity rail and bus lines, regional commuter rail lines, urban rail and bus transit lines, highways, and airports.

The HSR system will provide intercity, high-speed service on more than 800 miles of railroad throughout California, connecting the major population centers of Sacramento, the San Francisco Bay Area (Bay Area), the Central Valley, Los Angeles, the Inland Empire, Orange County, and San Diego. It will use state-of-the-art, electrically powered, high-speed, steel-wheel-on-steel-rail technology, including contemporary safety, signaling, and automatic train control systems, with trains capable of operating up to 220 miles per hour (mph) over a grade-separated, dedicated guideway alignment.

The FRA is responsible for oversight and regulation of railroad safety and implementation of the High-Speed Intercity Passenger Rail (HSIPR). As part of the HSIPR Program, the FRA is providing partial funding for the environmental analysis and documentation required under NEPA, CEQA, and other related environmental laws. Pursuant to U.S. Code Title 23 Section 327, under the NEPA Assignment Memorandum of Understanding between the FRA and the State of California, effective July 23, 2019, the Authority is the federal lead agency for environmental reviews for all Authority Phase 1 and Phase 2 California HSR System projects. The FRA performs Clean Air Act Conformity determinations and other federal approvals retained by the FRA under the NEPA Assignment Memorandum of Understanding.

Although the San Francisco to San Jose Project Section of the HSR system is independent of the other HSR project sections for purposes of NEPA and CEQA analysis, certain construction activities may occur concurrently with construction activities for other project sections within the SFBAAB. Therefore, estimates of cumulative emissions, where available, have been presented in Chapter 12, Estimated Emission Rates and Comparison to *de minimis* Thresholds—Cumulative Analysis, of this document. These future emissions estimates have been included in this document in the interest of full disclosure of future construction emissions that may occur in the SFBAAB from other sections of the HSR system; each of these sections will undergo separate conformity determinations.

2.2 California High-Speed Rail System—San Francisco to San Jose Project Section

The Project Section will provide HSR service between the 4th and King Street Station in San Francisco and San Jose Diridon Station in downtown San Jose, with a station in downtown Millbrae. It would connect San Francisco to San Jose, where it will also connect to the San Jose to Merced Project Section. The San Jose to Merced Project Section alignment will then turn eastward to connect to the Central Valley portion of the HSR system at the Central Valley Wye in Merced County, which in turn will connect to the portion of the HSR system running north to Merced and south to Fresno and Southern California.

The Project Section is designed to allow trains to and from the Bay Area to achieve the Proposition 1A (Prop 1A) travel time requirements. Prop 1A requires that the HSR system be designed to achieve a nonstop service travel time of 2 hours and 10 minutes between San Jose and Los Angeles Union Station, including a 30-minute ride between San Francisco and San Jose

(Cal. Streets & Highways Code § 2704.09(b)(4)). The Project Section follows existing transportation corridors and is designed to achieve travel times consistent with Prop 1A.²

Although the Project Section is defined as the section connecting San Francisco to San Jose, the southern-most subsection—the San Jose Diridon Station Approach Subsection—is fully analyzed as part of the *San Jose to Merced Project Section Final Environmental Impact Report/Environmental Impact Statement* and corresponding technical reports. While the analysis of this subsection has been incorporated into the *San Francisco to San Jose Project Section Final Environmental Impact Report/Environmental Impact Statement* to support a station-to-station analysis with logical termini for the San Francisco to San Jose Project Section, emissions and concentration results for the San Jose Diridon Station Approach Subsection are not included in this Final General Conformity Determination. Rather, this Final General Conformity Determination encompasses the Project Section from 4th and King Street Station in San Francisco to Scott Boulevard in Santa Clara. Refer to the Final General Conformity Determination for the San Jose to Merced Project Section for analysis that includes the San Jose Diridon Station Approach Subsection.

The Project corridor between Fourth Street in San Francisco and Scott Boulevard in Santa Clara constitutes approximately 43 miles of alignment, which includes blended Caltrain/HSR track and systems, and station locations at 4th and King Street Station in San Francisco and Millbrae-San Francisco International Airport Station in Millbrae, and a light maintenance facility (LMF) in Brisbane. HSR stations at 4th and King Street and Millbrae would support transit-oriented development, provide an interface with regional and local mass transit services, and provide connectivity from San Francisco to the South Bay and Central Valley highway network.³

The Project comprises the following four subsections:

- **San Francisco to South San Francisco**—Extends approximately 10 miles from 4th and King Street Station in San Francisco to Linden Avenue in South San Francisco.
- **San Bruno to San Mateo**—Extends approximately 8 miles from Linden Avenue in South San Francisco to Ninth Avenue in San Mateo.
- **San Mateo to Palo Alto**—Extends approximately 16 miles from Ninth Avenue in San Mateo to San Antonio Road in Palo Alto.
- **Mountain View to Santa Clara**—Extends approximately 9 miles from San Antonio Road in Palo Alto to Scott Boulevard in Santa Clara.

The Authority has developed two end-to-end alternatives for the Project: Alternative A and Alternative B, described in detail in Chapter 2, Alternatives. It is estimated that construction of the Project would take approximately 5 years, with initiation of construction in 2021 and completion in 2025.⁴

² Prop 1A requires that the HSR system be designed to operate on an alignment that follows existing transportation and utility corridors to the extent feasible (Cal. Streets & Highways Code § 2704.09(g)).

³ *South Bay* refers to Santa Clara County.

⁴ As construction is expected to take place later than these dates, these construction emissions estimates are conservative, as future emissions rates will be lower due to the implementation of cleaner and newer equipment.

3 AIR QUALITY CONDITIONS IN THE RESOURCE STUDY AREA

3.1 Meteorology and Climate

Air quality is affected by the rate and location of pollutant emissions and by meteorological conditions that influence movement and dispersal of pollutants in the atmosphere. Atmospheric conditions, such as wind speed, wind direction, and air temperature gradients, along with local topography, provide the link between air pollutant emissions and local air quality levels.

Local meteorological conditions vary greatly throughout the Bay Area because of topography and elevation as well as proximity to local waterbodies. The Project would traverse two unique and different meteorological zones in the SFBAAB: the San Francisco Peninsula and the Santa Clara Valley. These two areas are described in the following sections, based on information provided by the BAAQMD (BAAQMD 2017b).

In addition, trucks associated with disposal of material excavated for construction of the LMF would use State Route (SR) 152 to Interstate (I-) 5 to access the Kettleman Landfill in Kettleman City, CA. A small portion (approximately 0.1 mile) of SR 152 is located in the MBARD. I-5 is located in the western portion of the SJVAPCD. The meteorology of the MBARD and SJVAPCD is also described below, based on information provided by MBARD (MBUAPCD 2008) and SJVAPCD (SJVAPCD 2015).

3.1.1 San Francisco Peninsula

The San Francisco Peninsula region extends from the Golden Gate to northwest of San Jose, bounded by the San Francisco Bay on the east, and the Pacific Ocean on the west. The Santa Cruz Mountains run up the center of the peninsula, with elevations exceeding 2,000 feet at the southern end, decreasing to 500 feet in South San Francisco. Coastal towns experience a high incidence of cool, foggy weather in the summer. Cities in the southeastern peninsula experience warmer temperatures and fewer foggy days because the marine air layer is blocked by the ridgeline to the west. San Francisco lies at the northern end of the peninsula. Because most of San Francisco's topography is below 200 feet, marine air flows easily across most of the city, making the climate cool and windy.

At the northern end of the peninsula in San Francisco, pollutant emissions are high, especially from motor vehicle congestion. Localized pollutants, such as carbon monoxide (CO), can build up in urban canyons. Urban canyons are created when streets divide dense blocks of structures, especially skyscrapers, which can inhibit air circulation at the ground level. In most other areas, winds are generally fast enough to carry the pollutants away before they can accumulate. Air pollution potential is highest along the southeastern portion of the peninsula, where the high winds and fog of the marine layer are obstructed, resulting in accumulated concentrations of pollutants. Pollutant transport from upwind sites is common. In the southeastern portion of the peninsula, air pollutant emissions are relatively high because of motor vehicle traffic as well as stationary sources.

3.1.2 Santa Clara Valley

The Santa Clara Valley is bounded by San Francisco Bay to the north and by mountains to the east, south, and west. Temperatures are warm on summer days and cool on summer nights, and winter temperatures are mild. At the northern end of the valley, mean maximum temperatures are 79 degrees Fahrenheit (°F) to 82°F during the summer and 55°F to 59°F during the winter, and mean minimum temperatures range from 55°F to 59°F in the summer and 39°F to 43°F in the winter. Further inland, where the moderating effect of the bay is not as strong, temperature extremes are greater. For example, in San Martin, near the southern end of the Santa Clara Valley, temperatures can be more than 10°F warmer on summer afternoons and more than 10°F cooler on winter nights. Higher daytime temperatures can lead to increased ozone formation.

The air pollution potential of the Santa Clara Valley is high. High summer temperatures, stable air, and mountains surrounding the valley combine to promote ozone (O₃) formation. In addition to the many local sources of pollution, O₃ precursors from San Francisco, San Mateo, and

Alameda Counties are carried by prevailing winds to the Santa Clara Valley. The valley tends to channel pollutants to the southeast. On summer days with low-level inversions, O₃ can be recirculated by southerly drainage flows in the late evening and early morning and by prevailing northwesterlies in the afternoon. A similar recirculation pattern occurs in the winter, affecting levels of CO and particulate matter (PM). This movement of the air up and down the valley significantly increases the effects of pollutants.

3.1.3 North Central Coast Air Basin

The NCCAB comprises Monterey, Santa Cruz, and San Benito Counties. A small portion of the truck route along SR 152 falls within the NCCAB in San Benito County. The semi-permanent high-pressure cell in the eastern Pacific, known as the Pacific High, is the basic controlling factor in the climate of the air basin. In the summer, the high-pressure cell is dominant and frequently leads to temperature inversions that inhibit air movement. In the fall, weak offshore flows can transport pollutants from the Bay Area or Central Valley into the NCCAB, leading to higher levels of air pollution. Air quality is generally good in the winter and early spring as the Pacific High migrates southward and has less influence on the air basin (MBUAPCD 2008).

3.1.4 San Joaquin Valley Air Basin

The SJVAB contains all of San Joaquin, Stanislaus, Merced, Madera, Fresno, Kings, and Tulare Counties, as well as a portion of Kern County. The route that the Project construction trucks would travel (SR 152 and I-5) lies in the western portion of the SJVAB. The area has an inland Mediterranean climate that is characterized by warm, dry summers and cool winters. Although marine air generally flows into the basin from the Delta, the surrounding mountain ranges restrict air movement through and out of the valley, leading to frequent temperature inversions and poor air quality. Elevated pollutant concentrations are sometimes mediated by precipitation and fog, which tends to be greatest in the northern part of the air basin (SJVAPCD 2015).

3.2 Ambient Air Quality in the Resource Study Area

The CARB maintains ambient air monitoring stations for criteria pollutants throughout California. Three monitoring stations, each in the SFBAAB, and in the vicinity of the Project alternatives, were selected for representative ambient monitored data—Arkansas Street (San Francisco), Barron Avenue (Redwood City), and Jackson Street (San Jose). Locations of the monitoring stations are shown on Figure 2. These are the nearest stations to the Project area that are representative of local air quality conditions. These stations monitor CO, O₃, nitrogen dioxide (NO₂), PM smaller than or equal to 10 microns in diameter (PM₁₀), and PM smaller than or equal to 2.5 microns in diameter (PM_{2.5}). Table 2 summarizes the results of ambient monitoring at the three stations for 3 years of available data. Between 2015 and 2017, measured CO and NO₂ concentrations did not exceed any federal or state standards at any of the three monitoring locations. However, the state standards for PM₁₀ were exceeded, as was the federal standard for 24-hour PM_{2.5}. The federal and state O₃ standards were exceeded at Redwood City—Barron Avenue and San Jose—Jackson Street. The state 24-hour and annual standards for PM₁₀ were exceeded at San Francisco—Arkansas Street and San Jose—Jackson Street. The federal standard for 24-hour PM_{2.5} was exceeded at all three sites. The most frequent exceedances occurred at San Jose.



Figure 2 Air Quality Monitoring Stations Nearest to the Project

3.3 Resource Study Area Emissions

The CARB maintains an annual emission inventory for each county and air basin in the state. The inventory for the SFBAAB is composed of data submitted to CARB by the local air districts plus estimates for certain source categories, which are provided by CARB staff. Table 2 summarizes the 2015 inventory data for the SFBAAB. Table 3 shows emissions in tons per day, whereas the emissions estimates for the Project are shown in tons per year. Mobile source emissions represent the majority of volatile organic compounds (VOCs)⁵, nitrogen oxide (NO_x), and CO emissions. Area sources represent the majority of PM₁₀ and PM_{2.5} emissions, and stationary sources represent the majority of sulfur dioxide (SO₂) emissions.

3.4 Project Study Area Designations

Under the federal criteria, the SFBAAB is currently designated as nonattainment for the federal O₃ and PM_{2.5} standards, attainment for the federal CO and lead standards, and attainment/unclassified for the federal NO₂, PM₁₀, and SO₂ standards. The NCCAB is designated as attainment for the federal CO standards and attainment/unclassified for all other standards. The SJVAB is designated as nonattainment for the federal O₃ and PM_{2.5} standards, maintenance for the federal PM₁₀ standard, attainment for the federal CO and lead standards, and attainment/unclassified for the federal NO₂ and SO₂ standards.

⁵ VOCs, as defined by USEPA, are equivalent to reactive organic gases (ROG) as defined by CARB. Because conformity is a federal process, this document uses the term VOC except when referring to a California-specific requirement.

Table 2 Ambient Criteria Pollutant Concentration Data at Air Quality Monitoring Stations in the Resource Study Area

Pollutant and Standards	San Francisco—Arkansas Street			Redwood City—Barron Avenue			San Jose—Jackson Street		
	2015	2016	2017	2015	2016	2017	2015	2016	2017
Ozone (O₃)^a									
Maximum 1-hour concentration (ppm)	0.085	0.070	0.087	0.086	0.075	0.115	0.094	0.087	0.121
Maximum 8-hour concentration (ppm)	0.067	0.057	0.054	0.071	0.060	0.086	0.081	0.066	0.088
Number of days standard exceeded¹									
CAAQS 1-hour (>0.09 ppm)	0	0	0	0	0	2	0	0	3
NAAQS 8-hour (>0.070 ppm)	0	0	0	1	0	2	2	0	4
CAAQS 8-hour (>0.070 ppm)	0	0	0	1	0	2	2	0	4
Carbon monoxide (CO)^b									
Maximum 8-hour concentration (ppm)	1.3	1.1	1.4	1.6	1.1	1.4	1.8	1.4	1.8
Maximum 1-hour concentration (ppm)	1.8	1.7	2.5	3.4	2.2	2.8	2.4	1.9	2.1
Number of days standard exceeded¹									
NAAQS 8-hour (≥9 ppm)	0	0	0	0	0	0	0	0	0
CAAQS 8-hour (≥9.0 ppm)	0	0	0	0	0	0	0	0	0
NAAQS 1-hour (≥35 ppm)	0	0	0	0	0	0	0	0	0
CAAQS 1-hour (≥20 ppm)	0	0	0	0	0	0	0	0	0
Nitrogen dioxide (NO₂)^a									
National maximum 1-hour concentration (ppm)	0.0532	0.0507	0.0586	0.0403	0.0396	0.0462	0.0493	0.0511	0.0675
State maximum 1-hour concentration (ppm)	0.070	0.058	0.073	0.047	0.045	0.067	0.049	0.051	0.067
State annual average concentration (ppm)	0.012	0.010	0.011	0.010	0.009	0.010	0.012	0.011	N/A
Number of days standard exceeded									
NAAQS 1-hour (98th percentile>0.100 ppm)	0	0	0	0	0	0	0	0	0
CAAQS 1-hour (0.18 ppm)	0	0	0	0	0	0	0	0	0

Pollutant and Standards	San Francisco—Arkansas Street			Redwood City—Barron Avenue			San Jose—Jackson Street		
	2015	2016	2017	2015	2016	2017	2015	2016	2017
Annual standard exceeded?									
NAAQS annual (>0.053 ppm)	No	No	No	No	No	No	No	No	No
CAAQS annual (>0.030 ppm)	No	No	No	No	No	No	No	No	No
Particulate matter (PM₁₀)^{2, a}									
National ³ maximum 24-hour concentration (µg/m ³)	44.7	35.7	75.9	Station does not monitor PM ₁₀			58.8	40.0	69.4
National ³ second-highest 24-hour concentration (µg/m ³)	38.2	27.9	52.7				47.2	35.2	67.3
State ⁴ maximum 24-hour concentration (µg/m ³)	47.0	29.0	77.0				58.0	41.0	69.8
State ⁴ second-highest 24-hour concentration (µg/m ³)	39.0	28.0	53.0				49.3	37.5	67.6
National annual average concentration (µg/m ³)	9.8	8.8	11.0				21.3	17.5	20.7
State annual average concentration (µg/m ³) ⁵	N/A	N/A	22.1				21.9	18.3	21.3
Number of days standard exceeded¹									
NAAQS 24-hour (>150 µg/m ³) ⁶	0	0	0	Station does not monitor PM ₁₀			0	0	0
CAAQS 24-hour (>50 µg/m ³) ⁶	N/A	N/A	2				3	0	19
Annual standard exceeded?									
CAAQS annual (>20 µg/m ³)	N/A	N/A	Yes	Station does not monitor PM ₁₀			Yes	no	Yes
Particulate matter (PM_{2.5})^a									
National ³ maximum 24-hour concentration (µg/m ³)	35.4	19.6	49.9	34.6	19.5	60.8	49.4	22.6	49.7
National ³ second-highest 24-hour concentration (µg/m ³)	34.3	19.3	49.7	26.0	18.4	57.7	37.0	21.8	46.5
State ⁴ maximum 24-hour concentration (µg/m ³)	35.4	19.6	49.9	34.6	19.5	60.8	49.4	22.7	49.7
State ⁴ second-highest 24-hour concentration (µg/m ³)	34.3	19.3	49.7	26.0	18.4	57.7	37.0	21.8	46.5
National annual average concentration (µg/m ³)	7.9	7.5	9.7	6.0	8.3	9.0	9.9	8.3	9.5
State annual average concentration (µg/m ³) ⁵	7.9	N/A	9.7	6.0	N/A	9.1	10.6	8.4	N/A

Pollutant and Standards	San Francisco—Arkansas Street			Redwood City—Barron Avenue			San Jose—Jackson Street		
	2015	2016	2017	2015	2016	2017	2015	2016	2017
Number of days standard exceeded¹									
NAAQS 24-hour (>35 µg/m ³)	0	0	7	0	0	6	2	0	6
Annual standard exceeded?									
NAAQS annual (>12.0 µg/m ³)	No	No	No	No	No	No	No	No	No
CAAQS annual (>12 µg/m ³)	No	N/A	No	No	N/A	No	No	No	No
Sulfur dioxide (SO₂)									
National maximum 1-hour concentration (µg/m ³)	Station does not monitor SO ₂			Station does not monitor SO ₂			N/A	N/A	
State maximum 1-hour concentration (µg/m ³)							3.1	1.8	3.6
State maximum 24-hour concentration (µg/m ³)							1.1	0.8	1.1
Number of days standard exceeded									
NAAQS 1-hour (99th percentile>0.75 ppb [196 µg/m ³])	Station does not monitor SO ₂			Station does not monitor SO ₂			0	0	0
CAAQS 1-hour (0.25 ppm [655 µg/m ³])							0	0	0
CAAQS 24-hour (0.04 ppm [105 µg/m ³])							0	0	0

Sources: ^a CARB 2018; ^b USEPA 2018a

CAAQS = California ambient air quality standards

µg/m³ = micrograms per cubic meter

NAAQS = national ambient air quality standards

ppb = parts per billion

ppm = parts per million

N/A = not applicable or there was insufficient or no data available to determine the value

> = greater than

¹ An exceedance of a standard is not necessarily a violation because of the regulatory definition of a violation.

² National statistics are based on standard conditions data. In addition, national statistics are based on samplers using federal reference or equivalent methods.

³ State statistics are based on local conditions data.

⁴ Measurements usually are collected every 6 days.

⁵ State criteria for ensuring that data are sufficiently complete for calculating valid annual averages are more stringent than national criteria.

⁶ Mathematical estimate of how many days' concentrations would have been measured as higher than the level of the standard had each day been monitored. Values have been rounded.

Table 3 Estimated Annual Average Emissions for the San Francisco Bay Area Air Basin (2015 tons per day)

Source Category	TOG	VOC/ROG	CO	NO _x	SO _x	PM	PM ₁₀	PM _{2.5}
Stationary Sources								
Fuel combustion	18.8	4.2	27.6	33.4	9.4	1.3	1.3	1.3
Waste disposal	193.3	3.2	1.9	1.1	0.5	-	-	-
Cleaning and surface coatings	38.8	27.3	0	0	0	-	-	-
Petroleum production and marketing	72.9	15.1	0.9	0.6	2.1	-	-	-
Industrial processes	13.9	11.4	2.2	4.3	8.8	9.2	4.9	1.6
Total stationary sources	337.7	61.1	32.6	39.6	20.8	10.6	6.3	2.9
<i>Stationary sources percentage of total</i>	58%	26%	3%	15%	89%	5%	5%	7%
Area-Wide Sources								
Solvent evaporation	66.5	56.6	-	-	-	-	-	-
Miscellaneous processes	64.2	15	128.4	16.4	0.5	176.6	96.5	31.7
Total area-wide sources	130.7	71.6	128.4	16.4	0.5	176.6	96.5	31.7
<i>Area-wide sources percentage of total</i>	22%	30%	12%	6%	2%	87%	81%	72%
Mobile Sources								
On-road motor vehicles	62.7	57.8	546.8	126.8	1	12.1	11.9	5.6
Other mobile sources	50.4	45.6	399.8	88.8	1.3	4.2	4.1	3.8
Total mobile sources	113.2	103.3	946.6	215.6	2.3	16.3	16	9.4
<i>Mobile sources percentage of total</i>	19%	44%	85%	79%	10%	8%	13%	21%
Grand total (all sources)	581.6	236.1	1,107.5	271.6	23.5	203.4	118.8	44

Source: CARB 2017

- = not applicable or data not available

CO = carbon monoxide

NO_x = nitrogen oxide

PM = particulate matter

PM₁₀ = particulate matter smaller than or equal to 10 microns in diameter

PM_{2.5} = particulate matter smaller than or equal to 2.5 microns in diameter

ROG = reactive organic gases

SO_x = sulfur oxide

TOG = total organic gases

VOC = volatile organic compounds

4 RELATIONSHIP TO NEPA

The *San Francisco to San Jose Project Section Final EIR/EIS* identifies potential adverse and beneficial environmental impacts of the Project, identifies measures to mitigate adverse impacts, and identifies the Authority's preferred alternative. The EIR/EIS was prepared to comply with both NEPA and CEQA.

The General Conformity regulations establish certain procedural requirements that must be followed when preparing a General Conformity evaluation and are similar, but not identical, to those for conducting an air quality impact analysis under NEPA regulations. NEPA requires that the air quality impacts of the proposed Project's implementation be analyzed and disclosed. For purposes of NEPA, the air quality impacts of the Project were determined by identifying the Project's associated incremental emissions and air pollutant concentrations and comparing them, respectively, to emissions thresholds and to the CAAQS and NAAQS. The air quality impacts of the Project under future Plus Project conditions were also compared in the Final EIR/EIS to the future No Project conditions for NEPA purposes, and they were compared to existing conditions. The General Conformity Determination process and general findings are discussed in Sections 3.3.4.3, Method for Evaluating Impacts under NEPA, 3.3.6.2, Greenhouse Gases, and 3.3.8, Impact Summary for NEPA Comparison of Alternatives, of the Final EIR/EIS.

To appropriately document the identification and offset, where necessary, of the emissions resulting from the Project, FRA is issuing this Final General Conformity Determination. The Authority, in coordination with BAAQMD, will commit to purchase of additional offsets to net all criteria pollutant emissions to levels that are below the General Conformity de minimis level for each calendar year that exceedances occur. Refer to Section 11.2, Compliance with Conformity Requirements, for details on the Authority's commitments.

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5 IMPACT AVOIDANCE AND MINIMIZATION FEATURES AND MITIGATION MEASURES

To reduce impacts on the environment, the construction of the Project will include Project features and mitigation measures to avoid and minimize impacts on air quality. These Project features and mitigation measures will be included in the Mitigation Monitoring and Enforcement Program, which will be issued concurrently with the ROD and will be enforceable commitments undertaken by the Authority. Construction of the Project is anticipated to occur through contract. The Authority will include all Project features and mitigation measures in the construction contract, which will create binding and enforceable commitment to implement them.

The Authority will be responsible for implementing and overseeing a mitigation monitoring program so the contractor meets all air quality design features. Project design features as part of the Project and mitigation measures include the following:

AQ-IAMF#1: Fugitive Dust Emissions

During construction, the contractor will employ the following measures to minimize and control fugitive dust emissions. The contractor will prepare a fugitive dust control plan for each distinct construction segment. At a minimum, the plan will describe how each measure will be employed and identify an individual responsible for ensuring implementation. At a minimum, the plan will address the following components unless alternative measures are approved by the applicable air quality management district:

- Cover all vehicle loads transported on public roads to limit visible dust emissions and maintain at least 6 inches of freeboard space from the top of the container or truck bed.
- Clean all trucks and equipment before exiting the construction site using an appropriate cleaning station that does not allow runoff to leave the site or mud to be carried on tires off the site.
- Water exposed surfaces and unpaved roads at a minimum three times daily with adequate volume to result in wetting of the top 1 inch of soil but avoiding overland flow. Rain events may result in adequate wetting of top 1 inch of soil to alleviate the need to manually apply water.
- Limit vehicle travel speed on unpaved roads to 15 miles per hour (mph).
- Suspend any dust-generating activities when average wind speed exceeds 25 mph.
- Stabilize all disturbed areas, including storage piles that are not being used on a daily basis for construction purposes, by using water, a chemical stabilizer/suppressant, hydro mulch or by covering with a tarp or other suitable cover or vegetative ground cover. In areas adjacent to organic farms, the Authority will use nonchemical means of dust suppression.
- Stabilize all on-site unpaved roads and off-site unpaved access roads using water or a chemical stabilizer/suppressant, to effectively control fugitive dust emissions. In areas adjacent to organic farms, the Authority will use nonchemical means of dust suppression.
- Apply water to or presoak all areas where land clearing, grubbing, scraping, excavation, land leveling, grading, cut and fill, and demolition activities are carried out.
- For buildings up to six stories tall, wet all exterior surfaces of buildings during demolition.
- Limit or expeditiously remove the accumulation of mud or dirt from adjacent public streets at a minimum of once daily, using a vacuum type sweeper.
- After the addition of materials to or the removal of materials from surface or outdoor storage piles, apply sufficient water or a chemical stabilizer/suppressant.
- Where feasible, install wind breaks (e.g., dust curtains, plastic tarps, solid fencing) on the average dominant windward side(s) of station construction areas. For purposes of

implementation, chain-link fencing with added landscape mesh fabric adequately qualifies as solid fencing.

- Post a publicly visible sign with the telephone number and person to contact at the Authority regarding dust complaints. This person would respond and take corrective action within 48 hours. The phone number for the local air district would also be visible to ensure compliance with applicable regulations.

AQ-IAMF#2: Selection of Coatings

During construction, the contractor will use:

- Low-volatile organic compound (VOC) paint that contains less than 10 percent of VOC contents.
- Super-compliant or Clean Air paint that has a lower VOC content than that required by Bay Area Air Quality Management District Regulation 8, Rule 3 when available. If not available, the contractor will document the lack of availability, recommend alternative measure(s) to comply with Regulation 8, Rule 3, or disclose absence of measure(s) for full compliance, and obtain concurrence from the Authority.

AQ-IAMF#3: Renewable Diesel

During construction, the contractor will use renewable diesel fuel to minimize and control exhaust emissions from all heavy-duty off-road diesel-fueled construction equipment and on-road diesel trucks. Renewable diesel must meet the most recent American Society for Testing and Materials (ASTM) specification for diesel with the lowest carbon intensity among petroleum fuels sold in California. The contractor will provide the Authority with monthly and annual reports, through the Environmental Mitigation Management and Application (EMMA) system, of renewable diesel purchase records and equipment and vehicle fuel consumption. Exemptions to use traditional diesel can be made where renewable diesel is not available from suppliers within 200 miles of the project site. The construction contract must identify the quantity of traditional diesel purchased and fully document the availability and price of renewable diesel to meet project demand.

AQ-IAMF#4: Reduce Criteria Exhaust Emissions from Construction Equipment

Prior to issuance of construction contracts, the Authority will incorporate the following construction equipment exhaust emissions requirements into the contract specifications:

- All heavy-duty off-road construction diesel equipment used during the construction phase will meet Tier 4 engine requirements.
- A copy of each unit's certified tier specification and any required California Air Resources Board (CARB) or air pollution control district operating permit will be made available to the Authority at the time of mobilization of each piece of equipment.
- The contractor will keep a written record (supported by equipment-hour meters where available) of equipment usage during project construction for each piece of equipment.
- The contractor will provide the Authority with monthly reports of equipment operating hours (through the EMMA system) and annual reports documenting compliance.

AQ-IAMF#5: Reduce Criteria Exhaust Emissions from On-Road Construction Equipment

Prior to issuance of construction contracts, the Authority will incorporate the following material-hauling truck fleet mix requirements into the contract specifications:

- All on-road trucks used to haul construction materials, including fill, ballast, rail ties, and steel, will consist of an average fleet mix of equipment model year 2010 or newer, but no less than the average fleet mix for the current calendar year as set forth in the CARB's EMFAC 2014 database.

- The contractor will provide documentation to the Authority of efforts to secure such a fleet mix.
- The contractor will keep a written record of equipment usage during project construction for each piece of equipment and provide the Authority with monthly reports of vehicle miles traveled (through EMMA) and annual reports documenting compliance.

AQ-IA MF#6: Reduce the Potential Impact of Concrete Batch Plants

Prior to construction of any concrete batch plant, the contractor will provide the Authority with a technical memorandum documenting consistency with the Authority’s concrete batch plant siting criteria and utilization of typical control measures. Concrete batch plants will be sited at least 1,000 feet from sensitive receptors, including places such as day care centers, hospitals, senior care facilities, residences, parks, and other areas where people may congregate. The concrete batch plant will implement typical control measures to reduce fugitive dust, such as water sprays, enclosures, hoods, curtains, shrouds, movable and telescoping chutes, central dust collection systems, and other suitable technology, to reduce emissions to be equivalent to the U.S. Environmental Protection Agency AP-42 controlled emission factors for concrete batch plants. The contractor will provide to the Authority documentation that each batch plant meets this standard during operation.

AQ-MM#1: Construction Emissions Reductions—Requirements for Use of Zero Emission and/or Near Zero Emission Vehicles and Off-Road Equipment

This mitigation measure will reduce the impact of construction emissions from project-related on-road vehicles and off-road equipment.

The Authority and all project construction contractors will require that a minimum of 25 percent, with a goal of 100 percent, of all light-duty on-road vehicles (e.g., passenger cars, light-duty trucks) associated with the project (e.g., on-site vehicles, contractor vehicles) use zero emission (ZE) or near-zero emission (NZE) technology.

The Authority and all project construction contractors will have the goal that a minimum of 25 percent of all heavy-duty on-road vehicles (e.g., for hauling, material delivery and soil import/export) associated with the project use ZE or NZE technology.

The Authority and all project construction contractors will have the goal that a minimum of 10 percent of off-road construction equipment use ZE or NZE vehicles.

If local or state regulations mandate a faster transition to using ZE and/or NZE vehicles at the time of construction, the more stringent regulations will be applied. For example, EO N-79-20, issued by California Governor Newsom September 23, 2020, currently states the following:

- Light-duty and passenger car sales be 100 percent ZE vehicles by 2035
- Full transition to ZE short haul/drayage trucks by 2035
- Full transition to ZE heavy-duty long-haul trucks, where feasible, by 2045
- Full transition to ZE off-road equipment by 2035, where feasible.

The project will have a goal of surpassing the requirements of these or other future regulations as a mitigation measure.

Because the commercial availability of future electric equipment and vehicles is unknown, emissions reductions achieved by AQ-MM#1 cannot currently be quantified or included in the analysis.

AQ-MM#2: Offset Project Construction Emissions in the SFBAAB

Prior to issuance of construction contracts, the Authority will be required to enter into an agreement with BAAQMD to reduce ROG/VOC and NO_x emissions to the required levels. The required levels in the SFBAAB are as follows:

- For emissions in excess of the General Conformity *de minimis* thresholds (NO_x): net zero.
- For emissions not in excess of General Conformity *de minimis* thresholds but above the BAAQMD's daily emission thresholds (ROG/VOC and NO_x): below the appropriate CEQA threshold levels.

The mitigation offset fee amount will be determined at the time of mitigation to fund one or more emissions reduction projects within the SFBAAB. The offset fee will be determined by the Authority and BAAQMD based on the type of projects that present appropriate emission reduction opportunities. These funds may be spent to reduce either VOC or NO_x emissions (O₃ precursors). Documentation of payment will be provided to the Authority or its designated representative.

The agreement will include details regarding the annual calculation of required offsets the Authority must achieve, funds to be paid, administrative fee, and the timing of the emissions reductions projects. Acceptance of this fee by BAAQMD will serve as an acknowledgment and commitment by BAAQMD to undertake the following steps: (1) implement an emissions reduction project(s) within a timeframe to be determined based on the type of project(s) selected after receipt of the mitigation fee designed to achieve the emissions reduction objectives; and (2) provide documentation to the Authority or its designated representative describing the project(s) funded by the mitigation fee, including the amount of emissions reduced (tons per year) in the SFBAAB from the emissions reduction project(s). To qualify under this mitigation measure, the specific emissions reduction project(s) must result in emissions reductions in the SFBAAB that are real, surplus, quantifiable, enforceable, and would not otherwise be achieved through compliance with existing regulatory requirements or any other legal requirement. Pursuant to 40 C.F.R. Section 93.163(a), the necessary reductions must be achieved (contracted and delivered) by the applicable year in question. Funding will need to be received prior to contracting with participants and should allow enough time to receive and process applications to fund and implement off-site reduction projects prior to commencement of project activities being reduced. This would equate roughly to 1 year prior to the required mitigation; additional lead time may be necessary depending on the level of off-site emissions reductions required for a specific year.

This mitigation measure will be effective in offsetting emissions generated during construction of the project through the funding of emissions reduction projects. It is BAAQMD's experience that implementation of an agreement is feasible mitigation that effectively achieves actual emissions reductions.

This mitigation measure would not be expected to adversely affect air quality in the SFBAAB because purchasing emissions offsets would not result in any physical change to the environment, and therefore would not result in other secondary environmental impacts. In addition to VOC and NO_x, emissions reduction projects could reduce other criteria pollutants and GHGs. However, this would be a beneficial secondary impact of this mitigation measure and is not a required outcome to mitigate any impacts of the project.

6 REGULATORY PROCEDURES

The General Conformity regulations establish certain procedural requirements that must be followed when preparing a General Conformity evaluation. The procedures required for the General Conformity evaluation are similar, but not identical, to those for conducting an air quality impact analysis pursuant to NEPA regulations. The Draft General Conformity Determination was released for public and agency review pursuant to 40 C.F.R. Section 93.156, and this Final General Conformity Determination is being published concurrently with the ROD for the Project.

The Authority identified the appropriate emission estimation techniques and planning assumptions in consultation with the state entities charged with regulating air pollution in the SFBAAB.

6.1 Use of Latest Planning Assumptions

The General Conformity regulations require the use of the latest planning assumptions for the area encompassing the federal action, derived from the estimates of population, employment, travel, and congestion most recently approved by the area's metropolitan planning organizations (MPO) (40 C.F.R. § 93.159(a)).

The emission estimation techniques, which were slightly different from those used in establishing the applicable SIP emissions budgets, have been approved by the BAAQMD. The traffic data used in the air quality analysis are based on the level of ridership as presented in *Connecting and Transforming California, 2016 Business Plan* (2016 Business Plan) (Authority 2016). Further, the traffic data are consistent with the most recent estimates made by the MPOs for traffic volume growth rates, including forecast changes in VMT and vehicle hours traveled. The MPOs developed these estimates from their traffic assignment models based on current and future population, employment, and travel and congestion information. These assumptions are consistent with those in the current conformity determinations for the regions' regional transportation plans and transportation improvement programs.

6.2 Use of Latest Emission Estimation Techniques

The General Conformity regulations require the use of the latest and most accurate emission estimation techniques available, unless such techniques are inappropriate (40 C.F.R. § 93.159(b)). Emissions from construction activities were calculated using a combination of emission factors and methodologies from the California Emissions Estimator Model (CalEEMod), version 2016.3.2, the CARB's Emission FACtors 2017 (EMFAC2017) model, and the USEPA's *Compilation of Air Pollutant Emission Factors* (AP-42) based on Project-specific construction data (e.g., schedule, equipment, truck volumes) provided by the Project design team (Scholz 2018, 2020, 2021). CalEEMod provides the latest emission factors for construction off-road equipment. It accounts for lower fleet population and growth factors because of the 2007–2009 economic recession and updated load factors based on feedback from engine manufacturers. The use of emission rates from CalEEMod reflects the recommendation of the CARB to capture the latest off-road construction assumptions. CalEEMod default load factors (the ratio of average equipment horsepower utilized to maximum equipment horsepower) and useful life parameters were used for emission estimates.

Construction exhaust emissions from equipment; fugitive dust emissions from earthmoving activities; and emissions from worker trips, deliveries, and material hauling were calculated and compiled in a spreadsheet tool specific to the Project for each year of construction. Mobile source emission burdens from worker trips and truck trips were calculated using VMT estimates and appropriate emission factors from EMFAC2017. Fugitive dust from re-entrained road dust was calculated using emission factors from USEPA's AP-42, Sections 13.2.1 and 13.2.2. Refer to Chapter 8, Construction Activities Considered, for further detail on the emissions estimation techniques. Modeled emission rates assume the implementation of all IAMFs (see Chapter 5, Impact Avoidance and Minimization Features and Mitigation Measures).

6.3 Major Construction-Phase Activities

Project-specific data, including construction equipment lists and the construction schedule, were used for the analysis. Calculations were performed for each year of construction for the Project using default emission factors, as described further in Chapter 8, Construction Activities Considered.

Major activities were grouped into the following categories:

- At grade
- Embankment (berm)
- Stations and LMF

Construction activities associated with each component included demolition, excavation, utilities, ballast and trackwork, roadwork, concrete forming, and other rail work. Each of these activities was considered to evaluate the regional and localized air quality effects during the construction phase. Refer to Chapter 8 for further detail on the construction schedule.

6.4 Emission Scenarios

The General Conformity regulations require that the evaluation reflect certain emission scenarios (40 C.F.R. § 93.159(d)). Specifically, these scenarios generally include the evaluation of direct and indirect emissions from a proposed project for the following years: (1) for nonattainment areas, the attainment year specified in the SIP, or if the SIP does not specify an attainment year, the latest attainment year possible under the CAA, and for maintenance areas, the farthest year for which emissions are projected in the approved maintenance plan; (2) the year during which the total of direct and indirect emissions for the federal action are projected to be the greatest on an annual basis; and (3) any year for which the applicable SIP specifies an emissions budget. Both the operational and construction phases of the action must be analyzed, and the following applies to the Project:

- Emissions generated during the operational phase of the Project would meet the emission requirements for the years associated with Items 1 and 3 because the emissions generated during the operational phase would be less than those emitted in the No Project scenario. In addition, microscale analyses conducted for the EIR/EIS demonstrate that the operational phase of the Project would not cause or exacerbate a violation of the NAAQS for all applicable pollutants (see Final EIR/EIS, Section 3.3.6.1, Air Quality).
- Emissions generated during the Project's construction phase, which would include the year with the greatest amount of total direct and indirect emissions (2022, except 2025 for CO under Alternative A),⁶ may be subject to General Conformity regulations because they would increase regional emission rates and, as such, have the potential to cause or exacerbate an exceedance of the NAAQS. Therefore, analyses were conducted to estimate the amounts of emissions that would be generated during each year of the construction phase (for comparison with the General Conformity applicability rates) and the potential impacts of these emissions on local air quality levels. Emissions generated at the construction sites (e.g., tailpipe emissions from the on-site heavy-duty diesel equipment and fugitive dust emissions generated by vehicles traveling within the construction sites) and on the area's roadways by vehicles traveling to and from these sites (by vehicles transporting materials and the workers traveling to and from work) were considered.
- Air quality dispersion modeling would be required for this conformity analysis to estimate the Project's localized impacts on PM concentrations if the annual emissions of the pollutants generated during construction were to exceed the General Conformity *de minimis* thresholds.

⁶ As construction is expected to take place later than these dates, these construction emissions estimates are conservative, as future emissions rates will be lower due to the implementation of cleaner and newer equipment.

Annual emissions were estimated for each year of the Project's construction period. These emissions, which are the maximum values for the Project, are described in more detail in Chapter 9, Estimated Emission Rates and Comparison to *De Minimis* Thresholds, of this report.

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7 APPLICABILITY ANALYSIS

The first step in a General Conformity evaluation is an analysis of whether the requirements apply to a proposed federal action in a nonattainment or a maintenance area. Unless exempted by the regulations or otherwise presumed to conform, a Federal action requires a General Conformity Determination for each pollutant where the total of direct and indirect emissions caused by the federal action would equal or exceed an annual *de minimis* emission rate.

7.1 Attainment Status of Resource Study Area

The USEPA designates each county (or portions of counties) within California as attainment, maintenance, or nonattainment based on the area's ability to meet the NAAQS. Areas are designated as attainment if ambient air concentrations of a criteria pollutant are below the ambient standards. Areas are designated as nonattainment if ambient air concentrations are above the ambient standards. Areas previously designated as nonattainment that subsequently demonstrated compliance with the standards are designated as maintenance. Table 4 summarizes the attainment status of the SFBAAB, NCCAB, and SJVAB with regard to the NAAQS.

Table 4 Federal Attainment Status of the SFBAAB, NCCAB, and SJVAB

Pollutant	SFBAAB	NCCAB	SJVAB
O ₃	Marginal Nonattainment	Attainment	Extreme Nonattainment
PM ₁₀	Attainment	Attainment	Maintenance
PM _{2.5}	Moderate Nonattainment	Attainment	Serious/Moderate Nonattainment ¹
CO	Attainment	Attainment	Attainment
NO ₂	Attainment	Attainment	Attainment
SO ₂	Attainment	Attainment	Attainment

Source: USEPA 2018b

CO = carbon monoxide

NCCAB = North Central Coast Air Basin

NO₂ = nitrogen dioxide

O₃ = ozone

PM₁₀ = particulate matter smaller than or equal to 10 microns in diameter

PM_{2.5} = particulate matter smaller than or equal to 2.5 microns in diameter

SFBAAB = San Francisco Bay Area Air Basin

SJVAB = San Joaquin Valley Air Basin SO₂ = sulfur dioxide

¹ The SJVAB is designated serious nonattainment for the 1997 and 2006 PM_{2.5} standards and moderate nonattainment for the 2012 PM_{2.5} standard.

The SFBAAB is currently designated as marginal nonattainment for 8-hour O₃⁷ (2008 and 2015 standards) and moderate nonattainment for PM_{2.5} (2006 standard). The SJVAB is designated as extreme nonattainment for 8-hour O₃ (2008 and 2015 standards), serious nonattainment for PM_{2.5} (1997 and 2006 standards), moderate nonattainment for PM_{2.5} (2012 standard), and maintenance for PM₁₀ (1987 standard). As such, the FRA is required to demonstrate Project-level compliance with the General Conformity Rule for NO_x and VOCs (O₃ and PM_{2.5} precursors), PM_{2.5}, PM₁₀, SO₂ (PM_{2.5} precursor), and ammonia⁸ (PM_{2.5} precursor) if the total of direct and indirect emissions of these pollutants caused by the Project in the SFBAAB or SJVAB would exceed the General Conformity *de minimis* thresholds.

⁷ Because O₃ is a secondary pollutant (i.e., it is not emitted directly into the atmosphere, but is formed in the atmosphere from the photochemical reactions of VOCs and NO_x in the presence of sunlight), its *de minimis* threshold is based on primary emissions of its precursor pollutants, NO_x and VOCs. If the net emissions of either NO_x or VOCs exceed the *de minimis* applicability thresholds (USEPA 1994), the federal action is subject to a general conformity evaluation for O₃.

⁸ Neither construction nor operation of the project would result in material emissions of ammonia, so no further discussion of ammonia emissions is provided in this General Conformity Determination.

As shown in Table 4, the portion of the RSA in the NCCAB is in attainment for all criteria pollutants. As outlined in Section III.A of the General Conformity Rule, “only actions which cause emissions in designated nonattainment and maintenance areas are subject to the regulations.” As such, a General Conformity analysis is not required for the portion of the Project within the NCCAB. There are no applicable *de minimis* thresholds, and no further discussion of Project activities in the NCCAB is provided in this General Conformity Determination.

7.2 Exemptions from General Conformity Requirements

The General Conformity requirements apply if the net Project emissions equal or exceed certain *de minimis* emission rates. The only exceptions to this applicability criterion are if the activity is on the federal agency’s presumed-to-conform list (40 C.F.R. § 93.153(f)), meets the narrow exemption in response to an emergency or disaster (40 C.F.R. § 93.153(e)), or is one of the following topical exemptions:

- Actions that would result in no emissions increase or an increase in emissions that is clearly below the *de minimis* levels (40 C.F.R. § 93.153(c)(2)). Examples include administrative actions and routine maintenance and repair.
- Actions where the emissions are not reasonably foreseeable (40 C.F.R. § 93.153(c)(3))
- Actions which implement a decision to conduct or carry out a conforming program (40 C.F.R. § 93.153 (c)(4))
- Actions which include major new or modified sources requiring a permit under the New Source Review program (40 C.F.R. § 93.153(d)(1))
- Actions in response to emergencies or natural disasters (40 C.F.R. § 93.153(d)(2))
- Actions which include air quality research not harming the environment (40 C.F.R. § 93.153(d)(3))
- Actions which include modifications to existing sources to enable compliance with applicable environmental requirements (40 C.F.R. § 93.153(d)(4))
- Actions which include emissions from remedial measures carried out under the Comprehensive Environmental Response, Compensation and Liability Act that comply with other applicable requirements (40 C.F.R. § 93.153(d)(5))

The Project does not meet any of these exempt categories. In addition, the FRA has not established a presumed-to-conform list of activities at the time of this evaluation, and the Project does not meet the requirements of 40 C.F.R. Section 93.153(e).

7.3 Applicability for Project

After determining that the Project is not otherwise exempt, the applicability of the General Conformity requirements to the Project is evaluated by comparing the total of direct and indirect emissions for the calendar year of greatest emissions to the General Conformity *de minimis* thresholds. Where the total of direct and indirect emissions attributable to the Project is found to be below the *de minimis* emission rates for a pollutant, that pollutant is excluded from General Conformity requirements, and no further analysis is required. However, when the emissions of an applicable pollutant are at or above a *de minimis* threshold, that pollutant must undergo a General Conformity evaluation.

7.4 De Minimis Emission Rates

The General Conformity requirements would apply to the federal action for each pollutant for which the total of direct and indirect emissions caused by the Project equal or exceed the *de minimis* emission rates shown in Table 5. These emission rates are expressed in units of tons per year (tpy) in each air basin for the calendar year. The applicable threshold levels for the pollutants for which General Conformity is required in the RSA are shown in Table 5.

Table 5 De Minimis Rates for Determining Applicability of General Conformity Requirements to Federal Actions

Air Basin	Annual Air Pollutant Emissions in Tons per Year					
	VOC	NO _x	CO	PM ₁₀	PM _{2.5}	SO ₂
San Francisco Bay Area Air Basin ¹	100	100	None	None	100	100
San Joaquin Valley Air Basin ²	10	10	None	100	70	70
North Central Coast Air Basin ³	None	None	None	None	None	None

Source: 40 C.F.R. § 93.153(b)

CO = carbon monoxide

NAAQS = national ambient air quality standards

NO_x = nitrogen oxide

O₃ = ozone

PM_{2.5} = particulate matter smaller than or equal to 2.5 microns in diameter

PM₁₀ = particulate matter smaller than or equal to 10 microns in diameter

RSA = resource study area

SFBAAB = San Francisco Bay Area Air Basin

SJVAB = San Joaquin Valley Air Basin

SO₂ = sulfur dioxide

VOC = volatile organic compounds

¹ The General Conformity *de minimis* thresholds for criteria pollutants are based on the federal attainment status of the SFBAAB. The SFBAAB is designated a marginal nonattainment area for the O₃ NAAQS and a moderate nonattainment area for the PM_{2.5} NAAQS. Although the SFBAAB is in attainment for SO₂, because SO₂ is a precursor for PM_{2.5}, the PM_{2.5} General Conformity *de minimis* thresholds are used.

² The General Conformity *de minimis* thresholds for criteria pollutants are based on the federal attainment status of the SJVAB. The SJVAB is designated an extreme nonattainment area for the O₃ NAAQS, a serious/moderate nonattainment area for the PM_{2.5} NAAQS, and a maintenance area for the PM₁₀ NAAQS. Although the SJVAB is in attainment for SO₂, because SO₂ is a precursor for PM_{2.5}, the PM_{2.5} General Conformity *de minimis* thresholds are used. For PM_{2.5} and SO₂, the *de minimis* threshold for projects located in serious nonattainment areas (70 tons per year) is used because this threshold is lower than the 100 tons per year threshold for projects exclusively in moderate nonattainment areas. For NO_x and VOCs, the O₃ precursor threshold for extreme nonattainment areas (10 tons per year) is used because this threshold is lower than the PM_{2.5} precursor threshold for serious nonattainment areas (70 tons per year).

³ The NCCAB is in attainment for all criteria pollutants (see Table 4).

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8 CONSTRUCTION ACTIVITIES CONSIDERED

As shown in Section 3.3.6.2, Air Quality, of the Final EIR/EIS, the results of the regional analyses conducted for the Project demonstrate that emissions generated during the operational phase would be less than those emitted in the No Project and existing conditions scenarios and the microscale analyses demonstrate that the Project would not cause or exacerbate a violation of the NAAQS for these pollutants. As such, no further analysis of the operational period emissions is necessary for this General Conformity Determination. This section focuses on the emissions generated from the construction emissions for the Project.

The analysis conducted for the Final EIR/EIS to estimate potential air quality impacts caused by on-site (e.g., demolition activities, site preparation and remediation, construction equipment operations, and truck movements) and off-site (e.g., worker commuting and truck trips) construction-phase activities included the following:

- Estimation of emissions generated by the construction activities (e.g., demolition, trackwork, concrete and steel construction), including fugitive dust emissions and emissions released from diesel-powered equipment and trucks based on the hours of operation of each piece of equipment⁹
- Identification of heavily traveled truck routes to estimate the cumulative effects of on-site construction activity emissions and off-site traffic emissions
- An on-site dispersion modeling analysis of the major construction areas
- An off-site dispersion modeling analysis of the roadway intersections and interchanges adjacent to the construction areas, using traffic data that included construction-related vehicles and background traffic
- A comparison of the on-site and off-site modeling results to the applicable NAAQS for the applicable pollutants

Emission rates for these activities were estimated based on the following:

- The number of hours per day and duration of each construction activity
- The number and type of construction equipment to be used
- Horsepower and utilization rates (hours per day) for each piece of equipment
- The quantities of construction/demolition material produced and removed from each site
- The number of truck trips needed to remove construction and demolition material and to bring the supply materials to each site

The following is a discussion of the construction analysis methodology. A full list of assumptions can be found in Appendix C to the *San Francisco to San Jose Project Section Air Quality and Greenhouse Gases Technical Report* (Authority 2019c).

8.1 Models and Methods for Emissions Modeling

Construction of the Project would generate emissions of VOC, NO_x, CO, sulfur oxides (SO_x), PM₁₀, and PM_{2.5}. Emissions would originate from off-road equipment exhaust, employee and haul truck vehicle exhaust (on-road vehicles), site grading and earth movement, concrete batching, demolition, paving, and architectural coating. These emissions would be temporary (i.e., limited to the construction period) and would cease when construction activities are complete.

⁹ It is possible changes in VMT, speeds, or idle times resulting from traffic detours during construction could result in additional emissions. However, it is unknown to what extent motorists will change their driving patterns as a result of traffic detours and impediments, and, as such, it would be speculative to quantify the impact of temporary roadway restrictions on criteria pollutant emissions.

Combustion exhaust, fugitive dust (PM₁₀ and PM_{2.5}), and fugitive off-gassing (VOCs) were estimated using a combination of emission factors and methodologies from CalEEMod, version 2016.3.2; the CARB's EMFAC2017 model, and the USEPA's AP-42 *Compilation of Air Pollutant Emission Factors* based on Project-specific construction data (e.g., schedule, equipment, truck volumes) provided by the Project design team (Scholz 2018, 2020, 2021).

- **Off-road equipment**—Emission factors for off-road construction equipment (e.g., loaders, graders, bulldozers) were obtained from the CalEEMod (version 2016.3.2) User's Guide appendix, which provides values per unit of activity (in grams per horsepower-hour) by calendar year (CAPCOA 2017). Analysts estimated criteria pollutants by multiplying the CalEEMod emission factors by the equipment inventory provided by the Project engineering team (Scholz 2018, 2020, 2021).
- **On-road vehicles**—On-road vehicles (e.g., pickup trucks, flatbed trucks) would be required for material and equipment hauling, on-site crew and material movement, and employee commuting. The analysis estimated exhaust emissions from on-road vehicles using the EMFAC2017 emissions model and activity data (miles traveled per day) provided by the Project engineering team (Scholz 2018, 2020, 2021). Emission factors for haul trucks are based on aggregated-speed emission rates for EMFAC's T7 Single vehicle category. Factors for on-site dump, water, boom, and concrete trucks were based on 5-mph emission rates for the T6 Heavy category. Factors for employee commute vehicles were based on a weighted average for all vehicle speeds for EMFAC's light-duty automobile/light-duty truck vehicle categories. CARB's (2019) Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule adjustment factors were applied to the emission factors for gasoline-powered vehicles.¹⁰ Fugitive re-entrained road dust emissions were estimated using the USEPA's *Compilation of Air Pollutant Emission Factors* (AP-42), Sections 13.2.1 and 13.2.2 (USEPA 2006, 2011).
- **Site grading and earth movement**—Fugitive dust emissions from earth movement (e.g., site grading, bulldozing, and truck loading) were quantified using emission factors from CalEEMod and USEPA (1998) AP-42. Data on the total graded acreage and quantity of cut-and-fill material were provided by the Project engineering team (Scholz 2018, 2020, 2021).
- **Concrete batching**—Fugitive dust emissions from concrete batching at temporary batch plants were quantified using emission factors from the BAAQMD's (2016) Permit Handbook and USEPA's AP-42. Daily and annual batch quantities (cubic yards) were provided by the Project engineering team (Scholz 2018, 2020, 2021).
- **Demolition**—Fugitive dust emissions from building demolition were based on the anticipated amount of square feet to be demolished and calculation method from the CalEEMod User's Guide (CAPCOA 2017).
- **Paving**—Fugitive VOC emissions associated with paving were calculated using activity data (e.g., square feet paved) provided by the Project engineer and the CalEEMod default emission factor of 2.62 pounds of VOC per acre paved (Scholz 2018; CAPCOA 2017).
- **Architectural coating**—Fugitive VOC emissions associated with architectural coatings of the stations and LMF were calculated using activity data (e.g., square feet coated) provided by the Project engineering team and methods contained in the CalEEMod User's Guide (Scholz 2018; CAPCOA 2017). Emissions calculations assume a VOC content of 150 grams per liter, consistent with the BAAQMD's Regulation 8, Rule 3, Section 301.

¹⁰ On May 12, 2021, NHTSA issued a notice of proposed rulemaking to repeal the One National Program Rule (86 Fed Reg 25980). This repeal would reverse the effects of the SAFE Rule on light-duty vehicle emission rates. As of October 30, 2021, NHTSA has not issued a final rule.

8.2 Ballast and Subballast Hauling

Ballast and subballast materials could be transported from multiple quarry locations throughout Northern California. Analysts estimated emissions from ballast and subballast material hauling by trucks and locomotives based on the travel distances and transportation method (by rail or by truck) from the locations where ballast materials would be available. Analysts used heavy-duty truck emission factors (T7 Single) from EMFAC2017 to estimate emissions from haul trucks and rail emission factors from the USEPA (2009) to estimate the locomotive emissions.

Analysts identified up to five potential quarries that could provide ballast material. All quarries are within the SFBAAB, with the farthest quarry located 68 highway miles from the Project footprint. Ballast and subballast quantities for the Project were provided by the Project engineering team and distributed equally among the identified quarries (Scholz 2018). Analysts estimated emissions under two hauling scenarios: Scenario 1 assumed ballast and subballast would be hauled to the Project footprint using a combination of trucks and locomotives, and Scenario 2 assumed ballast and subballast would be hauled to the Project footprint using only trucks.

8.3 Project Design Features

The Authority has developed impact avoidance and minimization features (IAMFs) that would avoid or minimize potential air quality effects. Because IAMFs are included as part of the Project design, they are not considered mitigation, and are included as part of the Project construction emissions estimate. Specifically, the following emissions benefits achieved by AQ-IAMF#1 through AQ-IAMF#5 were assumed in the modeling¹¹.

- Fugitive dust reductions from earthmoving best management practices (AQ-IAMF#1)
 - PM from ground disturbance (e.g., scraping and grading activities), 75 percent (BAAQMD 2017a)
 - PM from unpaved vehicle travel (i.e., re-entrained road dust), 75 percent¹²
 - PM from demolition, 36 percent (Countess Environmental 2006)
- VOC reductions of 93 percent from application of architectural coatings (AQ-IAMF#2)¹³
- PM reductions of 30 percent and greenhouse gas (GHG) reductions from use of renewable diesel (AQ-IAMF#3) in all off-road diesel-powered engines (Lovegrove and Tadross 2017)
- Criteria pollutant and GHG reductions from use of Tier 4 off-road engines (AQ-IAMF#4). Emissions reductions vary by pollutant and equipment type. Emissions were modeled using Tier 4 emission rates from CalEEMod.
- Criteria pollutant and GHG reductions from use of model year 2010 or newer on-road engines in heavy-duty, diesel powered trucks (AQ-IAMF#5). Emissions reductions vary by pollutant, analysis year, and air basin. Emissions were modeled using emission rates for model year 2010 or newer engines derived from the CARB's EMFAC2017 model. The emission rates for model year 2010 and newer engines reflect implementation of USEPA's December 2000 Control of Air Pollution from New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements.

¹¹ Although the Authority would also comply with AQ-IAMF#6, it was not assumed in the modeling because no new concrete batch plants would be required for construction of the Project Section.

¹² Among other controls, this IAMF requires watering unpaved roads three times daily and limiting vehicle speeds. The 75 percent efficacy is based on a 55 percent reduction for watering and a 44 percent reduction for vehicle speed limits ($(1 - (.55 * .44)) = 0.75$ (Countess Environmental 2006).

¹³ Assumes an uncontrolled ROG content of 150 grams per liter per BAAQMD Regulation 8, Rule 3, Section 301 and a controlled ROG content of 10 grams per liter per AQ-IAMF#2.

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9 ESTIMATED EMISSION RATES AND COMPARISON TO DE MINIMIS THRESHOLDS

As discussed in Section 7.3, Major Construction-Phase Activities, three components—at-grade, embankment (berm), and stations and LMF—would be constructed, depending on the subsection and alternative. Each component would be constructed over multiple phases between 2021 and 2025.

Total annual estimated emissions generated within the SFBAAB and the SJVAB during the construction period are provided in Table 6 and Table 7, respectively. These values are the peak on-site emissions during each analysis year, plus maximum annual off-site emissions. The modeling accounts for implementation of AQ-IAMF#1 through AQ-IAMF#5. Emissions for each Project alternative are presented and analyzed in this General Conformity Determination.

As shown in Table 6, NO_x emissions would not exceed the General Conformity *de minimis* threshold in the SFBAAB under Alternative A, and would exceed the threshold in 2022 and 2023 under Alternative B. Emissions of all other pollutants would be less than the applicable *de minimis* thresholds. As shown in Table 7, emissions of all pollutants would be less than the applicable *de minimis* thresholds in the SJVAB.

Table 6 San Francisco to San Jose Annual Construction Emissions in the SFBAAB (tons per year)¹

Alternative/Year	VOC	NO _x	CO	SO ₂ ²	PM ₁₀	PM _{2.5}
Alternative A						
2021	2	35	51	0	24	6
2022	4	97	121	1	59	15
2023	3	85	101	0	54	13
2024	3	71	92	0	49	11
2025	4	90	126	0	49	14
Alternative B						
2021	2	39	57	0	27	7
2022	5	115	156	1	75	18
2023	4	103	122	1	65	16
2024	3	91	109	0	59	14
2025	4	96	132	0	55	15
General Conformity Threshold						
SFBAAB Threshold	100	100	None	100	None	100

Sources: CAPCOA 2017; CARB 2018; USEPA 1998, 2006, 2011; Scholz 2018, 2020, 2021

CO = carbon monoxide

N/A = not applicable

NO_x = oxides of nitrogen

PM_{2.5} = particulate matter smaller than or

equal to 2.5 microns in diameter

PM₁₀ = particulate matter smaller than or

equal to 10 microns in diameter

SFBAAB = San Francisco Bay Area Air Basin

SO₂ = sulfur dioxide

VOC = volatile organic compound

Values less than 0.5 have been rounded to zero.

Exceedances of the General Conformity thresholds are shown in **bold**.

¹ Emissions results include implementation of air quality impact avoidance and minimization features, as described in Chapter 5.

² Although the SFBAAB is in attainment for SO₂, because SO₂ is a precursor for PM_{2.5}, the PM_{2.5} General Conformity *de minimis* thresholds are used.

Table 7 San Francisco to San Jose Annual Construction Emissions in the SJVAB (tons per year)¹

Alternative/Year	VOC	NO _x	CO	SO ₂ ²	PM ₁₀	PM _{2.5}
Alternative A						
2021	0	0	0	0	0	0
2022	0	6	1	0	1	0
2023	0	3	0	0	0	0
2024	0	0	0	0	0	0
2025	0	0	0	0	0	0
2026	0	0	0	0	0	0
Alternative B						
2021	0	0	0	0	0	0
2022	0	6	1	0	1	0
2023	0	6	1	0	1	0
2024	0	5	1	0	1	0
2025	0	0	0	0	0	0
2026	0	0	0	0	0	0
General Conformity Threshold						
SJVAB Threshold	10	10	N/A	70	100	70

Sources: CAPCOA 2017; CARB 2018; USEPA 1998, 2006, 2011; Scholz 2018, 2020, 2021

CO = carbon monoxide

N/A = not applicable

NO_x = oxides of nitrogen

PM_{2.5} = particulate matter smaller than or equal to 2.5 microns in diameter

PM₁₀ = particulate matter smaller than or equal to 10 microns in diameter

SJVAB = San Joaquin Valley Air Basin

SO₂ = sulfur dioxide

VOC = volatile organic compound

Values less than 0.5 have been rounded to zero.

Exceedances of the general conformity thresholds are shown in **bold**.

¹ Emissions results include implementation of air quality impact avoidance and minimization features, as described in Chapter 5.

² Although the SJVAB is in attainment for SO₂, because SO₂ is a precursor for PM_{2.5}, the PM_{2.5} General Conformity *de minimis* thresholds are used.

10 REGIONAL EFFECTS

As shown in Section 3.3.6.2 of the Final EIR/EIS, the total regional emissions for all applicable pollutants are lower during the operations phase of the Project than under No Project conditions (and would therefore not exceed the *de minimis* emission thresholds). As such, only emissions generated during the construction phase were compared to the conformity threshold levels to determine conformity compliance. As shown in Tables 6 and 7, construction-phase emissions, compared to the General Conformity applicability rates, are as follows:

- Annual estimated NO_x emissions in the SFBAAB are less than the applicability rate of 100 tpy in all years under Alternative A, but greater than 100 tpy in 2022 and 2023 under Alternative B with implementation of IAMFs.
- Annual estimated VOC, SO₂, and PM_{2.5} emissions are less than the applicability rates in the SFBAAB with implementation of IAMFs, for all years and alternatives.
- Because the SFBAAB is federally designated attainment for CO and PM₁₀, the applicability rates do not apply and no conformity evaluation is required for CO and PM₁₀.
- Annual estimated emissions of all pollutants are less than the applicability rates in the SJVAB with implementation of IAMFs, for all years and alternatives.

Therefore, a General Conformity Determination is required for the Project for NO_x for the years during construction when the emissions would exceed the *de minimis* thresholds.

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11 GENERAL CONFORMITY EVALUATION

For federal actions subject to a General Conformity evaluation, the regulations delineate several ways an agency can demonstrate conformity (40 C.F.R. § 93.158). This section summarizes the findings that were used to make the determination for the Project.

11.1 Conformity Requirements of Proposed Project

Based on the results shown in Table 6, a conformity determination is required for construction-phase emissions for NO_x because annual estimated emissions are greater than the applicability rates of 100 tpy in the SFBAAB.

11.2 Compliance with Conformity Requirements

NO_x (a precursor to O₃) emissions caused by the construction of the Project will not result in an increase in regional NO_x emissions in the SFBAAB, because exceedances will be mitigated by offsets. This will be achieved by additional on-site controls and offsetting the remaining NO_x emissions generated by the construction of the Project in a manner consistent with the General Conformity regulations.

Any required offsets are anticipated to be accomplished by an agreement between the Authority, BAAQMD, and the Bay Area Clean Air Foundation. The requirements for offsets (as described below) will be implemented as part of the Project, and as described in the mitigation measures in the Final EIR/EIS:

AQ-MM#1: Construction Emissions Reductions—Requirements for Use of Zero Emission and/or Near Zero Emission Vehicles and Off-Road Equipment

This mitigation measure will reduce the impact of construction emissions from project-related on-road vehicles and off-road equipment.

The Authority and all project construction contractors will require that a minimum of 25 percent, with a goal of 100 percent, of all light-duty on-road vehicles (e.g., passenger cars, light-duty trucks) associated with the project (e.g., on-site vehicles, contractor vehicles) use zero emission (ZE) or near-zero emission (NZE) technology.

The Authority and all project construction contractors will have the goal that a minimum of 25 percent of all heavy-duty on-road vehicles (e.g., for hauling, material delivery and soil import/export) associated with the project use ZE or NZE technology.

The Authority and all project construction contractors will have the goal that a minimum of 10 percent of off-road construction equipment use ZE or NZE vehicles.

If local or state regulations mandate a faster transition to using ZE and/or NZE vehicles at the time of construction, the more stringent regulations will be applied. For example, EO N-79-20, issued by California Governor Newsom September 23, 2020, currently states the following:

- Light-duty and passenger car sales be 100 percent ZE vehicles by 2035
- Full transition to ZE short haul/drayage trucks by 2035
- Full transition to ZE heavy-duty long-haul trucks, where feasible, by 2045
- Full transition to ZE off-road equipment by 2035, where feasible.

The project will have a goal of surpassing the requirements of these or other future regulations as a mitigation measure.

Because the commercial availability of future electric equipment and vehicles is unknown, emissions reductions achieved by AQ-MM#1 cannot currently be quantified or included in the analysis.

AQ-MM#2: Offset Project Construction Emissions in the SFBAAB

Prior to issuance of construction contracts, the Authority will be required to enter into an agreement with BAAQMD to reduce ROG/VOC and NO_x emissions to the required levels. The required levels in the SFBAAB are as follows:

- For emissions in excess of the General Conformity *de minimis* thresholds (NO_x): net zero.
- For emissions not in excess of General Conformity *de minimis* thresholds but above the BAAQMD's daily emission thresholds (ROG/VOC and NO_x): below the appropriate CEQA threshold levels.

The mitigation offset fee amount will be determined at the time of mitigation to fund one or more emissions reduction projects within the SFBAAB. The offset fee will be determined by the Authority and BAAQMD based on the type of projects that present appropriate emission reduction opportunities. These funds may be spent to reduce either VOC or NO_x emissions (O₃ precursors). Documentation of payment will be provided to the Authority or its designated representative.

The agreement will include details regarding the annual calculation of required offsets the Authority must achieve, funds to be paid, administrative fee, and the timing of the emissions reductions projects. Acceptance of this fee by BAAQMD will serve as an acknowledgment and commitment by BAAQMD to undertake the following steps: (1) implement an emissions reduction project(s) within a timeframe to be determined based on the type of project(s) selected after receipt of the mitigation fee designed to achieve the emissions reduction objectives; and (2) provide documentation to the Authority or its designated representative describing the project(s) funded by the mitigation fee, including the amount of emissions reduced (tons per year) in the SFBAAB from the emissions reduction project(s). To qualify under this mitigation measure, the specific emissions reduction project(s) must result in emissions reductions in the SFBAAB that are real, surplus, quantifiable, enforceable, and would not otherwise be achieved through compliance with existing regulatory requirements or any other legal requirement. Pursuant to 40 C.F.R. Section 93.163(a), the necessary reductions must be achieved (contracted and delivered) by the applicable year in question. Funding will need to be received prior to contracting with participants and should allow enough time to receive and process applications to fund and implement off-site reduction projects prior to commencement of project activities being reduced. This would equate roughly to 1 year prior to the required mitigation; additional lead time may be necessary depending on the level of off-site emissions reductions required for a specific year.

This mitigation measure will be effective in offsetting emissions generated during construction of the project through the funding of emissions reduction projects. It is BAAQMD's experience that implementation of an agreement is feasible mitigation that effectively achieves actual emissions reductions.

This mitigation measure would not be expected to adversely affect air quality in the SFBAAB because purchasing emissions offsets would not result in any physical change to the environment, and therefore would not result in other secondary environmental impacts. In addition to VOC and NO_x, emissions reduction projects could reduce other criteria pollutants and GHGs. However, this would be a beneficial secondary impact of this mitigation measure and is not a required outcome to mitigate any impacts of the project.

11.3 Consistency with Requirements and Milestones in Applicable State Implementation Plan

The General Conformity regulations state that notwithstanding the other requirements of the rule, a federal action may not be determined to conform unless the total of direct and indirect emissions from the federal action is in compliance or consistent with all relevant requirements and milestones in the applicable SIP (40 C.F.R. § 93.158(c)). This includes, but is not limited to, such issues as reasonable further progress schedules, assumptions specified in the attainment or maintenance demonstration, prohibitions, numerical emission limits, and work practice standards.

This section briefly addresses how the construction emissions for the Project were assessed for SIP consistency for this evaluation.

11.3.1 Applicable Requirements from U.S. Environmental Protection Agency

The USEPA promulgates requirements to support the goals of the CAA with respect to the NAAQS. Typically, these requirements take the form of rules regulating emissions from significant new sources, including emission standards for major stationary point sources and classes of mobile sources, as well as permitting requirements for new major stationary point sources. Since states have the primary responsibility for implementation and enforcement of requirements under the CAA and can impose stricter limitations than the USEPA, the USEPA requirements often serve as guidance to the states in formulating their air quality management strategies.

11.3.2 Applicable Requirements from California Air Resources Board

In California, to support the attainment and maintenance of the NAAQS, the CARB is primarily responsible for regulating emissions from mobile sources. The USEPA has delegated authority to the CARB to establish emission standards for on-road and some non-road vehicles separate from the USEPA vehicle emission standards, although the CARB is preempted by the CAA from regulating emissions from many non-road mobile sources, including marine craft. Emission standards for preempted equipment can only be set by the USEPA.

11.3.3 Applicable Requirements from Bay Area Air Quality Management District

To support the attainment and maintenance of the NAAQS in the SFBAAB, the BAAQMD has primarily been responsible for regulating emissions from stationary sources. The BAAQMD develops and updates its air quality management plans regularly to support the California SIP. While the plans contain rules and regulations geared to attain and maintain the NAAQS, these rules and regulations also have the much more difficult goal of attaining and maintaining the CAAQS.

11.3.4 Consistency with Applicable Requirements for the California High-Speed Rail Authority

The Authority already complies with, and would continue to comply with, the rules and regulations implemented and enforced by federal and state agencies¹⁴ to protect and enhance ambient air quality in the SFBAAB. In particular, because of the long persistence of challenges to attain the ambient air quality standards in the SFBAAB, the rules and regulations promulgated by the CARB and the BAAQMD are among the most stringent in the U.S. The Authority would continue to comply with all existing applicable air quality regulatory requirements for activities over which it has direct control and would meet in a timely manner all regulatory requirements that become applicable in the future.

The following are appropriate USEPA, CARB, and BAAQMD rules that are standard practices and best management practices for construction in the SFBAAB, including control of emissions and exhaust:

- **BAAQMD Regulation 2, Rule 2 (New Source Review)**—This rule contains requirements for Best Available Control Technology and emission offsets.
- **BAAQMD Regulation 2, Rule 5 (New Source Review of Toxic Air Contaminants)**—This rule outlines guidance for evaluating toxic air contaminant emissions and their potential health risks.
- **BAAQMD Regulation 6, Rule 1 (Particulate Matter)**—This rule restricts emissions of PM darker than No. 1 on the Ringlemann Chart to less than 3 minutes in any 1 hour.

¹⁴ The Authority is a state agency and therefore is not required to comply with regional and local regulations; however, it has endeavored to design and build the HSR system to be compatible with regional and local regulations.

- **BAAQMD Regulation 6, Rule 6 (Prohibition of Trackout)**—This rule limits the quantity of PM in the atmosphere through control of trackout of solid materials onto paved public roads outside the boundaries of Large Bulk Material Sites, Large Construction Sites, and Large Disturbed Surface sites including landfills.
- **BAAQMD Regulation 7 (Odorous Substances)**—This regulation establishes general odor limitations on odorous substances and specific emission limitations on certain odorous compounds.
- **BAAQMD Regulation 8, Rule 3 (Architectural Coatings)**—This rule limits the quantity of ROG in architectural coatings.
- **BAAQMD Regulation 9, Rule 6 (Nitrogen Oxides Emission from Natural Gas–Fired Boilers and Water Heaters)**—This rule limits emissions of NO_x generated by natural gas–fired boilers.
- **BAAQMD Regulation 9, Rule 8 (Stationary Internal Combustion Engines)**—This rule limits emissions of NO_x and CO from stationary internal combustion engines of more than 50 horsepower.
- **BAAQMD Regulation 11, Rule 2 (Asbestos Demolition, Renovation, and Manufacturing)**—This rule controls emissions of asbestos to the atmosphere during demolition, renovation, milling, and manufacturing and establishes appropriate waste disposal procedures.
- **BAAQMD CEQA Guidelines**—The BAAQMD prepared its *CEQA Air Quality Guidelines* to assist lead agencies and project applicants in evaluating the potential air quality impacts of projects in the SFBAAB (BAAQMD 2017b). The Air Quality Guidelines provide BAAQMD–recommended procedures for evaluating potential air quality impacts during the CEQA environmental review process. The documents provide guidance on evaluating short-term (construction) and long-term (operational) air emissions. The *CEQA Air Quality Guidelines* used in this evaluation contain guidance on the following:
 - Criteria and thresholds for determining whether a project may have a significant adverse air quality impact
 - Specific procedures and modeling protocols for quantifying and analyzing air quality impacts
 - Methods to mitigate air quality impacts
 - Information for use in air quality assessments and environmental documents that will be updated more frequently, such as air quality data, regulatory setting, climate, and topography
- **USEPA Rule 40 C.F.R. Part 89, Control of Emissions from New and In-Use Nonroad Compression-Ignition Engines:** This rule requires stringent emission standards for mobile nonroad diesel engines of almost all types using a tiered phase-in of standards
- **CARB Rule 13 California Code of Regulations Section 1956.8, California Exhaust Emission Standards and Test Procedures for 1985 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles:** This rule requires significant reductions in emissions of NO_x, PM, and nonmethane organic compounds using exhaust treatment on heavy-duty diesel engines manufactured in model year 2007 and later years.

12 ESTIMATED EMISSION RATES AND COMPARISON TO *DE MINIMIS* THRESHOLDS—CUMULATIVE ANALYSIS

The RSA for cumulative air quality impacts is the SFBAAB and SJVAB.¹⁵ While they are separate projects for purposes of planning the HSR system, construction of the San Francisco to San Jose Project Section would overlap with the construction period for the following other HSR sections:

- San Jose to Merced, construction in the SFBAAB and SJVAB between 2022 and 2028
- Central Valley Wye, construction in the SJVAB in 2022 and material hauling in the SFBAAB in 2022
- Merced to Fresno, construction in the SJVAB in 2022 (no emissions in the SFBAAB)
- Fresno to Bakersfield, construction in the SJVAB between 2022 and 2023 (no emissions in the SFBAAB)
- Bakersfield to Palmdale, construction in the SJVAB between 2022 and 2025 (no emissions in the SFBAAB)

Overlapping construction activities could add to cumulative air quality impacts within the SFBAAB and SJVAB. For purposes of full disclosure of the potential impacts, the cumulative emissions that could result from potential concurrent construction activities are presented in Table 8 for the SFBAAB and Table 9 for the SJVAB. As the analysis demonstrates, concurrent construction could result in exceedances of the NO_x General Conformity *de minimis* threshold in the SFBAAB and the VOC and NO_x General Conformity *de minimis* thresholds in the SJVAB. The Authority has entered into an agreement with the SJVAPCD that will offset all emissions of VOC, NO_x, and PM generated in the SJVAB by construction of the HSR Project to net zero. Pursuant to AQ-MM#-2, the Authority would enter into an agreement with BAAQMD to offset VOC and NO_x emissions from construction of the San Francisco to San Jose Project Section to net zero, for each year in which VOC or NO_x emissions from construction exceed the federal general conformity *de minimis* thresholds. These commitments currently cover VOC and NO_x emissions, although reduction projects implemented to reduce O₃ precursors may also contribute to PM reductions.

The Merced to Sacramento Project Section would also generate emissions in the SJVAB. However, this section would not be completed until Phase 2, which would occur after completion of the mandated Los Angeles to San Francisco line. It is likely that construction activities would therefore take place after the San Francisco to San Jose Project Section is completed (i.e., after 2025).

¹⁵ Although the San Francisco to San Jose Project Section is not in the SJVAB, the SJVAB nonetheless is part of the cumulative analysis because the HSR project sections in the SJVAB could add to cumulative air quality impacts in the SFBAAB. In addition, some truck travel associated with construction of the LMF would occur in the SJVAB. The NCCAB is not included in the cumulative air quality analysis because no HSR project sections are located in the NCCAB.

Table 8 Overlapping HSR System Construction Emissions in the San Francisco Bay Area Air Basin (tons per year)

Year and Project Section	VOC	NO _x	CO	SO ₂ ¹	PM ₁₀	PM _{2.5}
2022						
JM ^{2,3}	6	77	192	1	47	11
FJ ^{2,4,5}	5	115	156	1	75	18
CVY	1	31	9	<1	1	1
<i>Total</i>	11	223	357	1	123	30
2023						
JM ^{2,3}	7	118	255	1	70	17
FJ ^{2,4,5}	4	103	122	0	65	16
CVY	0	0	0	0	0	0
<i>Total</i>	10	221	387	1	135	33
2024						
JM ^{2,3}	9	156	304	1	95	23
FJ ^{2,4,5}	3	91	109	0	59	14
CVY	0	0	0	0	0	0
<i>Total</i>	12	248	413	1	154	37
2025						
JM ^{2,3}	7	139	241	1	79	19
FJ ^{2,4,5}	4	96	132	0	55	15
CVY	0	0	0	0	0	0
<i>Total</i>	12	235	372	1	134	35
General Conformity Threshold						
SFBAAB threshold	100	100	N/A	100	N/A	100

Sources: See Table 6 in Section 10; Authority and FRA 2017

The Merced to Fresno, Fresno to Bakersfield, and Bakersfield to Palmdale Project Sections are omitted because they would not produce construction emissions in the SFBAAB.

Emissions in 2021 are not shown because construction emissions for project sections other than FJ are not projected to occur in 2021.

Emissions in 2026 are not shown because construction emissions for the FJ Project Section in 2026 would be less than 0.5 tons of any pollutant.

CO = carbon monoxide

CVY = Central Valley Wye

FJ = San Francisco to San Jose

IAMF = impact avoidance and minimization feature

JM = San Jose to Merced

N/A = not applicable

NO_x = oxides of nitrogen

PM_{2.5} = particulate matter smaller than or equal to 2.5 microns in diameter

Sum of individual values may not equal total due to rounding.

Values less than 0.5 have been rounded to zero.

Exceedances of the applicable *de minimis* thresholds are shown in **bold**.

¹ Although the SFBAAB is in attainment for SO₂, because SO₂ is a precursor for PM_{2.5}, the PM_{2.5} General Conformity *de minimis* thresholds are used.

² Emissions results include implementation of air quality IAMFs, as described in Section 6.

³ Presents emissions under Alternative 4, which is the JM alternative with the greatest emissions in the SFBAAB.

⁴ Presents emissions under Alternative B, which is the FJ alternative with the greatest emissions in the SFBAAB.

⁵ To avoid double-counting, FJ values do not include the San Jose Diridon Station Approach Subsection.

Table 9 Overlapping HSR System Construction Emissions in the San Joaquin Valley Air Basin (tons per year)

Year ¹	VOC	NOx	CO	SO ₂ ²	PM ₁₀	PM _{2.5}
2022						
JM ^{3,4}	6	42	218	1	18	5
FJ ^{3,4}	0	6	1	0	1	0
B-P ⁴	11	103	87	1	10	5
F-B ⁴	<1	1	1	<1	<1	<1
M-F ⁴	5	4	3	<1	9	2
CVY ⁴	2	44	20	<1	2	2
<i>Total</i>	25	200	331	2	40	13
2023						
JM ^{3,4}	6	55	226	1	24	6
FJ ^{3,4}	0	6	1	0	1	0
B-P ⁴	8	70	66	1	9	4
F-B ⁴	<1	<1	<1	<1	<1	<1
M-F ⁴	0	0	0	0	0	0
CVY ⁴	0	0	0	0	0	0
<i>Total</i>	14	132	293	2	34	10
2024						
JM ^{3,4}	6	56	220	1	23	5
FJ ^{3,4}	0	5	1	0	1	0
B-P ⁴	6	50	50	1	6	3
F-B ⁴	0	0	0	0	0	0
M-F ⁴	0	0	0	0	0	0
CVY ⁴	0	0	0	0	0	0
<i>Total</i>	12	111	271	2	30	8
2025						
JM ^{3,4}	6	54	209	1	21	5
FJ ^{3,4}	0	0	0	0	0	0
B-P ⁴	2	10	11	1	1	1
F-B ⁴	0	0	0	0	0	0
M-F ⁴	0	0	0	0	0	0
CVY ⁴	0	0	0	0	0	0
<i>Total</i>	8	64	220	2	22	6

Year ¹	VOC	NO _x	CO	SO ₂ ²	PM ₁₀	PM _{2.5}
General Conformity Threshold						
SJVAB threshold	10	10	-	70	100	70

Source: Authority 2021

Sum of individual values may not equal total due to rounding.

Values less than 0.5 have been rounded to zero.

Exceedances of the *de minimis* thresholds are shown in **bold**.

B-P = Bakersfield to Palmdale

CO = carbon monoxide

CVY = Central Valley Wye

F-B = Fresno to Bakersfield

FJ = San Francisco to San Jose

IAMF = impact avoidance and minimization feature

JM = San Jose to Merced

M-F = Merced to Fresno

NO_x = oxides of nitrogen

PM_{2.5} = particulate matter 2.5 microns in diameter or less

PM₁₀ = particulate matter 10 microns in diameter or less

RSA = resource study area

SO₂ = sulfur dioxide

VOC = volatile organic compound

¹ The analysis assumed that Project construction would take place from 2022 to 2025, and that construction of other HSR project sections would occur according to the schedules presented in their respective environmental documents.

² Although the SJVAB is in attainment for SO₂, because SO₂ is a precursor for PM_{2.5}, the PM_{2.5} General Conformity *de minimis* thresholds are used.

³ Emissions results include implementation of air quality IAMFs, as described in Section 6.

⁴ The highest annual emissions for each pollutant among the analyzed alternatives is presented.

13 REPORTING AND PUBLIC COMMENTS

The FRA issued a Draft General Conformity Determination for a 30-day public and agency review as required by 40 C.F.R. §§ 93.155 and 93.156. In developing the analysis underlying this general conformity determination, the Authority has consulted extensively with the BAAQMD on a variety of technical and modeling issues. The Authority has also consulted with the USEPA and CARB on the overall approach to demonstrating general conformity.

The FRA published a notice in the Federal Register on May 2, 2022 announcing the availability of the Draft General Conformity Determination for a 30-day review and comment period. This draft conformity determination was made available on FRA's docket at <https://www.regulations.gov/>, Docket FRA-2022-0026. The comment period of the Draft Conformity Determination closed on June 2, 2022.

FRA received one comment on the Draft General Conformity Determination on behalf of the City of Brisbane. The commenter stated "the Draft GCD findings are erroneous because it is based upon the Project's EIR/EIS, which provides inaccurate and incomplete information." The commenter also identified specific statements in the Draft General Conformity Determination where the commenter believed the analysis was deficient. FRA prepared a response to the City's comment, which is included as Attachment B, Comments and Responses, to this Final General Conformity Determination. The Final General Conformity Determination is available at <http://www.regulations.gov>, Docket No. FRA-2022-0026, and on FRA's website at <https://railroads.dot.gov/environment/environmental-reviews/clean-air-act-california-general-conformity-determinations>.

14 FINDINGS AND CONCLUSIONS

FRA conducted a General Conformity evaluation consistent with 40 C.F.R. Part 93 Subpart B. The General Conformity regulations apply at this time to this Project because the Project is in an area that is designated as a marginal nonattainment area for the O₃ NAAQS and a moderate nonattainment area for the PM_{2.5} NAAQS. The FRA conducted the General Conformity evaluation consistent with all regulatory criteria and procedures and following the Authority's coordination with the USEPA, BAAQMD, and CARB. As a result of this review, the FRA concluded, because Project-generated emissions in exceedance of the General Conformity *de minimis* thresholds would either be offset (for construction phase) or less than zero (for operational phase), that the Project's emissions can be accommodated in the SIP for the SFBAAB. The FRA has determined that the Project as designed would conform to the approved SIP based on the following:

- The Authority commits that construction-phase NO_x emissions will be offset consistent with the applicable federal regulations through an agreement with the BAAQMD. See Attachment A.
- The Authority and the BAAQMD will enter into a contractual agreement to offset the Project's NO_x emissions by providing funds for the BAAQMD to fund grants for projects that achieve the necessary emission reductions.
- The BAAQMD will seek and implement the necessary emission reduction measures, using Authority funds.
- The BAAQMD will serve as administrator of the emissions reduction projects and verifiers of the successful mitigation effort.

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ATTACHMENT A: BAAQMD LETTER(S) OF AGREEMENT



**BAY AREA
AIR QUALITY
MANAGEMENT
DISTRICT**

ALAMEDA COUNTY

John J. Bauters
(Vice Chair)
Pauline Russo Cutter
David Haubert
Nate Miley

CONTRA COSTA COUNTY

John Gioia
David Hudson
Karen Mitchoff
(Chair)
Mark Ross

MARIN COUNTY

Katie Rice

NAPA COUNTY

Brad Wagenknecht

SAN FRANCISCO COUNTY

Tyrone Jue
(SF Mayor's Appointee)
Myrna Melgar
Shamann Walton

SAN MATEO COUNTY

David J. Canepa
Carole Groom
Davina Hurt
(Secretary)

SANTA CLARA COUNTY

Margaret Abe-Koga
Cindy Chavez
Rich Constantine
Rob Rennie

SOLANO COUNTY

Erin Hannigan
Lori Wilson

SONOMA COUNTY

Teresa Barrett
Lynda Hopkins

Jack P. Broadbent
EXECUTIVE OFFICER/APCO

Connect with the
Bay Area Air District:



March 11, 2022

Brian Kelly
Chief Executive Officer
California High Speed Rail Authority
770 L Street, Suite 620,
Sacramento, CA 95814

Re: Intent to offset future emissions during construction of San Francisco to San Jose and San Jose to Merced Sections of the California High-Speed Rail System for purposes of Federal Clean Air Act General Conformity

Dear Mr. Kelly,

Purpose

The purpose of this letter is to document that the Bay Area Air Quality Management District (Air District) and the Bay Area Clean Air Foundation (Foundation) intend to work with the California High Speed Rail Authority (Authority) on off-site emission reduction measures to support General Conformity for the San Francisco to San Jose and San Jose to Merced Project Sections of the California High-Speed Rail (HSR) System.

Projects

The California HSR System will provide intercity, high-speed service on more than 800 miles of guideway throughout California, connecting the major population centers of Sacramento, the San Francisco Bay Area, the southern Central Valley, Los Angeles, the Inland Empire, Orange County, and San Diego. The San Francisco to San Jose (FJ) and San Jose to Merced Project (JM) Sections ("Projects" or "Actions") are critical links connecting the Bay Area to the Central Valley project sections.

General Conformity Rule

The General Conformity Rule, as codified in Title 40 Code of Federal Regulations Part 93, Subpart B, establishes the process by which federal agencies determine conformance of proposed projects that are federally funded or require federal approval with applicable air quality standards. This determination must demonstrate that a proposed action would not cause or contribute to new violations of air quality standards, exacerbate existing violations, or interfere with timely attainment or required interim emissions reductions towards attainment. The Authority, as the proponent of the Actions, is receiving federal grant funds through the Federal Railroad Administration's (FRA) High-Speed Intercity Passenger Rail program. The Actions may also receive FRA safety approvals. Because of the federal

funding and potential safety approvals, the Actions are subject to the General Conformity Rule; and because construction-phase emissions (without mitigation) would exceed General Conformity *de minimis* thresholds, the Actions are not exempt and must demonstrate how the projects intend to achieve conformity.

General Conformity Determinations

It is the Air District's understanding that the draft General Conformity Determinations for the Actions document FRA's findings that the Actions comply with the General Conformity Rule, conform to the purposes of the State Implementation Plan, and are consistent with all applicable requirements. FRA will issue the draft General Conformity Determination for the San Francisco to San Jose Project Section for public review and comment and has issued the draft General Conformity Determination for the San Jose to Merced Project Section for public review. Neither Air District nor the Bay Area Clean Air Foundation have reviewed or commented on the draft Conformity Determinations.

The draft General Conformity Determinations are based on the Impact Avoidance and Minimization Measures (IAMF) and Mitigation Measures (MM) that are described in Appendix 2-E and Section 3.3.7 of the Final EIR/EISs for both Actions and that will be implemented for the Actions. This compliance is demonstrated as follows:

- The operation of the Action would result in a reduction of regional emissions of all applicable air pollutants and would not cause a localized exceedance of an air quality standard; and
- Whereas emissions generated during the construction of the Actions would exceed General Conformity *de minimis* thresholds for one pollutant, these emission increases would be offset through off-site emissions reductions projects funded by the Authority and administered by Air District's support organization, the Bay Area Clean Air Foundation, a public charity.

Based on the Authority's current emissions analysis, construction emissions exceed General Conformity *de minimis* thresholds for nitrogen oxides (NO_x) in the San Francisco Bay Area Air Basin. The Authority has advised that these exceedances are based on current construction schedule and equipment estimates and based on the available information to date. The methodology used by the Authority in creating these estimates is similar to what was used for estimating the emissions for the EIR/EISs for the Authority's Merced to Fresno and Fresno to Bakersfield Project Sections. After seven years of construction in the Central Valley, the Authority reports that the estimates in those EIR/EISs are conservative and actual emissions from construction are currently lower than EIR/EIS estimates by 50 to 70 percent.

Impact Avoidance and Minimization Features

The Authority has incorporated the following IAMFs into the Projects:

- **AQ-IAMF#1: Fugitive Dust Emissions:** The contractor will employ several control measures to minimize and control fugitive dust emissions and prepare a fugitive dust control plan for each distinct construction segment.
- **AQ-IAMF#2: Selection of Coatings:** The contractor will use lower VOC content paint than that required by Air District Regulation 8, Rule 3, when available.
- **AQ-IAMF#3: Renewable Diesel:** The contractor will use renewable diesel fuel to minimize and control exhaust emissions from all heavy-duty diesel-fueled construction diesel equipment and on-road diesel trucks.
- **AQ-IAMF#4: Reduce Criteria Exhaust Emissions from Construction Equipment:** All heavy-duty off-road construction diesel equipment used during the construction phase will meet Tier 4 engine requirements.
- **AQ-IAMF#5: Reduce Criteria Exhaust Emissions from On-Road Construction Equipment:** All diesel on-road trucks used to haul construction materials will be model year 2010 or newer.¹
- **AQ-IAMF#6: Reduce the Potential Impact of Concrete Batch Plants:** The contractor will prepare a technical memorandum documenting the concrete batch plant siting criteria, including locating the plant at least 1,000 feet from sensitive receptors, and utilization of typical control measures.

Mitigation Measures

The Authority has committed to the following mitigation measure in its Northern California environmental documentation and has committed in its environmental documentation to incorporating this measure into its future Northern California construction contracts.

AQ-MM#2² - Construction Emissions Reductions—Requirements for Use of Zero Emission and/or Near Zero Emission Vehicles and Off-Road Equipment

This mitigation measure will reduce the impact of construction emissions from project-related on-road vehicles and off-road equipment.

The Authority and all project construction contractors will require that a minimum of 25 percent, with a goal of 100 percent, of all light-duty on-road vehicles (e.g., passenger cars, light-duty trucks) associated with the project (e.g., on-site vehicles, contractor vehicles) use zero emission (ZE) or near-zero emission (NZE) technology.

The Authority and all project construction contractors will have the goal that a minimum of 25 percent of all heavy-duty on-road vehicles (e.g., for hauling, material delivery and soil import/export) associated with the construction activities for the San

¹ IAMFs listed are from the San Jose to Merced Project Section. AQ-IAMF#5 in San Francisco to San Jose Project Section is slightly different and reads as follows: All on road trucks will consist of an average fleet mix of equipment year 2010 or newer, but no less than the average fleet mix for the current calendar year as set forth in the CARB's EMFAC 2014 database.

² This mitigation measure number is specific to the San Jose to Merced Project Section Final EIR/EIS. This same measure is AQ-MM#1 in the San Francisco to San Jose Project Section Final EIR/EIS.

Francisco to San Jose and San Jose to Merced Sections of the HSR System use ZE or NZE technology.

The Authority and all project construction contractors will have the goal that a minimum of 10 percent of off-road construction equipment use ZE or NZE vehicles.

If local or state regulations mandate a faster transition to using ZE and/or NZE vehicles at the time of construction, the more stringent regulations will be applied. For example, Executive Order (EO) N-79-20, issued by California Governor Newsom September 23, 2020, currently states the following:

- Light duty and passenger car sales be 100 percent ZE vehicles by 2035
- Full transition to ZE short haul/drayage trucks by 2035
- Full transition to ZE heavy-duty long-haul trucks, where feasible, by 2045
- Full transition to ZE off-road equipment by 2035, where feasible.

The project will have a goal of surpassing the requirements of these or other future regulations as a mitigation measure.

It is the Air District's understanding that the Authority already mandates that all such equipment meet the highest emission standard codified by the U.S. Environmental Protection Agency (EPA) —Tier 4 and that the Authority intends for its implementation strategy to go further, mandating through contractual measures that by 2030, 10 percent of off-road equipment be ZEV at start of construction, and sets the goal of 100 percent ZEV for such equipment by 2035.

Future Emissions Estimates

It is the Air District's understanding that since funding has not been fully secured for the Projects, construction emissions would be recalculated after funding is secured, prior to the implementation of any off-site emissions reduction programs and prior to construction activities commencing. As such, the Authority reports that the following steps will be followed to demonstrate conformity:

- Once construction funding is secured for the project section, a revised construction schedule will be developed.
- Based on the new schedule, a construction plan will be developed and analyzed to determine the emissions generated by construction.
- At the time of analysis, the IAMFs and MMs will be revisited and may be updated to include technologies and methodologies that were not considered in the earlier analysis. This review and implementation of updated measures will aid the projects in reducing the generation of emissions due to construction. The Air District strongly recommends that these additional measures include the following:

-
- All on-road heavy-duty trucks traveling to the construction site shall have engines that are no more than seven years old (i.e., in 2022, engines must be 2015 model year or newer).
 - All off-road equipment shall use the highest tier engines available when zero-emissions equipment is not available (e.g. Tier 4 construction, rail, marine equipment). In place of Tier 4 engines, off-road equipment can incorporate retrofits such that emission reductions achieved equal or exceed that of a Tier 4 engine.
 - All off-road equipment with a power rating below 19 kilowatts (e.g., plate compactors, pressure washers) shall be battery powered.
 - Diesel generators, including any designated for back-up, shall not be used at the project sites during construction unless absolutely necessary. If necessary, generators shall have Best Available Control Technology (BACT) that meets CARB's Tier 4 emission standards or meets the most stringent in-use standard, whichever has the least emissions.
- Once emission estimates are calculated using the IAMF and MMs, the Authority will confirm whether the estimates are still above the applicable General Conformity *de minimis* thresholds.
 - All affected air districts will be notified of the emission levels and consulted to offset emissions for those years/pollutants that exceed General Conformity *de minimis* thresholds. Alternatively, the air districts could include these emissions in the applicable State Implementation Plan.
 - The emission accounting program the Authority uses to track emissions for the segments currently being constructed will be utilized to actively quantify the construction emissions generated by the project.

Conclusion

The Air District and the Bay Area Clean Air Foundation acknowledge the following:

- The Authority will ensure that the lowest level of construction emissions are generated through the use of IAMFs outlined in this document and rolling review of best available technologies.
- The Authority will exhaust all on-site opportunities to reduce emissions during the construction phase, including from vehicles traveling to and from the project site, before seeking off-site NOx mitigation.

As such, by signing below the Air District and the Bay Area Clean Air Foundation commit to the following:

- The Air District will work with the Authority to mitigate all NOx emissions exceeding General Conformity *de minimis* thresholds to zero as required by General Conformity, through an off-site emissions reductions program. Funds from the Authority for mitigation offsets will be administered by Air District's Bay Area Clean Air Foundation for the award of grants to Bay Area businesses, public agencies, and

residents who will implement projects that reduce emissions of NO_x, reactive organic gases, and particulate matter. The Bay Area Clean Air Foundation intends to enter into a contractual agreement with the Authority to implement this program, with the Authority providing funds for off-site emissions reductions projects that achieve the necessary emissions reductions. Current off-site emissions reductions programs work to cost-effectively reduce emissions from primarily mobile source projects. Project types may include, but are not limited to:

- Grants to replace dirty diesel off-road equipment, e.g., tractors and agricultural equipment, marine, lawn and garden;
 - Grants to replace older, high-polluting trucks and buses; and
 - Grants to owners to scrap older, high-polluting vehicles.
- The Bay Area Clean Air Foundation requires adequate lead time to achieve emissions reductions, and understands that the Authority will commit to working with the Foundation well in advance of construction years during which emissions reductions may be necessary (no less than three years, for construction years estimated to require emissions reductions of 100 tons/year or more).
 - The Bay Area Clean Air Foundation will seek and implement the necessary emission reduction measures to the extent possible, using Authority funds; and
 - The Bay Area Clean Air Foundation will serve in the role of administrator of the emissions reduction projects and verifier of the successful mitigation effort.

Thank you for your continuing partnership with Air District and the Foundation to protect air quality, the climate and public health in the Bay Area.

Sincerely,



Jack P. Broadbent
Executive Officer/APCO Bay Area Air Quality Management District
President, Bay Area Clean Air Foundation

cc: Director Margaret Abe-Koga
Director David J. Canepa
Chair Cindy Chavez
Director Rich Constantine
Director Carole Groom
Director Davina Hurt
Director Tyrone Jue
Director Rob Rennie
Director Shamann Walton

ATTACHMENT B: COMMENTS AND RESPONSES

ATTACHMENT B-1: COMMENT 1 - CITY OF BRISBANE ¹

¹ This comment included, as Attachment A, the City of Brisbane's comment letter on the San Francisco to San Jose Project Section Draft EIR/EIS dated September 8, 2020. This comment letter and the Authority's responses to this letter are included in the San Francisco to San Jose Project Section Final EIR/EIS in Volume 4, Responses to Comments on the Draft EIR/EIS and Revised/Supplemental Draft EIR/EIS.

May 26, 2022

Client-Matter: 23890-033

VIA EMAIL AND ELECTRONIC SUBMISSION TO REGULATIONS.GOV

Federal Railroad Administration and Department of Transportation
Draft General Conformity Determination (Docket No. FRA-2022-0026)
California High-Speed Rail System – San Francisco to San José Project Section

Re: Comments by the City of Brisbane, California, on the Draft General Conformity Determination (Docket No. FRA-2022-0026) for the San Francisco to San José Section of the California High Speed Rail System

To Whom It May Concern:

We represent the City of Brisbane (City) in the above-reference matter and, on its behalf, provide this comment letter regarding the Draft General Conformity Determination (Draft GCD) for the California High-Speed Rail (HSR) System's San Francisco to San José Project Section (Project). The Draft GCD (Docket No. FRA-2022-0026) for the Project utilizes the Project's Draft Environmental Impact Report/Environmental Impact Statement (Draft EIR/EIS),¹ which is "where appropriate, integrated into this draft General Conformity Determination." (Draft GCD, p. 1-1.)

The Draft GCD concludes that "Project-generated emissions will either be offset for its construction phase or will be less than zero for its operational phase, and that the Project's emissions can be accommodated in the Statewide Implementation Plan for the San Francisco Bay Area Air Basin."² However, as discussed below, the Draft GCD findings are erroneous because it is based upon the Project's EIR/EIS, which provides inaccurate and incomplete information. The EIR/EIS's deficiencies related to the analysis of air quality impacts prohibit the Federal Railroad Administration (FRA) and

¹ The San Francisco to San José Project Section Draft Environmental Impact Report/Environmental Impact Statement is available at the following link:
<https://hsr.ca.gov/programs/environmental-planning/project-section-environmental-documents-tier-2/san-francisco-to-san-jose-project-section-draft-environmental-impact-report-environmental-impact-statement/>.

² Notice of Draft General Conformity Determination for the California High-Speed Rail System San Francisco to San José (Docket No. FRA-2022-0026), available here:
<https://www.govinfo.gov/content/pkg/FR-2022-05-02/pdf/2022-09331.pdf>.

Department of Transportation (DOT) from making a sufficient General Conformity Determination.

I. THE HIGH-SPEED RAIL SAN FRANCISCO TO SAN JOSÉ PROJECT SECTION DRAFT EIR/EIS CONTAINS DEFICIENCIES THAT PROHIBIT A GENERAL CONFORMITY DETERMINATION

The City submitted a comment letter dated September 8, 2020 on the Draft EIR/EIS for the HSR San Francisco to San José Project Section. (City of Brisbane Draft EIR/EIS Comment Letter [referenced as “BCL”], provided as an Attachment to this correspondence.) The City’s comments demonstrate that the Draft EIR/EIS fails to meet the requirements of the California Environmental Quality Act (CEQA, Pub. Resources Code, § 21000 et seq.), the National Environmental Policy Act (NEPA, 42 U.S.C. § 4321 et seq.), and numerous other environmental laws. The Draft EIR/EIS fails to include a sufficient degree of analysis to provide decision makers with information that enables them to make a decision that intelligently takes account of environmental consequences.

Specifically, the deficiencies of the EIR/EIS’s air quality impact analysis that prohibit an accurate GCD include the following:

1. The EIR/EIS fails to recognize that construction of the Light Maintenance Facility (LMF) requires truck hauling of approximately 3 million cubic yards of contaminated soils for the West LMF. (BCL, pp. 3, 99; Draft EIR/EIS, Table 3.8-16.) The EIR/EIS also fails to recognize that the East LMF is located on the site of a former landfill and requires an undisclosed amount of truck hauling to remove soil cover and municipal waste to bring the East LMF to grade, which would cause significant impacts on air quality, as well as transportation, greenhouse gas, and solid waste disposal systems. (BCL, pp. 9, 70; Draft EIR/EIS, Table 2-25; Draft EIR/EIS *Geology, Soils, and Seismicity Technical Report*, pp. 5-33.)
2. The EIR/EIS lacks information regarding site remediation for sites UPC-OU-SM and UPC-OU-2 (West LMF) as well as Title 27 landfill closure requirements (East LMF), which is necessary for a comprehensive air quality analysis. (BCL, pp. 3, 9-11, 60, 66, 69-71, 81; Draft EIR/EIS, p. 3.10-39.)
3. The EIR/EIS’s air quality impact analysis improperly relies on artificially inflated estimates of HSR ridership to offset the Project’s significant

- operational impacts and avoids implementation of sufficient mitigation measures. (BCL, pp. 14, 30, 122; Draft EIR/EIS, pp. 2-111-113, Table 2-18.)
- a. Insufficient evidence is presented to show that the ridership estimates are accurate, especially in light of the long-term reductions in intercity travel and rail transit likely to be caused by COVID-19 changes in travel behavior. (Draft EIR/EIS, pp. 2-111-113, Table 2-18.)
 - b. The Draft EIR/EIS only uses medium and high ridership numbers to analyze Project benefits; a low ridership scenario analysis adjusted for long-term effects of COVID-19 on ridership (e.g., reduced business travel due to increased use of virtual meetings) is required to sufficiently inform the decision makers and public. (Draft EIR/EIS, pp. 2-111-113, Table 2-18.)
4. The EIR/EIS also lacks certainty regarding the hauling of offsite LMF construction waste, including the number of truck trips for such hauling, the waste classifications, and the Vehicle Miles Traveled (VMT) associated with these truck trips. (BCL, pp. 43-48.) The additional discussion of this necessary information would likely result in substantial changes to the air quality analysis, which relies on estimated construction VMT by vehicle type, as well other resource areas such as traffic analysis, noise, and greenhouse gas analysis.
- a. To provide adequate analysis, the EIR/EIS should have, but failed to, quantify the number of truck trips, based on the volume of excavated materials to be hauled, and analyze their impacts on intersection impacts and traffic delays. (BCL, pp. 43-48; See Draft EIR/EIS, Sections 3.2 *Transportation*.) The EIR/EIS also failed to describe the duration of the hauling of material, the number of trucks per day, planned truck routes, and time periods during the day when hauling trucks are allowed.
5. Air quality construction mitigation measures are inadequate because they are too uncertain to be effective. (BCL, pp. 48, 51; Draft EIR/EIS, pp. 3.3-90-91.)
- a. The EIR/EIS's Mitigation Measure AQ-MM#1 (Offset Project Construction Emissions in the San Francisco Bay Area Air Basin) lacks essential information such that it is not effective mitigation. The amount of the mitigation fee, the timing of payment, and the offset projects to which it

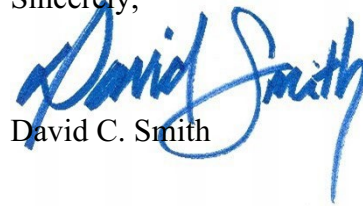
would be applied are not specified such that there is no evidence presented to demonstrate that mitigation will actually result. (BCL, pp. 48, 51; Draft EIR/EIS, pp. 3.3-90-91.)

- b. Mitigation Measure AQ-MM#1 inappropriately resorts straight to an uncertain and improperly deferred mitigation fee approach without first proposing implementation of all feasible onsite mitigation measures, which includes the Bay Area Air Quality Management District (BAAQMD) list of construction mitigation measures. These BAAQMD measures are commonly used as CEQA construction mitigation measures in Bay Area projects because such measures' implementation is more certain and enforceable. (BCL, pp. 51.) The BAAQMD measures should have been added to Mitigation Measure AQ-MM#1 and their effectiveness in reducing emissions should be quantified using BAAQMD guidance before offset fees are considered to mitigate residual impacts that cannot be mitigated onsite.

II. CONCLUSION

As described in the Draft GCD, a federal agency's conformity determination must demonstrate that the federal action would not cause or contribute to new violations of air quality standards, exacerbate existing violations, or interfere with timely attainment or required interim emissions reductions towards attainment. (Draft GCD, p. 1-1.) Because the Draft EIR/EIS utterly fails to provide a sufficient degree of analysis to allow an adequate assessment of environmental impacts, including air quality impacts, the Draft GCD is based on inadequate information and its conclusions and findings are erroneous. FRA and DOT must reevaluate the findings within the Draft GCD after the EIR/EIS is corrected and updated with more accurate and complete information necessary for a sufficient General Conformity Determination.

Sincerely,



David C. Smith



Federal Railroad Administration and Department of Transportation
May 26, 2022
Page 5

DCS:dcs

Attachment: City of Brisbane's September 8, 2020 Comment Letter on the California High Speed Rail San Francisco to San José Project Section Draft EIR/EIS

cc: City Council Members
Thomas McMorrow, City Attorney
Clay Holstine, City Manager

ATTACHMENT B-2: RESPONSE TO COMMENT 1 - CITY OF BRISBANE

Response to Comment 1 - City of Brisbane

FRA received one comment submission, on behalf of the City of Brisbane (City), on the Draft General Conformity Determination (GCD). The commenter stated that “the Draft GCD findings are erroneous because it is based upon the Project’s EIR/EIS, which provides inaccurate and incomplete information.” As of July 23, 2019, FRA has assigned its responsibilities under the National Environmental Policy Act (NEPA) to the California High-Speed Rail Authority (Authority). The Authority is responsible for conducting the environmental analysis for the Project and preparing the Project’s Environmental Impact Report/ Environmental Impact Statement (EIR/EIS). However, FRA retains authority for general conformity determinations under the Clean Air Act. Since the commenter raises concerns with the Project’s EIR/EIS, FRA coordinated with the Authority in preparing this response.

The comment reiterates previous concerns raised by the City during the comment period for the Project’s Draft EIR/EIS issued in June 2020. The City provided these comments to the Authority in a letter dated September 8, 2020. These comments were considered in the air quality analysis underlying FRA’s Draft GCD, published on May 2, 2022. Additionally, the Authority responded to the City’s comment letter in the Project’s Final EIR/EIS issued in June 2022.

In Table 1 below, FRA explains how the City’s comments, dated September 8, 2020, were considered in FRA’s Draft GCD and provides responses to the substantive comments raised in the City’s comment letter, dated May 26, 2022.

Since FRA has assigned its NEPA responsibilities to the Authority, for comments that concern the Project’s EIR/EIS, FRA is referring the commenter to the Project’s Final EIR/EIS. Specifically, responses to Attachment A of the City’s May 26, 2022 comment letter were prepared by the Authority, and are provided for in the Final EIR/EIS Volume 4, Response to Comments on the Draft EIR/EIS and Revised/Supplemental Draft EIR/EIS (see responses to submissions 1163 through 1167 in Chapter 20, Local Agency Comments, available at https://hsr.ca.gov/wp-content/uploads/2022/05/Final_EIRS_FJ_V4-05_Ch_20_LocalAgencyComments.pdf). Where applicable, these responses are incorporated herein by reference.

Table 1, City of Brisbane Comments and Responses

Comment	Response
1. The EIR/EIS fails to recognize that construction of the LMF requires truck hauling of approximately 3 million cubic yards of contaminated soils for the West LMF. The EIR/EIS also fails to recognize that the East LMF is located on the site of a former landfill and requires an undisclosed amount of truck hauling to remove soil cover and municipal waste to bring the East LMF to grade, which would cause significant impacts on air quality, as well as transportation, greenhouse gas, and solid waste disposal systems.	The refined assumptions and analysis regarding site remediation, soil disposal, truck trips, and related air quality impacts in the Final EIR/EIS, described above, were reflected in the analysis presented in Chapter 9, Estimated Emissions Rates and Comparison to De Minimis Threshold, of the Draft GCD. Refer to Section 3.1, Meteorology and Climate, of the Draft GCD, which states that “trucks associated with disposal of material excavated for construction of the LMF would use State Route (SR) 152 to Interstate (I-) 5 to access the Kettleman Landfill,” and footnote 15, which confirms that air quality

Comment	Response
	<p>effects of these truck trips were considered in the Draft GCD. Refer also to Chapter 8, Construction Activities Considered, of the Draft GCD, which clarifies that on-site and off-site construction-phase activities (e.g., worker commuting and truck trips to supply materials and remove construction and demolition material) were considered in the analysis of potential air quality impacts. Accordingly, no additional changes are necessary for this Final GCD.</p> <p>The comment is also addressed in the Final EIR/EIS response to submission FJ-1164, comment 1392:</p> <p><i>“Assumptions regarding truck trips required for disposal of materials excavated at the site of the East and West Brisbane LMF have been refined for the Final EIR/EIS. Refer to Section 2.10.3, Major Construction Activities, for a description of the construction assumptions used for the purposes of the Final EIR/EIS. As shown in Table 2-25 of the Final EIR/EIS, it was estimated that construction of the East Brisbane LMF under Alternative A would require disposal of approximately 1,875,000 cubic yards as solid waste and approximately 208,300 cubic yards as hazardous waste. For the West Brisbane LMF under Alternative B, it was estimated that construction would require disposal of 206,000 cubic yards as solid waste and approximately 432,000 cubic yards as hazardous waste. For the East Brisbane LMF under Alternative A, transport of this waste is anticipated to generate 690 daily truck trips to the off-site waste facilities. For the West Brisbane LMF under Alternative B, transport of this waste is anticipated to generate 450 daily truck trips to the off-site waste facilities.</i></p> <p><i>Revisions have been implemented or additional clarifying information has been added to Section 3.2, Transportation; Section 3.3, Air Quality and Greenhouse Gases; Section 3.6, Public Utilities and Energy; and Section 3.10, Hazardous Materials and Wastes, of the Final EIR/EIS. None of the revisions to the analysis</i></p>

Comment	Response
	<p><i>resulted in changes to the impact determinations under CEQA or resulted in new adverse effects under NEPA”</i></p>
<p>2. The EIR/EIS lacks information regarding site remediation for sites UPC-OUSM and UPC-OU-2 (West LMF) as well as Title 27 landfill closure requirements (East LMF), which is necessary for a comprehensive air quality analysis. (BCL, pp. 3, 9-11, 60, 66, 69-71, 81; Draft EIR/EIS, p. 3.10-39.</p>	<p>The Final EIR/EIS provides information on sites UPC-OUSM and UPC-OU-2 as well as Title 27 landfill closure requirements in Section 3.10, Hazardous Materials (pages 3.10-5, 3.10-19, and 3.10-43 in the Final EIR/EIS). This information was considered in the analysis presented in Chapter 9, Estimated Emissions Rates and Comparison to De Minimis Threshold, of the Draft GCD.</p> <p>As stated in the Final EIR/EIS response to submission FJ-1165, comment 1934:</p> <p><i>“ . . . The Draft EIR/EIS evaluated the impacts of earthwork excavation and environmental remediation under regulatory oversight required to construct the Brisbane LMF. A more detailed description of these activities has been added to Section 2.10.3.4, Brisbane Light Maintenance Facility, and Section 3.10, Hazardous Materials and Wastes, of the Final EIR/EIS. Site remediation and landfill closure approvals have been added to Table 2-26 in Section 2.11, Permits, of the Final EIR/EIS.</i></p> <p><i>The comment also asserts that the impacts of site remediation have not been evaluated in the impacts analysis. While the approach to site remediation has not been fully determined, construction-related analysis throughout various sections of the EIR/EIS take into account the need for remediation prior to the start of construction. Moreover, several sections of the Final EIR/EIS have been revised to provide clarifications in this regard. Construction analyses in Final EIR/EIS Sections 3.2, Transportation, Section 3.3, Air Quality and Greenhouse Gases, and Section 3.4, Noise and Vibration, each take into account the remediation activity concerning either Brisbane LMF option in terms of construction-period truck traffic, as well as air pollutant emissions and noise associated with such activities. Section 3.6, Public Utilities and Energy, discloses</i></p>

Comment	Response
	<p><i>that both Alternative A and B would entail the disposal of substantial volumes of hazardous waste. Additional description of contamination risks associated with construction was added to Final EIR/EIS Section 3.8, Hydrology and Water Quality. . .”</i></p> <p>Site remediation and landfill closure information were considered in the Draft GCD air quality analysis. No additional changes are necessary for this Final GCD.</p>
<p>3. The EIR/EIS’s air quality impact analysis improperly relies on artificially inflated estimates of HSR ridership to offset the Project’s significant operational impacts and avoids implementation of sufficient mitigation measures. (BCL, pp. 14, 30, 122; Draft EIR/EIS, pp. 2-111-113, Table 2-18.)</p> <p>a. Insufficient evidence is presented to show that the ridership estimates are accurate, especially in light of the long-term reductions in intercity travel and rail transit likely to be caused by COVID-19 changes in travel behavior. (Draft EIR/EIS, pp. 2-111-113, Table 2-18.)</p> <p>b. The Draft EIR/EIS only uses medium and high ridership numbers to analyze Project benefits; a low ridership scenario analysis adjusted for long-term effects of COVID-19 on ridership (e.g., reduced business travel due to increased use of virtual meetings) is required to sufficiently inform the decision makers and public. (Draft EIR/EIS, pp. 2-111-113, Table 2- 18.)</p>	<p>The air quality analysis demonstrates that even under the low ridership scenario, the Project would still result in a net regional reduction of criteria air pollutants and would not cause a localized exceedance of the applicable Federal air quality standards (see Impact AQ#9 in the Final EIR/EIS). Additionally, the Final EIR/EIS explicitly considers whether COVID-19 would lead to long-term effects on ridership in Standard Response FJ-Response-GEN-7: Effects of COVID-19 on HSR Ridership in the Final EIR/EIS Chapter 17, Standard Responses. Therefore, no revisions to the Draft GCD are required based on this comment.</p> <p>As stated in the Final EIR/EIS response to submission FJ-1164, comment 1463:</p> <p><i>“Refer to Standard Response FJ-Response-GEN-7: Effects of COVID-19 on HSR Ridership.</i></p> <p><i>The Authority has used the best available methods and data to develop ridership projections. Section 2.7, Ridership, in the Draft EIR/EIS provides a detailed description of the ridership projections from the 2016 Business Plan, which formed the basis for the analysis in the Draft EIR/EIS. To the extent that the lower ridership levels would result in fewer trains operating in 2040, the impacts associated with the train operations in 2040 would be somewhat less than the impacts presented in the Draft EIR/EIS and the benefits accruing to the project (e.g., reduced VMT, reduced GHG emissions, reduced energy consumption) also would be less than the benefits presented in the Draft EIR/EIS. As with the impacts, the benefits</i></p>

Comment	Response
	<p><i>would continue to build and accrue over time and would eventually reach the levels discussed in the Draft EIR/EIS for the Phase 1 system.”</i></p>
<p>5. Air quality construction mitigation measures are inadequate because they are too uncertain to be effective. (BCL, pp. 48, 51; Draft EIR/EIS, pp. 3.3-90-91.)</p> <p>a. The EIR/EIS’s Mitigation Measure AQ-MM#1 (Offset Project Construction Emissions in the San Francisco Bay Area Air Basin) lacks essential information such that it is not effective mitigation. The amount of the mitigation fee, the timing of payment, and the offset projects to which it would be applied are not specified such that there is no evidence presented to demonstrate that mitigation will actually result. (BCL, pp. 48, 51; Draft EIR/EIS, pp. 3.3-90-91.)</p>	<p>The Authority and BAAQMD have entered into an agreement to work together “to mitigate all NOx emissions exceeding General Conformity <i>de minimis</i> thresholds to zero as required by General Conformity, through an off-site emissions reductions program” (refer to the Draft GCD Attachment A, Letters of Agreement with BAAQMD). As further described in BAAQMD’s commitment letter, “[f]unds from the Authority for mitigation offsets will be administered by BAAQMD’s Bay Area Clean Air Foundation for the award of grants to Bay Area businesses, public agencies, and residents who will implement projects that reduce emissions of NOx, reactive organic gases, and particulate matter. . . . The Bay Area Clean Air Foundation will serve in the role of administrator of the emissions reduction projects and verifier of the successful mitigation effort.”</p> <p>Based on the commitments outlined in the agreement between the Authority and BAAQMD, and the Authority’s coordination with BAAQMD, sufficient certainty is provided regarding the mitigation measures effectiveness and no change in this Final GCD is needed.</p> <p>A response is also stated in the Final EIR/EIS response to submission FJ-1164, comment 1525:</p> <p><i>“Refer to Standard Response FJ-Response-GEN-6: Level of Detail in Analysis and Mitigation.</i></p> <p><i>The Authority’s process for implementing offsets under AQ-MM#1 (renumbered to AQ-MM#2 in the Final EIR/EIS) would be effective in offsetting emissions generated during construction of the project through the funding of emissions reduction projects. The measure requires that prior to issuance of construction contracts, the Authority would enter into an agreement with the BAAQMD to reduce ROG/VOC and NOx emissions to the required</i></p>

Comment	Response
	<p><i>levels. . . [T]he measure establishes a detailed process and standards for offset projects.</i></p> <p><i>With regard to uncertainty, the Authority coordinated with BAAQMD to confirm the feasibility of this measure, and confirmed that based on BAAQMD's experience, implementation of an offset agreement is feasible mitigation that effectively achieves actual emissions reductions. Based on the performance of current incentive programs and reasonably foreseeable future growth, BAAQMD has confirmed that enough emissions reduction credits would be available to offset emissions generated by the project for all years in excess of the BAAQMD's thresholds and General Conformity de minimis thresholds (refer to [Final EIR/EIS] Volume 2, Appendix 3.3-B, [Draft General Conformity Determination]). The specific projects, which must meet the requirements specified, would be identified by BAAQMD and funded by the Authority at the time of construction based on exceedances identified. . . The comment did not result in any revisions to the Draft EIR/EIS."</i></p>
<p>b. Mitigation Measure AQ-MM#1 inappropriately resorts straight to an uncertain and improperly deferred mitigation fee approach without first proposing implementation of all feasible onsite mitigation measures, which includes the Bay Area Air Quality Management District (BAAQMD) list of construction mitigation measures. These BAAQMD measures are commonly used as CEQA construction mitigation measures in Bay Area projects because such measures' implementation is more certain and enforceable. (BCL, pp. 51.) The BAAQMD measures should have been added to Mitigation Measure AQ-MM#1 and their effectiveness in reducing emissions should be quantified using BAAQMD guidance before offset fees are considered to mitigate residual impacts that cannot be mitigated onsite.</p>	<p>As stated in the Final EIR/EIS response to submission FJ-1164, comment 1526:</p> <p><i>"Project features that minimize air quality impacts (AQ-IAMF#1 through AQ-IAMF#6) are described in detail in Volume 2, Appendix 2-E, Project Impact Avoidance and Minimization Features, of the Final EIR/EIS. These project features represent the best available on-site controls to reduce construction emissions. For example, AQ-IAMF#1 minimizes fugitive dust emissions consistent with BAAQMD's requirements and recommendations, and AQ-IAMF#3 minimizes exhaust emissions from off-road equipment through the use of renewable diesel fuel. The Authority has also included, as part of AQ-MM#1 in the GCD and Final EIR/EIS, on-site mitigation measures for project-related on-road vehicles and off-road equipment that were suggested by BAAQMD. The Authority will</i></p>

Comment	Response
<p>As described in the Draft GCD, a federal agency’s conformity determination must demonstrate that the federal action would not cause or contribute to new violations of air quality standards, exacerbate existing violations, or interfere with timely attainment or required interim emissions reductions towards attainment. (Draft GCD, p. 1-1.) Because the Draft EIR/EIS utterly fails to provide a sufficient degree of analysis to allow an adequate assessment of environmental impacts, including air quality impacts, the Draft GCD is based on inadequate information and its conclusions and findings are erroneous. FRA and DOT must reevaluate the findings within the Draft GCD after the EIR/EIS is corrected and updated with more accurate and complete information necessary for a sufficient General Conformity Determination.</p>	<p><i>implement all feasible on-site mitigation measures.”</i></p> <p>FRA’s analysis concludes that the Project, when implemented with the mitigation measures described in the GCD, and in consideration of the Authority’s agreement with BAAQMD to offset Project-generated emissions, will conform to the approved State Implementation Plan.</p> <p>The Draft GCD incorporates the Authority’s analysis used in the Final EIR/EIS, in which the Authority considered the City of Brisbane’s comments on the Draft EIR/EIS, and where appropriate, modified the analysis in the Final EIR/EIS.</p> <p>As such, the Draft GCD is consistent with the information and analysis presented in the Final EIR/EIS. No changes to the analysis or conclusions in the Draft GCD are necessary.</p> <p>The Authority’s responses to the City’s comments are provided in Chapter 20, Local Agency Comments, within Volume 4 of the Final EIR/EIS (https://hsr.ca.gov/wp-content/uploads/2022/05/Final_EIRS_FJ_V4-05_Ch_20_LocalAgencyComments.pdf).</p>

APPENDIX B: U.S. FISH AND WILDLIFE SERVICE BIOLOGICAL OPINION, APRIL 22, 2022



United States Department of the Interior

FISH AND WILDLIFE SERVICE
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In Reply Refer to:
2022-0001884-S7

April 22, 2022

Serge Stanich
Director of Environmental Services
California High-Speed Rail Authority
770 L Street, Suite 620
Sacramento, California 95814
Serge.Stanich@hsr.ca.gov

Subject: Formal Consultation on the California High-Speed Rail System: San Francisco to San Jose Project Section

Dear Serge Stanich:

This letter is in response to the California High-Speed Rail Authority's (Authority) request for initiation of formal consultation with the U.S. Fish and Wildlife Service (Service) on the San Francisco to San Jose Project Section of the California High-Speed Rail (HSR) System (project) in San Francisco, San Mateo, and Santa Clara counties, California. This letter is sent to the Authority in its role as the federal lead agency for the project under the National Environmental Policy Act (NEPA) and other federal laws. Pursuant to 23 United States Code (U.S.C.) 327, under the NEPA Assignment Memorandum of Understanding (MOU) between the Federal Railroad Administration (FRA) and the State of California, effective July 23, 2019, the Authority is the federal lead agency for environmental reviews and approvals for all Authority Phase 1 and Phase 2 projects. Under the MOU, the Authority has been assigned FRA's Endangered Species Act (Act) Section 7 (16 U.S.C. 1536) responsibilities for consultations (formal and informal) with respect to HSR and other projects described in subpart 3.3 of the MOU.

At issue are the project's effects on the following federally listed species and critical habitats:

Species federally listed as endangered:

- Callippe silverspot butterfly (*Speyeria callippe callippe*) (callippe; butterflies)
- Mission blue butterfly (*Icaricia icarioides missionensis*) (mission; butterflies)
- San Francisco garter snake (*Thamnophis sirtalis tetrataenia*) (snake)

Species federally listed as threatened:

- Bay checkerspot butterfly (*Euphydryas editha bayensis*) (checkerspot; butterflies)
- California red-legged frog (*Rana draytonii*) (frog)

Critical habitat has been designated for the frog but does not occur within the action area and is not considered further in this biological opinion.

The project action area encroaches into checkerspot critical habitat Unit 1 (San Bruno Mountain Unit) and Franciscan Manzanita (*Arctostaphylos franciscana*) critical habitat Unit 11 (Bayview Park Unit). However, there is no effect to these critical habitat units because the primary constituent elements (PCE's) are not affected by project activities. Therefore, these critical habitats will not be discussed further in this biological opinion.

This response is provided under the authority of the Act of 1973, as amended (16 U.S.C.. 1531 et seq.), and in accordance with the implementing regulation pertaining to interagency cooperation (50 Code of Federal Regulations [CFR]] Part 402).

The federal action on which we are consulting is the construction, operation, and maintenance of the Authority's San Francisco to San Jose Project Section of the HSR. Pursuant to 50 CFR 402.12(j), you submitted a biological assessment (BA) and a BA supplement for our review and requested concurrence with the findings presented therein. These findings conclude the project may affect and is likely to adversely affect the following federally listed species: the callippe, the mission, the snake, the checkerspot, and the frog.

In considering your request, we based our evaluation on the following:

- 1) Extensive coordination between the Service and the Authority (and the FRA prior to the MOU, as described above) from April 2015 to January 2022 regarding the project, conservation measures, and framework for evaluating the effects on federally listed species;
- 2) The December 2, 2021, letter from the Authority to the Service requesting initiation of formal consultation;
- 3) The *San Francisco to San Jose Project Section Biological Assessment*, dated June 2021, and supplemental information provided December 2, 2021;
- 4) Correspondence between the Authority and the Service; and
- 5) Other information available to the Service.

Consultation History

April to December 2015	The Authority initiated informal consultation with the Service; coordinated meetings with the Service; provided maps of the proposed alignments and species models to the Service; and requested a list of species for consideration for the BA.
January to December 2016	The Authority coordinated with the Service regarding species information, modeling, and mitigation.
January 2017 to May 2020	The Authority coordinated with the Service regarding species information, modeling, mitigation, and effects analysis.
June 24, 2021	The Authority submitted the June 2021 <i>San Francisco to San Jose Project Section Biological Assessment</i> (BA) for review.
June 24 to October 26, 2021	The Service requested additional information from the Authority necessary to complete formal consultation. The Authority and the Service held meetings and conferences to discuss the need for additional information.

December 2, 2021

The Authority requested formal consultation with the Service for the project and submitted supplemental information to the BA.

BIOLOGICAL OPINION

Description of the Project

Project Overview

The State of California proposes to build a HSR system to connect the major population centers of the San Francisco Bay Area with the Los Angeles metropolitan region. The HSR system is envisioned as an electrically powered, high-speed, steel-wheel-on-steel-rail technology with state-of-the-art safety, signaling, and automated train-control systems. The trains will be capable of operating at speeds of up to 220 miles per hour (mph) over a fully grade-separated, dedicated track alignment.

The project is the construction, operation, and maintenance of the approximately 43-mile portion of the San Francisco to San Jose Project Section between the Salesforce Transit System in San Francisco to Scott Boulevard (Blvd) in the City of San Jose as part of Phase 1 of the HSR system. The project will be a blended rail system, operating the HSR trains with existing intercity and commuter and regional rail trains on common infrastructure, with Caltrain and HSR service sharing tracks; HSR stations at 4th and King Street and Millbrae; and a light maintenance facility (LMF) in the City of Brisbane (Figure 1).

The project is divided into the following 4 geographic subsections: San Francisco to South San Francisco, San Bruno to San Mateo, San Mateo to Palo Alto, and Mountain View to Santa Clara (Figure 1).



Figure 1. San Francisco to San Jose Project Section Infrastructure and Subsections

The San Francisco to San Jose Project Section will modify approximately 14.5 miles of existing Caltrain track, predominantly within the existing Caltrain right-of-way; build the East Brisbane LMF; modify seven existing stations or platforms to accommodate HSR; and install safety improvements and communication radio towers. Caltrain has several locations of four-track segments where trains can pass; no additional passing tracks will be built.

The blended system includes HSR trains, station and platform modifications to accommodate HSR trains passing through or stopping at existing stations; track modifications to support higher speeds while maintaining passenger comfort; modifications to the overhead contact system (OCS) (a series of wires strung above the tracks on poles); and potential equipment upgrades at traction power facilities installed by Caltrain as part of the Peninsula Corridor Electrification Project (PCEP). The project will implement safety improvements at existing at-grade roadway crossings and Caltrain stations and platforms, as well as security modifications such as installing perimeter fencing along the right-of-way. The project will also build an LMF to accommodate planned operational needs for high-capacity rail movement and install communication radio towers at approximately 2.5-mile intervals.

The project will operate on a predominantly two-track system primarily within the existing Caltrain right-of-way, utilizing existing and in-progress infrastructure improvements developed by Caltrain for its Caltrain Modernization Program, including electrification of the Caltrain corridor between San Francisco and San Jose as part of the PCEP. The blended system of previous existing track and high-speed track will require curve straightening, track center modifications, and superelevation¹ of existing Caltrain tracks along approximately 33 percent of the project corridor to support higher speeds of up to 110 mph. Where horizontal track modifications will be greater than 1 foot, the OCS poles and wires will require relocation.

The blended system will consist of predominantly ballasted track of varying profiles. Low, near-the-ground tracks will be at grade; higher tracks will be elevated on embankment (earthen fill graded to a slope on either side or supported by retaining walls) and structure (viaduct); and below-grade tracks will extend through four existing short tunnels in the City of San Francisco.

Operation of the blended system will require additional infrastructure improvements and project elements. Limited freight service (approximately three round trips per day) operates between San Francisco and San Jose using the same tracks as Caltrain; this service will continue to operate with PCEP and with HSR using the same tracks as Caltrain and HSR.

In the blended portions of the system, HSR and Caltrain will operate at speeds of up to 110 mph and will have a coordinated schedule to allow both services to efficiently serve their respective stations. HSR trains will be able to pass Caltrain trains in existing four-track segments and at the Millbrae Station.

Security lights will be required on permanent facilities. These facilities include radio communication towers; the Brisbane LMF; traction power facilities; and new structures and facilities at the existing 4th and King Station and the Millbrae Station.

Project Footprint

The project footprint extends to the physical limits of the construction activities associated with the action and includes all areas that will be permanently or temporarily affected by the action. The project footprint includes all components and rights-of-way (ROW) needed to construct,

¹ *Superelevation* is the vertical distance between the height of the inner and outer rails at a curve. Superelevation is used to partially or fully counteract the centrifugal force acting radially outward on a train when it is traveling along the curve.

operate, and maintain all permanent HSR features between the 4th and King Street Station in the City of San Francisco and Scott Boulevard in the City of San Jose. The estimated project footprint (i.e., combined permanent and temporary disturbance areas) for the action is expected to be no greater than approximately 830 acres.

The project footprint primarily consists of the existing Caltrain ROW, which predominately consists of a two-track at-grade profile, with a minimum of 15 feet between track centerlines. Additional ROW will be required to accommodate track modifications, maintenance facilities and equipment storage areas, stations improvements, permanent access roads, train signaling and communication facilities, and safety improvements such four-quadrant gates. The project footprint also includes areas for utility relocations, roadway relocations, and construction activities (e.g., laydown, storage, and similar areas). The project footprint consists of the limits of ground disturbance, plus all access roads and areas required for operating, storing, and refueling construction equipment.

Due to the Design/Build nature of the project, design refinements will occur as construction progresses, which may result in minor modifications to the footprint into adjacent habitat. In addition, acquisition of ROW will provide access for surveys and updated habitat mapping. The HSR system, project footprint, and modeled habitat acreages included in the text below are based on the best available information at this time. Regardless of the final project footprint, project impacts will be similar geographically as well as in general nature and magnitude.

San Francisco to South San Francisco Subsection

The San Francisco to South San Francisco Subsection will extend approximately 10 miles from the 4th and King Street Station in downtown San Francisco to Linden Avenue in the City of South San Francisco, through the cities of San Francisco, Brisbane, and South San Francisco. The existing Caltrain track in this subsection is predominantly two-track at grade, with four two-track tunnel segments in San Francisco, and a four-track at-grade section through Brisbane. This project will modify the existing 4th and King Street and Bayshore Stations, build the East Brisbane LMF and associated track modifications, reconfigure Tunnel Avenue, relocate the Tunnel Avenue overpass, install four-quadrant gates at three existing at-grade crossings, and install six communication radio towers. Additional right-of-way will be required in the cities of San Francisco and Brisbane to accommodate track modification, the East Brisbane LMF, Tunnel Avenue reconfiguration, four-quadrant gates, and communication radio towers.

San Bruno to San Mateo Subsection

The San Bruno to San Mateo Subsection will extend approximately 8 miles from Linden Avenue in South San Francisco to Ninth Avenue in San Mateo through the cities of South San Francisco, San Bruno, Millbrae, Burlingame, and San Mateo. The existing Caltrain track in this subsection is predominantly two-track at grade on retained fill with a three-track at-grade section south of the Millbrae Caltrain Station. This project will modify the existing San Bruno, Millbrae, and Broadway Caltrain Stations; modify track; install four-quadrant gates at 16 existing at-grade crossings; and install three communication radio towers.

San Mateo to Palo Alto Subsection

The San Mateo to Palo Alto Subsection will extend approximately 16 miles from Ninth Avenue in San Mateo to San Antonio Road in Palo Alto through the cities of San Mateo, Belmont, San Carlos, Redwood City, Atherton, Menlo Park, and the northern portion of Palo Alto. The existing Caltrain track in this subsection is predominantly two-track at grade on retained fill. This project will modify platforms at the existing Hayward Park and Atherton Stations, modify tracks, install four-quadrant gates at 15 existing at-grade crossings, and install 7 communication radio towers.

Mountain View to Santa Clara Subsection

The Mountain View to Santa Clara Subsection will extend approximately 9 miles from San Antonio Road in Palo Alto to Scott Boulevard in Santa Clara through Palo Alto (southern portion), Mountain View, Sunnyvale, and Santa Clara. The existing Caltrain track in this subsection is predominantly two-track at grade (except for the four-track section from North Fair Oaks to north of Bowers Avenue) and there are no major project features in this subsection. The project will make minor track modifications, install four-quadrant gates at four at-grade crossings, and install four communication radio towers.

Pre-Construction Activities

During final design, the Authority and its contractors will conduct several pre-construction activities to optimize construction staging and management. These activities include the following:

- Conducting geotechnical investigations to define precise geologic, groundwater, and seismic conditions along the alignment. The results of this work will guide final design and construction methods for foundations, stations, and aerial structures.
- Identifying construction laydown and staging areas used for mobilizing personnel, stockpiling materials, and storing equipment for building HSR or related improvements. In some cases, these areas will also be used to assemble or prefabricate components of guideway or wayside facilities before transport to installation locations. Field offices and temporary jobsite trailers will also be located at the staging areas. Construction laydown areas are part of the project footprint that is evaluated for potential environmental impacts; however, actual use of the area will be at the discretion of design-build contractor. After completing construction, the staging and laydown areas will be restored to pre-construction condition.
- Initiating site preparation and demolition, such as clearing, grubbing, and grading, followed by the mobilization of equipment and materials. Demolition will require strict controls so that adjacent buildings, infrastructure, and natural and community resources are not damaged or otherwise affected by the demolition efforts.
- Relocating utilities prior to construction. The contractor will work with the utility companies to relocate or protect in place high-risk utilities, such as overhead tension wires, pressurized transmission mains, oil lines, fiber optical conduits or cables, and communications lines or facilities prior to construction.
- Implementing temporary, long-term, and permanent road closures to reroute or detour traffic away from construction activities. Handrails, fences, and walkways will be provided for the safety of pedestrians and bicyclists.
- Conducting other studies and investigations, as needed, such as surveys of local business to identify usage, delivery, shipping patterns, and critical times of the day or year for business activities, as well as necessary cultural resource investigations, and historic property surveys. This information will help develop construction requirements and worksite traffic control plans and identify potential alternative routes and resource avoidance plans.

Temporary staging will occur primarily within the existing Caltrain right-of-way, except for temporary staging areas outside of the existing Caltrain right-of-way for construction of the East Brisbane LMF and Millbrae Station. Track modifications will mostly be performed by track-mounted equipment, and construction materials (e.g., rail, ties, ballast) will be delivered by rail.

Modifications to existing Caltrain station platforms will be isolated to each Caltrain station and associated parking lots, which are within the existing Caltrain right-of-way. At-grade crossing improvements will not require separate construction staging areas.

There are two locations where construction staging areas greater than 5 acres outside the existing Caltrain right-of-way will be required:

- Brisbane LMF—Construction of the East Brisbane LMF will require temporary construction easements (TCEs) (approximately 65 acres) to establish equipment and materials storage areas close to construction sites for the LMF and the realigned Tunnel Avenue overpass.
- Millbrae Station—Construction will require approximately 8 acres of TCE east and west of the Millbrae Station to establish equipment and materials storage areas close to construction sites, build a new HSR station concourse and platforms, build overhead circulation elements between the new station and platforms, and modify roadways.

Land needed for temporary construction activities will be leased from landowners, taken out of its current use, used temporarily for construction, and restored to its pre-construction state after construction is completed. Construction will require the temporary use of 103.4 acres of land outside the Caltrain right-of-way. TCEs will typically be on roadway rights-of-way, shoulders of the existing railroad tracks, backyards, or vacant areas adjacent to structures that are used for residential, commercial, mixed use, industrial, public facilities, and parks/open-space purposes. These TCEs will be used for construction equipment and materials staging; no precasting yards or batch plants for concrete manufacturing will be required for project construction.

Major Construction Activities

Major types of construction activities for the project include demolition, grubbing, and earthwork; trackwork; station modifications; construction of the Brisbane LMF; construction of aerial structures; and roadway modifications.

Demolition, Grubbing, and Earthwork

The first stage of construction will involve the demolition of building and roadway structures directly affected by the HSR system. Several activities will need to be conducted before demolition work can commence, including:

- Relocation of building occupants and roadways
- Completion of a demolition survey and demolition plan
- Removal and disposal of hazardous materials in a safe and controlled manner, if any hazardous materials such as asbestos are identified
- Obtaining permits from the Bay Area Air Quality Management District

After mobilizing and setting up the construction staging areas, the contractor will commence with clearing and grubbing areas of new right-of-way in advance of the major structures, roadway and utility relocations. This activity (clearing and grubbing) consists of the removal of topsoil, trees, minor physical objects, and other vegetation from the construction site with use of specialized equipment for raking, cutting, and grubbing.

Construction will also involve earthwork, which includes both excavation and embankment. Excavation is the removal of soils by use of mechanical equipment, and embankment is the placing and compacting of soils for the construction process with use of mechanical equipment. The HSR system seeks to balance the volume of soils needed for excavation and embankment and to minimize the input of materials from quarries and disposal of materials outside of the right-of-way.

Overall, earthwork activities for the project will be minor because construction will occur mostly on the existing at grade Caltrain alignment. The exceptions are earthwork required for construction of the Brisbane LMF. Construction will require the disposal of excavated materials to an appropriate offsite location. Construction will reuse approximately 22 percent of excavated materials suitable for embankment construction. Excavated material kept for reuse will be stored within the project footprint.

Track Modifications and Overhead Contact System Adjustments

Within the blended Caltrain corridor, trackwork will follow Caltrain practices and standards for conventional ballast track for at-grade alignments. Since the Caltrain tracks will be upgraded to meet FRA Class 6 Track standards, the construction methods will follow 49 C.F.R. Part 213 Subpart G requirements. Construction will include the following:

- Lateral alignment adjustments—The primary track modifications in the Project Section will be for curve straightening to allow for increased operational speeds on the corridor. Track realignments of less than 1 foot will be performed by track-mounted equipment that will operate along the existing Caltrain tracks as it adjusts track alignment and ballast; these track realignments will not require relocation of OCS poles and will be completed within several days at any given location. Track realignments of less than 10 feet will be done at night or on weekends over several work windows to allow continued passenger service; relocation of OCS poles will be required, and speed restrictions will be imposed until the track realignment is completed.

For realignments of more than 10 feet, a parallel track and new OCS poles will be built first and then connected to the existing track. Temporary track closure for reconnecting tracks will occur at night or on weekends and will take 1 to 2 days each. The track realignment works will be carried out according to track possession work windows.

- Vertical alignment adjustment—The existing track profile will require modification to allow for increased operational speeds on the corridor, including raising or lowering the profile up to and greater than 6 inches.

Station Modifications

Construction of the project will require relocation and modification of existing Caltrain stations to accommodate HSR trains passing through or stopping at the stations. Construction at these stations will primarily entail modifications to the existing platforms, minor track shifts, modifications to pedestrian crossings, new pedestrian crossings, and relocation of several existing stations. More extensive construction will be required at the Millbrae Station.

Brisbane Light Maintenance Facility

The project will include construction of an LMF in Brisbane. Construction will occur over an approximately 2- to 3-year period and will involve demolition, grubbing, extensive earthwork, and utilities relocation. Because the site of the Brisbane LMF is relatively hilly, both cut and fill will be required to create a level surface for the workshop, yard, tracks, and supporting systems and utilities.

Bridge and Aerial Structures

Aerial structures for this section will be limited to: (1) the Brisbane LMF lead tracks; (2) the realigned Tunnel Avenue overpass; (3) either widening existing bridges or building parallel bridges through the four tracking areas of Millbrae Station.

Most of the elevated guideways will be designed and built using single box segmental girder construction. Where needed, other structural types and construction methods will be considered.

This section provides an overview of the construction methods required for foundations, substructures, and superstructures of bridges, aerial structures, and roadway crossings.

Foundations

A typical aerial structure foundation pile cap is supported by an average of four large-diameter (5 to 9 feet) bored piles. Depth of piles depends on the geotechnical conditions at each pile site. Pile construction can be achieved by using rotary drilling rigs, and either bentonite slurry or temporary casings may be used to stabilize pile shaft excavation. The estimated pile production rate is 4 days per pile installation. Additional pile installation methods available to the contractor include bored piles, rotary drilling cast-in-place piles, driven piles, and a combination of pile jetting and driving. Following completion of the piles, pile caps can be built using conventional methods supported by structural steel: either precast and pre-stressed piles or cast-in-drilled-hole piles.

Substructure

Typical aerial structures of up to 90 feet will be built using cast-in-place bent caps and columns supported by structural steel and installed upon pile caps.

Superstructure

The selection of superstructure type will consider the loadings, stresses, and deflections encountered during the various intermediate construction stages, including changes in static scheme, sequence of tendon installation, maturity of concrete at loading, and load effects from erection equipment. Accordingly, the final design will depend on the contractor's selected means and methods of construction, such as full-span precast, span-by-span, balanced cantilever segmental precast, and cast-in-place construction on falsework. These superstructure construction methods are summarized as follows:

- Full-span precast construction—Box girders will be precast and pre-stressed in advance as a full span and stored in a precasting yard. The 110-foot precast segments, weighing around 900 tons, will be transported along the previously built aerial guideway using a special gantry system.
- Span-by-span precast segmental construction—Shorter box girder segments will be precast and pre-stressed and stored in a precasting yard. These segments, limited to 12-foot segments weighing less than 70 tons, will likely be individually transported to the construction site by ground transportation. Once the gantry system is in place, construction will involve hoisting the segments from the ground and installing and tensioning the pre-stressing tendons to create the box girder.
- Balanced cantilever segmental construction—In locations where construction will occur over existing facilities that prevent equipment and temporary supports on the ground, balanced cantilever segmental construction may be used. Under this construction method, box girder segments (12-foot segments weighing less than 70 tons) that are either precast or cast in place will be placed in a symmetrical fashion around a bent column. The segments will be anchored at the ends by cantilever tendons in the deck slab, with midspan tendons balancing the weight between two cantilevers. Precast segments will be precast off-site, transported to the construction site, and installed incrementally onto a portion of the existing cantilever using ground cranes, hoisting devices, or a self-launching gantry. Segments can also be cast in place and installed two at a time, one at each end of the balanced cantilever. Segments generated by casting in place are generally longer than those in precast construction because they do not need to be transported to the construction site.

- Cast in place construction on falsework—The method involves creating a suspended formwork with either a launching girder or gantry system. Once the formwork is in position and reinforcements and pre-stressing are placed, concrete is poured, and the pre-stressing is stressed. The formwork is then removed and moved to the next segment.

Construction of road crossings and bridges will be similar to the approach for aerial structures. The superstructure will likely be built using precast, pre-stressed, concrete girders and cast-in-place deck. Approaches to bridges will be earthwork embankments, mechanically stabilized earth wall, or other retaining structures.

Crossings of existing railroads, roads, and the HSR will be built on the line of the existing road or offline at some locations. When built online, the existing road will be closed or temporarily diverted. Where HSR will cross over existing railroads, the Authority will coordinate with the rail operators to avoid operational effects during construction.

Roadway Modifications

The most common type of roadway modification within the Project Section will be the installation of four-quadrant gates at at-grade crossings, required at 38 at-grade crossings. The installation of four-quadrant gates at each at-grade crossing will occur within roadway rights-of-way over a period of 4 to 6 months, with the greatest level of construction activity occurring over a period of 2 to 4 weeks.

Construction of the project will also involve roadway reconstructions at several locations. Portions of Tunnel Avenue and the existing Tunnel Avenue grade separation in Brisbane will require relocation. Construction of the new Tunnel Avenue overpass will occur prior to removing the existing Tunnel Avenue roadway and overpass from operation, which will maintain access to Tunnel Avenue from Bayshore Boulevard throughout the construction process. Roadway work associated with the project will be done using conventional methods in the following sequence as appropriate: demolition, utility relocation, excavation, grading, placing aggregate base, building concrete curb and gutter, and placing concrete or asphalt concrete top surface base and top surfaces.

Operations and Maintenance

High-Speed Rail Service

The conceptual HSR service plan for Phase 1 describes service from Anaheim/Los Angeles through the Central Valley from Bakersfield to Merced and northwest into the San Francisco Bay Area (Authority and FRA 2017). Subsequent stages of the HSR system include a southern extension from Los Angeles to San Diego via the Inland Empire and an extension from Merced north to Sacramento.

Train service will operate in diverse patterns between various terminals. Three basic service types are envisioned:

- Express trains, which will serve major stations only, providing fast travel times between Los Angeles and San Francisco during the morning and afternoon peak
- Limited-stop trains, which will skip selected stops along a route to provide faster service between stations
- All-stop trains, which will focus on regional service

Most trains will provide limited-stop services and offer a relatively fast run time along with connectivity among various intermediate stations. Numerous limited-stop patterns will be

provided to achieve a balanced level of service at the intermediate stations. The service plan envisions at least four limited-stop trains per hour in each direction, all day long, on the main route between San Francisco and Los Angeles. Each intermediate station in the Bay Area, Central Valley between Fresno and Bakersfield, Palmdale in the High Desert, and Sylmar and Burbank in the San Fernando Valley will be served by at least two limited-stop trains every hour—offering at least two reasonably fast trains an hour to San Francisco and Los Angeles. Selected limited-stop trains will be extended south of Los Angeles as appropriate to serve projected demand.

Including the limited-stop trains on the routes between Sacramento and Los Angeles, and Los Angeles and San Diego, and the frequent-stop local trains between San Francisco and Los Angeles/Anaheim, and Sacramento and San Diego, every station on the HSR network will be served by at least two trains per hour per direction throughout the day and at least three trains per hour during the morning and afternoon peak periods. Stations with higher ridership demand will generally be served by more trains than those with lower estimated ridership demand.

The service plan provides direct train service between most station pairs at least once per hour. Certain routes may not always be served directly, and some passengers will need to transfer from one train to another at an intermediate station, such as Los Angeles Union Station, to reach their destination. Generally, the Phase 1 conceptual operations and service plans offer a wide spectrum of direct service options and minimize the need for passengers to transfer.

In 2029, the assumed first year of Phase 1 HSR operation, two trains per hour will operate during peak and one train per hour off peak between San Francisco and Bakersfield. When Phase 1 operations occur, the following service is assumed:

- Two peak trains per hour from San Francisco and Los Angeles (one in off peak)
- Two peak trains per hour from San Francisco and Anaheim (one in off peak)
- Two peak trains per hour from San Jose and Los Angeles
- One peak train per hour from Merced and Los Angeles
- One train per hour (peak and off peak) from Merced and Anaheim

Total projected daily operations for the Project Section in 2029 and 2040 are shown in Table 1.

Table 1 Total Daily Train Operations—San Francisco to San Jose Project Section

Service Description	2029	2040
HSR Nonrevenue Trains¹		
Between Brisbane LMF and San Francisco	11	22
Between San Jose Diridon Station and Millbrae Station	0	12
HSR Revenue Trains		
Trains per peak hour (max, one-way)	2	4
Trains per off-peak hour (max, one-way)	1	3
Trains per peak period per day (max)	24	48
Trains per off-peak period per day (max)	24	74
Number of daytime operations: 7 a.m.–10 p.m. (max)	40	102
Number of nighttime operations: 10 p.m.–7 a.m. (max)	8	20
Total HSR Trains, San Francisco and Brisbane LMF		
Trains per peak period per day (max)	28	56
Trains per off-peak period per day (max)	31	88
Number of daytime operations: 7 a.m.–10 p.m. (max)	44	110
Number of nighttime operations: 10 p.m.–7 a.m. (max)	15	34
Total HSR Trains, San Francisco and San Jose Diridon Station		
Trains per peak period per day (max)	24	80
Trains per off-peak period per day (max)	24	96
Number of daytime operations: 7 a.m.–10 p.m. (max)	40	148
Number of nighttime operations: 10 p.m.–7 a.m. (max)	8	28

HSR = high-speed rail

LMF = light maintenance facility

¹ Nonrevenue train trips include the operation of trains entering or leaving service at a terminal station to and from a maintenance facility, test runs, and operation of on-track maintenance equipment.

Maintenance Activities

Blended Portions of the Project Section

The Authority will be a tenant operating within the Caltrain ROW for the blended portions of the Project Section. The Peninsula Corridor Joint Powers Board (PCJPB) will continue to perform regular maintenance along the track and railroad ROW as well as on the power systems, train control, signaling, communications, and other vital systems required for the safe operation of the blended system. Maintenance methods will be like those currently used for the existing Caltrain system and will involve:

- Inspection and routine maintenance of the track and ballast, including tamping; OCS; structures; and signaling, train control, and communications components
- Inspections and daily maintenance of the stations and the LMF
- Maintenance of the ROW including culvert and drain cleaning, vegetation control, litter removal, and other inspection that will typically occur monthly to several times a year

Dedicated Portions of the Project Section

The Authority will regularly perform maintenance along the dedicated track and railroad ROW as well as on the power systems, train control, signaling, communications, and other vital systems required for the safe operation of the HSR system. Maintenance methods are expected to be similar to existing European and Asian HSR systems, adapted to the specifics of the California HSR. However, the FRA will specify standards of maintenance, inspection, and other items in a set of regulations (i.e., Rule of Particular Applicability) to be issued in the next several years, and the overseas practices may be amended in ways not currently foreseen. The brief descriptions of maintenance activities provided in the following subsections are thus based on best professional judgment about future practices in California.

Track and Right-of-Way

The track at any point will be inspected several times each week using measurement and recording equipment aboard special measuring trains. These trains are of similar design to the regular trains but will operate at a lower speed. They will run between midnight and 5 a.m. and will usually pass over any given section of track once in the night.

Most adjustments to the track and routine maintenance will be accomplished in a single night at any specific location with crews and material brought by work trains along the line. When rail resurfacing (i.e., rail grinding) is needed, several times a year, specialized equipment will pass over the track sections at 5 to 10 mph.

Approximately every 4 to 5 years, ballasted track will require tamping. This more intensive maintenance of the track uses a train with a succession of specialized cars to raise, straighten, and tamp the track, using vibrating “arms” to move and position the ballast under the ties. The train will typically cover a 1-mile-long section of track in the course of one night’s maintenance.

Slab track, the track support type anticipated at elevated sections, will not require this activity. No major track components are expected to require replacement through 2040.

Other maintenance of the ROW, aerial structures, culverts, drains, and bridge sections of the alignment will include culvert and drain cleaning, vegetation control, litter removal, and other inspection that will typically occur monthly to several times a year and will be performed by Caltrain. Maintenance activities, including vegetation control, litter removal, and inspections at radio communication towers and the East Brisbane LMF, will be performed by the Authority.

Power

The OCS along the ROW will be inspected nightly, with repairs being made when needed; these will typically be accomplished during a single night maintenance period. Other inspections will be made monthly. Many of the functions and status of substations and smaller facilities outside the trackway will be remotely monitored. However, visits will be made to repair or replace minor items and will also be scheduled several times a month to check the general site. No major component replacement for the OCS or the substations is expected through 2040.

Structures

Visual inspections of the structures along the ROW and testing of fire/life safety systems and equipment in or on structures will occur monthly, while inspections of all structures for structural integrity will be conducted at least annually. Steel structures will require painting every several years. Repair and replacement of lighting and communication components of tunnels and buildings will be performed on a routine basis. No major component replacement or reconstruction of any structures is expected through 2040.

Signaling, Train Control, and Communications

Inspection and maintenance of signaling and train control components will be guided by FRA regulations and standards to be adopted by the Authority. Typically, physical in field inspection and testing of the system will be conducted four times a year using hand-operated tools and equipment. Communication components will be routinely inspected and maintained, usually at night, although daytime work may be undertaken if the work area, defined as the portion of the project footprint that is currently under active construction, is clear of the trackway. No major component replacement of these systems is expected through 2040.

Perimeter Fencing and Intrusion Protection

Fencing and intrusion protection systems will be remotely monitored, as well as periodically inspected. Maintenance will take place as needed; however, fencing and intrusion protection systems are not expected to require replacement before 2040.

Vegetation and Pest Control

The Brisbane LMF may require vegetation control, litter removal, rodent control and, as described in the sections above, infrastructure inspection. Vegetation control may include mowing, disking, or herbicide application. Rodent control may include manual exclusion methods but could also include application of pesticides.

Conservation Measures

The Authority has proposed the following measures to minimize effects on federally listed species. The measures below are considered part of the project evaluated by the Service in this biological opinion.

The results of the habitat suitability modeling, described below, will be used as a guide during species' habitat assessment surveys. However, Designated Biologists, described below, will consider all areas in and adjacent to the project footprint when determining where surveys are warranted. Habitat assessment, protocol-level surveys when available, and pre-construction surveys will be phased with project buildout and the start of activities at each work area.

General Conservation Measures

CM-GEN-01: Establish Qualified Biologists and Biological Monitors

At least 15 days prior to the onset of activities, the Authority will submit, for review and approval by the Service, the name(s), contact information, and relevant qualifications and experience of Project Biologists and Designated Biologists who will conduct activities specified in the following measures. The roles of biologists will be as follows:

- **Project Biologists.** For each section or CP, the Authority will identify a Project Biologist(s). For their section or CP, the Project Biologist(s) will be responsible for implementation of the conservation measures, oversee the scheduling and work of Designated Biologists and Biological Monitors, and develop compliance reporting.
- **Designated Biologists.** Designated Biologists will be responsible for directly overseeing and reporting the implementation of general and species-specific conservation measures. Designated Biologists may be Service-approved on a species-specific basis, in which case Designated Biologists will only be authorized to conduct surveys and implement other measures for the covered species for which they have been approved. The Designated Biologists will have support from Biological Monitors. Designated Biologists will submit

memoranda and reports to the Authority to document compliance with conservation measures.

- **Biological Monitors.** Biological Monitors will report directly to a Designated Biologist for implementation of species measures or directly to the Project Biologist for implementation of general measures. Biological Monitors will be selected by the Authority based on their documented experience with and understanding of the ecology of the species included in the biological opinion. Biological Monitors will be responsible for conducting Worker Environmental Awareness Program (WEAP) training, implementing general conservation measures, conducting compliance monitoring, and reporting their compliance monitoring activities. Biological Monitors also may assist Designated Biologists in implementing species-specific conservation measures under the direct, on-site, supervision of the Designated Biologist.

CM-GEN-02: Conduct Monitoring of Construction Activities

The Designated Biologist or Biological Monitor will be present in the work area to verify compliance with avoidance and minimization measures, including during ground- or vegetation-disturbing activities in or adjacent to environmentally sensitive areas (ESA), wildlife exclusion fencing (WEF), and construction exclusion fencing (exclusion fencing).

CM-GEN-03: Prepare and Implement a Biological Resources Management Plan

Prior to construction activities, the Project Biologist will prepare the Biological Resources Management Plan (BRMP). The goal of the BRMP will be to provide the Project Biologist, Designated Biologists, and Biological Monitors with an organized reference and reporting tool to verify that the conservation measures and terms and conditions are implemented and reported in a timely manner. The BRMP will include terms and conditions from applicable permits and agreements and make provisions for monitoring assignments, scheduling, and responsibility designations. These will include all conservation measures and repair, mitigation, and compensatory actions included in the biological opinion. These measures and conditions will be tracked through final design, implementation, and post-construction phases. For all measures, terms, and conditions, requirements and planned mechanisms for documenting and reporting compliance will be identified. The BRMP will also identify the individual responsible for post-construction compliance reporting. All project environmental plans, such as the Restoration and Revegetation Plan (RRP) and Weed Control Plan (WCP), will be included as appendices to the BRMP. The BRMP will contain, but not be limited to, the following information:

- A master schedule that shows construction of the project, pre-construction surveys, and establishment of buffers and exclusions zones to protect sensitive biological resources
- Specific measures for the protection of special-status species
- Identification (on construction plans) of the locations and quantity of habitats to be avoided or removed, along with the locations where habitats are to be restored
- Identification of agency-approved Project Biologist(s), Designated Biologists, and Biological Monitor(s), including those responsible for notification and report of injury or mortality of federally- or state-listed species
- Measures to preserve topsoil and control erosion
- Design and locations of protective fencing around ESA and the construction staging areas
- Locations of trees to be protected as wildlife habitat (roosting sites) and locations for planting replacement trees

- Specification of the purpose, type, frequency, and extent of chemical use for insect and disease control operations as part of vegetative maintenance in sensitive habitat areas
- Specific measures for the protection of riparian areas. These measures may include erosion and siltation control measures, protective fencing guidelines, dust control measures, grading techniques, construction area limits, and biological monitoring requirements
- Provisions for biological monitoring during ground-disturbing activities to confirm compliance and success of protective measures will: (1) identify specific locations of wildlife habitat and sensitive species to be monitored; (2) identify the frequency of monitoring and the monitoring methods (for each habitat and sensitive species to be monitored); (3) list required qualifications of Biological Monitor(s); (4) identify the reporting requirements; and (5) provide an accounting of impacts to special-status species habitat compared to pre-construction impact estimates
- Notification and reporting requirements in the event of an accidental death or injury to a federally listed species during project activities or failure to meet conservation measures included in the biological opinion

The BRMP will be submitted to the Authority for review and approval prior to any ground- disturbing activity.

CM-GEN-04: Prepare and Implement a Restoration and Revegetation Plan

Prior to any ground-disturbing activity, the Project Biologist will prepare an RRP to address temporary impacts resulting from ground-disturbing activities in 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, re-vegetating disturbed areas with native plant species, and using certified weed-free straw and mulch. The Authority will implement the RRP in all temporarily disturbed areas outside of the permanent ROW that potentially support special-status species, wetlands, and/or other aquatic resources.

Consistent with section 1415 of the Fixing America's Surface Transportation Act, restoration activities will provide habitat for native pollinators by planting native forbs and grasses. The Project Biologist will obtain a locally sourced native seed mix. The restoration success criteria will include limits on non-native 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 will be submitted to the Authority for review and approval.

CM-GEN-05: Prepare and Implement a Weed Control Plan

Prior to any ground-disturbing activity during the construction phase, the Project Biologist will develop a WCP.

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 operations and maintenance. The WCP will include, at a minimum, the following:

- A requirement to delineate ESAs 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 will be linked to the BRMP standards for on-site work during ground-disturbing activities. In particular, the criteria will 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 will 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 will continue the monitoring and control efforts, and remedial actions will be identified and implemented until the success criteria are met.
- Provisions to ensure 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
- All vehicles and equipment will arrive at project sites free of plant and soil material within or near serpentine habitat

CM-GEN-06: Facilitate Regulatory Agency Access

Throughout the construction period, the Authority or its designee will allow access by the Service or other resource agency staff to the project site. Because of safety concerns, all visitors will check in with the Authority's resident engineer prior to entering the project footprint. If agency personnel visit the project footprint, the Project Biologist will prepare a memorandum within three business days after the visit documenting the issues raised during the field meeting. The Project Biologist will report any issues regarding regulatory compliance raised by agency personnel to the Authority.

CM-GEN-07: Prepare WEAP Training Materials and Conduct Construction Period WEAP Training

Prior to any ground-disturbing activity, the Project Biologist will prepare a WEAP to train construction crews to recognize and identify sensitive biological resources that may be encountered in the vicinity of the project footprint. The WEAP training materials will be submitted to the Authority for review and approval. A video of the WEAP training prepared and presented by the Project Biologist and approved by the Authority may be used if the Designated Biologist or Biological Monitor is not available to present the training in person.

At a minimum, WEAP training materials will include the following information: key provisions of the Act, the California Endangered Species Act, the Bald and Golden Eagle Protection Act, the Migratory Bird Treaty Act, California Fish and Game Code 1600, Porter-Cologne Water Quality Control Act, and the Clean Water Act; the consequences and penalties for violation or noncompliance with these laws and regulations and project authorizations; identification and characteristics of special-status plants, special-status wildlife, jurisdictional waters, and special-status plant communities and explanations about their ecological value; hazardous substance spill prevention and containment measures; the contact person and procedures in the event of the discovery of a dead or injured wildlife species; and review of avoidance, minimization, and mitigation measures.

The Designated Biologist or Biological Monitor will present WEAP training to all construction personnel prior to working in the project footprint. As part of the WEAP training, construction timing in relation to species' habitat and life-stage requirements will be detailed and discussed on project maps, which will show areas of planned minimization and avoidance measures. Crews will be informed during the WEAP training that, except when necessary as determined in consultation with the Designated Biologist or Biological Monitor, travel in the project footprint is restricted to established roadbeds, which include all pre-existing and project-constructed unimproved and improved roads. Training materials will include a fact-sheet handout or wallet-sized card conveying this information to be distributed to all participants in WEAP training sessions and will be provided in other languages as necessary to accommodate non-English speaking workers. All construction staff will attend WEAP training prior to beginning work on-site and will attend the WEAP training on an annual basis thereafter.

Upon completion of the WEAP training, each construction crew training attendee will sign a form stating that they attended the training, understood the information presented, and agreed to comply with the requirements set out in the WEAP training. The Project Biologist will submit the signed WEAP training forms to the Authority monthly, and annually the Authority will certify that WEAP training had been provided to all construction personnel. Each month, the Project Biologist will provide updates relevant to the training to construction personnel during the daily safety (tailgate) meeting.

CM-GEN-08: Conduct Operations and Maintenance Period WEAP Training

Prior to initiating operation and maintenance (O&M) activities, O&M personnel will attend a WEAP training session arranged by the Authority. At a minimum, O&M WEAP training materials will include the following information: key provisions of the Act, the California Endangered Species Act, the Bald and Golden Eagle Protection Act, the Migratory Bird Treaty Act, Porter-Cologne Water Quality Control Act, and the Clean Water Act; the consequences and penalties for violation or noncompliance with these laws and regulations and project authorizations; identification and characteristics of special-status plants, special-status wildlife, jurisdictional waters, and special- status plant communities and explanations about their ecological value; hazardous substance spill prevention and containment measures; and the contact person in the event of the discovery of a dead or injured wildlife species. The training will include an overview of provisions of the BRMP, annual vegetation and management plan, WCP, and security fencing, ESAs, and WEF maintenance plans pertinent to O&M activities. A fact sheet prepared by the Authority environmental compliance staff will be prepared for distribution to the O&M employees. The training will be provided by the Authority's environmental compliance staff. The training sessions will be provided to employees prior to their involvement in any O&M activity and will be repeated for all O&M employees on an annual basis. Upon completion of the WEAP training, O&M employees will, in writing, verify their attendance at the training sessions and confirm their willingness to comply with the requirements set out in those sessions.

CM-GEN-09: Establish Monofilament Restrictions

Prior to any ground-disturbing activity, the Biological Monitor will verify that plastic monofilament netting (erosion control matting) or similar material is not being used as part of erosion control materials. Non-monofilament substitutes including coconut coir matting, tackified hydroseeding compounds, rice straw wattles, and reusable erosion, sediment, and wildlife control systems that have been approved by the regulatory agencies (e.g., ERTEC Environmental Systems products) may be used.

CM-GEN-10: Avoid Animal Entrapment

At the beginning and end of each workday all excavated, steep-walled holes or trenches that are more than eight inches deep with sidewalls steeper than a 1:1 (45 degree) slope will be inspected for trapped animals and, at the close of each day, will be covered with plywood or similar materials or provided a minimum of one escape ramp constructed of fill earth per 10 feet of trenching. Before such holes or trenches are filled, they will be thoroughly inspected for trapped wildlife by the Biological Monitor(s).

All construction pipe, culverts, or similar structures with a diameter of three inches or greater that are stored overnight in the project footprint will be covered and elevated at least one foot above ground. Pipes or similar structures, regardless of diameter, will be covered such that avian entrapment is avoided. All pipes, culverts, and similar structures will be inspected for wildlife before such material is moved, buried, or capped.

CM-GEN-11: Delineate Equipment Staging Areas and Traffic Routes

Prior to any ground-disturbing activity, the Designated Biologist and Biological Monitor(s) will establish staging areas for construction equipment in areas that minimize effects to sensitive biological resources, including habitat for special-status species, seasonal wetlands, and wildlife movement corridors. Staging areas (including any temporary material storage areas) will be in areas that will be occupied by permanent facilities, where practicable. Equipment staging areas will be identified on final project construction plans. The Designated Biologist and Biological Monitor(s) will flag and mark access routes to ensure that vehicle traffic in the project footprint is restricted to established roads, construction areas and other designated areas.

CM-GEN-12: Dispose of Construction Spoils and Waste

The contractor will dispose of waste materials associated with construction, including soil materials unsuitable for reuse, in local landfills permitted to take these types of materials, and in conformance with State and federal laws.

CM-GEN-13: Establish Environmentally Sensitive Areas and Non-Disturbance Zones

Prior to any ground-disturbing activity in a work area, the Project Biologist will 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 will also direct the installation of WEF to prevent special-status wildlife species from entering work areas. The WEF will have exit doors to allow animals that may be inside an enclosed area to leave the area. The Project Biologist will also direct the installation of construction exclusionary fencing (exclusionary fencing) at the boundary of the work area, as appropriate, to avoid and minimize impacts to special-status species or aquatic resources outside of the work area during the construction period. The ESAs, WEF, and exclusionary fencing will be fine mesh material (e.g., Animex Fencing or similar) and delineated by the Designated Biologist based on the results of habitat mapping or modeling and any pre-construction surveys, and in coordination with the Authority. The ESA, WEF, and exclusionary fencing locations will be identified and depicted on an exclusion fencing exhibit. The purpose of the ESAs and WEF will be explained at WEAP training and the locations of the ESA and WEF areas will be noted during worker tailgate sessions.

Fencing installation will be monitored by a Designated Biologist or Biological Monitor to ensure that federally listed species are not injured or killed during installation. Temporary fencing will be installed in areas of construction that are beyond the perimeter of the ROW or in areas where

construction staging will occur. After installation of the temporary fencing, the work area will be surveyed by a Designated Biologist(s) to confirm the absence of federally-listed wildlife. The ESA, WEF, and exclusionary fencing will be regularly inspected and maintained by the Designated Biologist or Biological Monitors to ensure its integrity and that wildlife are not trapped.

CM-GEN-14: Install Aprons or Barriers within Security Fencing

Prior to final construction design, the Project Biologist will review the fencing plans along any portion of the permanent ROW adjacent to natural habitats and confirm that the permanent security fencing will be enhanced with a barrier (e.g., fine mesh fencing) that extends at least 12 inches below ground and 12 inches above ground to prevent special-status reptiles, amphibians, and mammals from moving through or underneath the fencing and gaining access to areas in the ROW. At the 12-inch depth of the below grade portion of the apron, it will extend or be bent at an approximately 90-degree angle and oriented outward from the ROW a minimum of 12-inches, to prevent fossorial wildlife from digging or tunneling below the security fence. A climber barrier (e.g., rigid curved or bent overhang) will be installed at the top of the apron to prevent wildlife from climbing over the apron. The Project Biologist may coordinate with the Service prior to completion of the fencing design.

The Project Biologist will ensure that the selected apron material and climber barrier will not have the potential to cause harm, injury, entanglement, or entrapment to wildlife species. The Authority will provide for yearly inspection and repair of the fencing.

Prior to construction and operation, the Project Biologist will field inspect the fencing along any portion of the permanent ROW that is adjacent to natural habitats and confirm that the fencing has been appropriately installed. Both the fencing plan review and field inspection will be documented in memorandums from the Project Biologist and provided to the Authority.

CM-GEN-15: Work Stoppage

During construction activities, the Designated Biologists and Biological Monitors will have stop work authority to protect any federally listed wildlife species in the project footprint. This work stoppage will be coordinated with the Authority or its designee. The Contractor will suspend vegetation- or ground-disturbing activities in the work area(s) where the potential construction activity could result in injury or mortality of listed species; work may continue in other areas. The Contractor will continue the suspension until the individual leaves voluntarily or is moved to an approved release area using Service-approved handling techniques and methods, or as required by the Service. Measures from *The Declining Amphibian Task Force Fieldwork Code of Practice* (DAPTF 1998) will be implemented to prevent the introduction and spread of amphibian diseases.

CM-GEN-16: Enforce Construction Speed Limit

A speed limit of 15 mph will be enforced during project construction for all vehicles operating on unimproved access roads and in temporary and permanent construction areas in the limit of direct effect.

CM-GEN-17: Implement Avoidance of Nighttime Light Disturbance

Prior to construction requiring nighttime lighting, the Contractor will prepare a Lighting Plan verifying how the Contractor will shield nighttime construction lighting and direct it downward in such a manner to minimize the light that falls outside the construction site boundaries. The Lighting Plan will be submitted to the Authority for review and approval prior to any work requiring nighttime lighting. The Lighting Plan will describe the type of lighting that will be

used, maximum level of lumens to be emitted, and a schematic showing where lighting equipment will be stationed and which cardinal direction(s) the lighting equipment will face.

Permanent or temporary, fixed, exterior lighting, including motion triggered security lighting that casts light beyond the project footprint between sunset and sunrise will not be used.

CM-GEN-18: Implement Water of Dust Palliative Measures

Water or dust palliatives will be applied to the construction ROW, dirt roads, trenches, spoil piles, and other areas where ground disturbance takes place to minimize dust emissions and topsoil erosion. Dust palliatives will be nontoxic to wildlife and plants. For construction in suitable habitat for listed species, the Biological Monitor will patrol areas of disturbance to ensure that water does not puddle for long periods and attract listed species or other wildlife to the project site. Operational ponding will be avoided through careful grading and hydrologic design. Water tanks will be covered with secure lids. Leaking hoses, tanks, or other sources of inadvertent pooling will be repaired immediately or moved offsite.

CM-GEN-19: Design the Project to Be Bird Safe

Prior to final construction design, the Authority, in consultation with the Project Biologist, will ensure that the catenary system, masts, and other structures such as fencing, electric lines, communication towers and facilities are designed to be bird and raptor-safe in accordance with the applicable recommendations presented in *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* (APLIC 2006) and *Reducing Avian Collisions with Power Lines: State of the Art in 2012* (APLIC 2012).

Applicable APLIC recommendations include, but are not limited to:

- Ensuring sufficient spacing of phase conductors to prevent bird electrocution
- Configuring lines to reduce vertical spread of lines and/or decreasing the span length if such options are feasible
- Marking lines and fences (e.g., Bird Flight Diverter for fencing and lines) to increase the visibility of lines and reduce the potential for collision. Where fencing is necessary, using bird compatible design standards to increase visibility of fences to prevent collision and entanglement
- Installing perch guards to discourage avian presence on and near project facilities
- Minimizing the use of guy wires. Where the use of guywires is unavoidable, demarcating guywires using the best available methods to minimize avian strikes (e.g. line markers)
- Structures will be monopole or dual-pole design versus lattice tower design to minimize perching and nesting opportunities. Communication towers will conform to *Recommended Best Practices for Communication Tower Design, Siting, Construction, Operation, Maintenance, and Decommissioning* (Service 2018)
- Reusing or co-locating new transmission facilities and other ancillary facilities with existing facilities and disturbed areas to minimize habitat impacts and avoid collision risks
- Use of facility lighting that does not attract birds or their prey to project sites. These include using non-steady burning lights (red, dual red and white strobe, strobe-like flashing lights) to meet Federal Aviation Administration requirements, using motion or heat sensors and switches to reduce the time when lights are illuminated, using

appropriate shielding to reduce horizontal or skyward illumination, and avoiding the use of high-intensity lights (e.g., sodium vapor, quartz, and halogen). Lighting will not be installed under viaduct and bridge structures in riparian habitat areas

- Ensuring poles do not have openings that could entrap birds; including sealing or capping all openings in poles or providing for escape routes (e.g., openings accommodating escape for various species)
- Designing aerial structures (e.g., viaducts and bridges) and tunnel portals to discourage birds and bats from roosting in expansion joints or other crevices
- Insulated wire or tree wire will be used for all electrical conduits to increase visibility of wires and minimize potential for collision

Additional bird operational actions will be required for dry lakes and playas, Audubon Important Bird Areas, and documented avian movement corridors. These measures include:

- Avoid, to the extent feasible, siting transmission lines across canyons or on ridgelines to prevent bird and raptor collisions
- Install bird flight diverters on all facilities spanning or within 1,000 feet of stream and wash channels, canals, ponds, and any other natural or artificial body of water

Fencing or other type of flight diverter will be installed on all viaduct structures to encourage birds and raptors to fly over the HSR and avoid flying directly in the path of on-coming trains.

CM-GEN-20: Prohibit Pets in Work Areas

No pets will be allowed on site during construction or O&M.

CM-GEN-21: Prepare Post-Construction Compliance Report

A post-construction compliance report will be submitted to the Service upon completion of each construction package, as defined by the Authority-Contractor D/B contracts. The post-construction compliance report will provide the following information:

- Dates of project groundbreaking and completion
- Pertinent information concerning the success of the project in meeting compensation and other conservation measures
- Known project effects on listed species
- Observed incidences of injury or mortality of any listed species
- Other pertinent information

CM-GEN-22: Notification of Dead, Injured, or Sick Wildlife

The Authority will notify the Service within 24 hours if dead, injured, or sick listed species are observed.

Conservation Measures Specific to Bay Checkerspot, Callippe Silverspot, and Mission Blue Butterflies

CM-INS-01: Avoiding Direct Impacts on Bay Checkerspot, Callippe Silverspot, and Mission Blue Butterfly Larvae

Prior to construction, the Designated Biologist will survey for checkerspot, callippe, and mission larval host plants, such as dwarf plantain, densenflower Indian paintbrush, English plantain,

purple owl's-clover, exerted paintbrush, johnny jump-up, silver lupine, summer lupine, manycolored lupine, within suitable habitat. If host plants are found within the project footprint, the Designated Biologist will search the plant and immediate area for eggs or larvae. If eggs or larvae are found, the Service will be contacted.

Conservation Measures Specific to California Red-legged Frog and San Francisco Garter Snake

CM-HERP-01: Conduct Pre-Construction Surveys for California Red-Legged Frog and San Francisco Garter Snake

Where suitable habitat has been identified within the project work area and prior to any ground-disturbing activities a Designated Biologist will conduct a pre-construction survey of the work area and the suitable habitat immediately adjacent to the work area. The results of the pre-construction survey will be used to guide the placement of ESAs and WEF, as described below in CM-HERP-3.

CM-HERP-02: Implement Avoidance and Minimization Measures for California Red-Legged Frog and San Francisco Garter Snake

Construction activities within 100 feet of suitable aquatic habitat will take place May 15 through October 31, when the watercourses are dry or at their lowest water level and the frog and the snake are less likely to be present. Construction will also include, but will not be limited to, the following design restrictions within the narrow strip of modeled habitat between the Caltrain ROW and the suburban development of the City of San Bruno in order to avoid the maximum amount of suitable habitat:

- The middle TCE at approximately San Felipe Avenue will be removed in order to avoid Drainage Ditch 7.
- The northern communication radio tower antennae at approximately San Mateo Avenue will be shifted to the north to avoid aquatic and refugia/foraging habitat, including Highline Creek Tributary.
- The TCE located just south of Santa Helena Avenue will be reduced in size to avoid Highline Creek and the associated drainage ditch.

All leaf litter and ground vegetation present within each work and access area will be cleared by hand under the direct supervision of the Designated Biologist or Biological Monitor. No worker foot traffic will occur in areas where leaf litter or vegetation debris is present, and no construction equipment or materials will be driven, parked, or placed on leaf litter or vegetation in suitable habitat. Any leaf litter or vegetation remaining will be fenced with WEF at the direction of the Designated Biologist or Biological Monitor (Service 2015).

The Designated Biologist or Biological Monitor will monitor all initial ground-disturbing activities that occur within suitable habitat for the frog and the snake and will conduct clearance surveys of suitable habitat in the work area on a daily basis. If the frog or the snake are observed within the work area, all work within 100 feet of the individual will stop until the Designated Biologist or Biological Monitor confirms the individual has left the work area of its own volition. Such actions may include establishing a temporary ESA in the area where a frog or a snake has been observed and delineating a 100-foot no-work buffer around the ESA. If the individual needs to be moved, it will be relocated by the Designated Biologist outside the project footprint but within the action area. Measures from *The Declining Amphibian Task Force Fieldwork Code of Practice* (DAPTF 1998) will be implemented to prevent the introduction and spread of amphibian diseases.

Work activities that will be conducted at night within 50 feet of sensitive habitats for the frog and snake identified during pre-construction surveys (including riparian habitat, streams, creeks, or freshwater marsh) will direct construction light inward toward the ROW and away from sensitive habitat areas. If lights cannot be directed in a way to avoid fugitive light from leaving the project footprint, then fully and/or partially shielded lights will be used to restrict all light to the project footprint during night work.

Disturbance of riparian vegetation types identified as providing habitat for frog or snake during pre-construction surveys will be minimized to the extent feasible, and any riparian vegetation removed will be replaced at a 2:1 ratio. Removed riparian trees will be planted along the affected stream corridor, wherever feasible. Although the planting will not be in the original locations, new riparian plantings will provide shade for the affected creeks in nearby unshaded areas to offset any potential habitat effect from construction or maintenance.

CM-HERP-03: Install, Monitor, and Maintain Exclusion Barriers for San Francisco Garter Snake and California Red-Legged Frog

Prior to any ground-disturbing activity adjacent to or within snake and frog suitable habitat, including artificial features such as culverts and constructed basins, the contractor, under the direction of the Designated Biologist, will install temporary WEF along the boundary of the work area consistent with CM-GEN-13. WEF must be installed for a 2-week period prior to the initiation of ground-disturbing activity and trenched into the soil at least 6 inches deep, with the soil compacted against both sides of the fence for its entire length to prevent snakes and frogs from passing under the fence. The WEF must have exit funnels every 200 feet. Cover boards will be provided along the inside and outside of the WEF to provide shade and refugia from predators. Shrubs within 5 feet of the outside of the fence will be trimmed if they provide climbing opportunities. The fence will be secured to metal posts and/or wooden stakes to ensure it remains upright and does not fall over. Posts/stakes will be placed on the inside of the fence to prevent climbing (Service 2015).

As appropriate to discourage frogs from entering the project impact areas via freshwater ditches, the ditches will be equipped with lightweight, one-way flow gates. These will be designed so that water can easily pass from the project site to the ditches, but small vertebrates such as the frog cannot move upstream from the ditches to the project site. This measure will only apply between November 1 and March 31 (e.g., rainy season).

The Designated Biologist or Biological Monitor will monitor construction activities inside the WEF on a full-time basis during the peak activity period for snakes and frogs (March to October) and will conduct daily inspections of the WEF prior to and during any construction activities inside the WEF from August to February. No work will occur within WEF areas on days with a 40 percent chance or greater for rain or within 24 hours after a rain event. Vehicle speeds inside WEF work areas will be limited to 5 mph. Any needed repairs to the WEF will be made within 24 hours. During monitoring and daily inspections, the Designated Biologist or Biological Monitor will check for snakes and frogs under vehicles and equipment that have been inactive for periods of 8 hours or more. Temporary WEF will be removed after all ground disturbance and equipment use (including vehicles) for the activity is completed. Post-construction inspections of the work area on foot will not require the installation of additional WEF.

Compensatory Habitat

To offset project impacts, the Authority will provide compensatory habitat mitigation that seeks to increase the amount of protected habitat for federally listed species; preserve and

enhance important wildlife movement corridors; and consolidate and expand existing protected habitat.

The Authority will secure conservation easements, and develop long-term management plans, for compensatory mitigation sites. The list of potential compensatory mitigation sites has not been finalized and is subject to augmentation with Service approval. The final compensatory mitigation sites will be selected based on their relatively high conservation value (e.g., proximity to other protected habitats or conserved areas such as core habitat areas, linkages connecting core habitat patches); location within important wildlife movement corridors, recovery areas, or designated critical habitat; presence of listed species and/or suitable habitat (i.e., high species richness/high biodiversity sites); mitigation habitat overlap among species; and ability to satisfy the requirements of the Service and other permitting agencies. The permanent protection of the compensatory mitigation sites will also support goals identified for the butterflies, the frog, and the snake in the recovery plans for these species by protecting habitat (Service 1984, Service 1985, Service 2002, Service 2019).

For all proposed mitigation sites, long-term management plans, conservation easements, and funding analyses for the long-term endowments will be submitted to the Service for review and approval before the plans are finalized and implemented. The Authority may also purchase species habitat credits at a Service-approved conservation or mitigation bank in addition to securing compensatory sites.

If newly protected habitat with conservation easements and Service-approved mitigation conservation banks are not available for the Authority, restoration projects may be approved by the Service in protected areas where the species is known to occur and where the greatest benefit to the species would occur.

To avoid a temporal loss of habitat and reduce project effects to listed species, the Authority's proposed mitigation strategy includes securing compensatory mitigation prior to the start of or concurrent with the commencement of construction. Compensatory mitigation will be secured in phases in accordance with the progress of construction of the project. As such, the Authority's proposed mitigation strategy will ensure that the compensatory mitigation will be secured before or concurrent with the commencement of construction for each Construction Package (CP) that may impact listed species. In the event that it is not possible to secure all of the compensatory mitigation for each CP in advance, it will be completed no later than 18 months after the initiation of ground disturbance of each CP.

Reporting

The Authority will submit monthly and annual reports to the Service documenting compliance with the conservation measures and this biological opinion. The reports will include summaries of the habitat assessment and species-specific pre-activity surveys and findings, observations and incidental take of threatened or endangered species, compliance with conservation measures successfully implemented, noncompliance events and corrections or adjustments to meet compliance, an accounting of the cumulative total number of acres of species suitable habitat that has been disturbed (with associated GIS layers, associated metadata, and photo documentation), and the type and number of acres for which compensatory mitigation has been secured. For each species, a cumulative acreage of habitat loss will be presented in a table.

Action Area

The action area is defined in 50 CFR § 402.02, as “all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action.” The action area (Figure 2) includes the project footprint and the lands surrounding it. The project footprint includes the rail alignment as well as associated project structures such as roadway improvements, overcrossings, related ancillary facilities, and other permanent project elements, such as the East Brisbane LMF. The project footprint includes 830 acres. The area affected by disturbance from noise, vibration, dust, and lighting during project construction and operations extends 1,000 feet from both sides of the project footprint and is estimated to include 10,776 acres. Therefore, the total action area that will be evaluated for potential effect from the San Francisco to San Jose Project Section of the HSR system under this biological opinion is 11,606 acres.



MAY 2020

Figure 2 Action Area

Analytical Framework for the Jeopardy Determination

Section 7(a)(2) of the Act requires that federal agencies ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of listed species. “Jeopardize the continued existence of” means to engage in an action that reasonably will be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a

listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR § 402.02).

The jeopardy analysis in this biological opinion considers the effects of the proposed federal action, and any cumulative effects, on the rangewide survival and recovery of the listed species. It relies on four components: (1) the *Status of the Species*, which describes the current rangewide condition of the species, the factors responsible for that condition, and its survival and recovery needs; (2) the *Environmental Baseline*, which analyzes the current condition of the species in the action area without the consequences to the listed species caused by the project, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the species; (3) the *Effects of the Action*, which determines all consequences to listed species that are caused by the proposed federal action; and (4) the *Cumulative Effects*, which evaluates the effects of future, non-federal activities in the action area on the species. The *Effects of the Action* and *Cumulative Effects* are added to the *Environmental Baseline* and in light of the status of the species, the Service formulates its opinion as to whether the project is likely to jeopardize the continued existence of the listed species.

Status of the Species

Callippe Silverspot Butterfly

Please refer to the *Species Status Assessment for the Callippe Silverspot Butterfly (Speyeria callippe callippe)* (Service 2020a) and the *5-Year Review Callippe Silverspot Butterfly (Speyeria callippe callippe)* (Service 2020b) for the most recent comprehensive assessment of the species' range-wide status. The 5-year review found habitat loss and degradation, including invasion by nonnative species, continue to be the primary threats to the species' recovery and that the species continues to meet the criteria for the endangered listing (Service 2020b). To date no project has proposed a level of effects for which the Service has issued a biological opinion of jeopardy for the species.

Bay Checkerspot Butterfly

Please refer to the *Bay Checkerspot Butterfly (Euphydryas editha bayensis) 5-Year Review: Summary and Evaluation* (Service 2009) for the most recent comprehensive assessment of the species' range-wide status. The review found that because of continued population declines and habitat loss, the butterfly is at greater risk of extinction now than at the time of listing and may warrant reclassification to endangered status. Threats evaluated during that review have continued to act on the species since the 2009 5-year review was finalized. After being extirpated from San Bruno Mountain in northern San Mateo County in the 1980s, Bay checkerspot butterfly larvae were reintroduced to San Bruno Mountain in 2017-2021 (Creekside Science 2022). Bay checkerspot butterfly larvae at San Bruno Mountain were observed utilizing the more abundant nonnative English plantain (*Plantago lanceolata*) as a larval host plant in addition to its traditional native host plant dwarf plantain (*Plantago erecta*) (Creekside Science 2022). To date no project has proposed a level of effects for which the Service has issued a biological opinion of jeopardy for the species.

Mission Blue Butterfly

Please refer to the *Mission Blue Butterfly (Icaricia icariodes missionensis) 5-Year Review* (Service 2010b) and the *Recovery Plan for San Bruno Elfín Butterfly (Callophrys mossii)*

bayensis) and *Mission Blue Butterfly* (*Icaricia icariodes missionensis*) *Recovery Plan Amendment* (Service 2019b) for the most recent comprehensive assessment of the species' range-wide status. The 5-year review reaffirms the species' endangered status. Habitat degradation by encroachment of coastal chaparral, coastal scrub succession, and non-native grasses and associated thatch build-up is now considered the most serious threat to the species. To date no project has proposed a level of effects for which the Service has issued a biological opinion of jeopardy for the species.

California Red-Legged Frog

Please refer to the *Recovery Plan for the California Red-Legged Frog (Rana draytonii)* (Service 2002) for the most recent comprehensive assessment of the species' range-wide status. Threats evaluated during that review and discussed in the recovery plan have continued to act on the species since the review was published, with loss of habitat and invasive species (e.g., bullfrogs) being the most significant effect. To date no project has proposed a level of effects for which the Service has issued a biological opinion of jeopardy for the species.

San Francisco Garter Snake

Please refer to the *Species Status Assessment for the San Francisco Garter Snake (Thamnophis sirtalis tetrataenia)* (Service 2020c) for the most recent comprehensive assessment of the species' range-wide status. A recent *5-Year Review for the San Francisco Garter Snake (Thamnophis sirtalis tetrataenia)* (Service 2020d) reaffirmed the species' endangered status. Current threats include fragmentation and urbanization, changes to aquatic habitat, seral succession, illegal collection, predation from non-native species, and small population sizes (Service 2020d). To date no project has proposed a level of effects for which the Service has issued a biological opinion of jeopardy for the species.

Environmental Baseline

Environmental baseline refers to the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the project. The environmental baseline includes the past and present impacts of all federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process. The consequences to listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency's discretion to modify are part of the environmental baseline.

The action area is within one U.S. Department of Agriculture Ecoregion section; the Central California Coast. This section includes the eastern side of the San Francisco Peninsula and the northern portion of the Santa Clara Valley. Terrain is low to moderate elevation with parallel ranges and valleys. The bedrock is sedimentary, granitic, and ultramafic formations. Vegetation is a mixture of western hardwoods, chaparral-mountain shrub, and annual grassland cover types, with many of the species adapted to fire. The Central California Coast ecoregion includes South San Francisco Bay, San Bruno Mountain, Edgewood Park, and the South Bay Baylands. The climate for the ecoregion is Mediterranean-like, with mild, wet winters and hot, dry summers with brief periods of drought (USDA 2007).

Stressors

Common stressors in the action area to most or all the species include:

- Disturbance to habitat from urbanization, energy development (oil, gas, and solar), grazing, and agriculture
- Impacts from introduction of non-native invasive species (plants and insects)
- Herbicide and pesticide use
- Small population size
- Predation
- Climate change (including impacts from regional flooding, drought and fire)
- Inadequacy of existing regulatory mechanisms
- The presence of roads, routes, trails, railroads, and utility corridors in suitable habitat.
- Vehicle-caused mortality

Species

The Authority used species habitat suitability modeling initially to delineate potentially suitable habitat (hereinafter referred to as *modeled habitat*) and to estimate potential species distribution in the action area along the alignment. It can be reasonably assumed that not all modeled habitat will be occupied. The modeling effort used rule-based models for the butterflies, the frog, and the snake.

The rule-based models identified potentially suitable habitat based on scientific literature and species expert input related to the physical and biological habitat parameters associated with species occurrence. In the BA, *Suitable habitat* is defined as any land cover type that is known to provide the resources and conditions necessary for survival and reproduction of a listed species (Hall et al. 1997). The precision of the species models is greatest in the project footprint, and within 1,000 feet of the edge of the project footprint, where detailed vegetation mapping was conducted using high resolution aerial photography and field reconnaissance surveys where access was available.

The results of the species habitat suitability modeling were applied to the following:

The species habitat suitability models were overlain with the project footprint to determine the total area of potential impact to each species' modeled habitat within the action area.

Species habitat suitability models provided information for the development and application of species-specific conservation measures and for the determination of the amount of compensatory mitigation that may be necessary to offset impacts to species and their habitat.

Butterflies

The action area contains 300 acres of modeled butterfly habitat in the San Francisco to South San Francisco project section. Approximately 31 acres of modeled dispersal and nectaring habitat for the butterflies are in the project's temporary disturbance footprint, and approximately 66 acres are in the permanent disturbance footprint.

The project alignment is within the range of the butterflies. There is suitable breeding (grasslands with sufficient larval host plants, proper topography, adequate nectar sources, areas influenced by coastal fog, and hilltops for mating congregations) and dispersal and nectaring habitat (ruderal or annual grassland with native and non-native flowering plants, e.g., thistles, within dispersal distance of occupied habitat) has been mapped within the action area, and there are documented occurrences within the action area.

In the action area, suitable breeding habitat and known occurrences of the butterflies are on San Bruno Mountain (San Mateo County Parks Department 2018), which is outside of the project footprint. Suitable dispersal and nectaring habitat is mapped in the grassland areas between Highway 101 and Bayshore Drive north of San Bruno Mountain and south of Bayview Park.

Between the existing railway and occupied habitat on San Bruno Mountain, there is Bayshore Boulevard and eight lanes of Highway 101 traffic, as well as the existing train traffic, which pose collision risks to dispersing butterflies.

California Red-Legged Frog

The action area contains 167 acres of modeled habitat for the frog in the San Bruno to South San Mateo project section. Approximately 0.1 acre of modeled aquatic habitat and 0.1 acre of upland habitat are in the project's temporary disturbance footprint, and approximately 0.4 acre of aquatic habitat and 6.0 acres of upland habitat are in the permanent disturbance footprint.

The project alignment is within the range of the frog. Suitable breeding aquatic (freshwater wetlands) and upland habitat (grassland, riparian) has been mapped within the action area, and there are documented occurrences within the action area. In the action area, suitable habitat and frog occurrences occur on the San Francisco International Airport West-of-Bayshore property, located between Angus Avenue in San Bruno and the Millbrae Station. Between Highway 101 and the occupied marsh complex, runs the existing railway for Caltrain and the BART ROW. Specifically, BART's cement fence serves as the western-most boundary to the marsh complex and is considered a complete barrier to western movement of the frog. However, several culverts under the Caltrain and BART railways provide connectivity to the ruderal grassland patches on the western side of the Caltrain ROW. Once on the western side of the Caltrain ROW, frogs could enter the Caltrain railway through the existing cyclone fence. While no other occurrences are known within the action area, suitable habitat is mapped within the action area at the following 20 watercourses south of the West-of-Bayshore property.

- Mills Creek
- Highline Creek Tributary
- Easton Creek
- Sanchez Creek
- Burlingame Creek
- San Mateo Creek
- Borel Creek
- Laurel Creek
- Belmont Creek
- Pulgas Creek
- Cordilleras Creek
- San Francisquito Creek
- Matadero Creek
- Barron Creek

- Adobe Creek
- Permanente Creek
- Stevens Creek
- Sunnyvale East Channel
- Calabazas Creek
- San Tomas Aquino Creek

San Francisco Garter Snake

The action area contains 132 acres of modeled habitat for the snake in the San Bruno to South San Mateo project section. Approximately 0.1 acres of modeled aquatic habitat and 0.1 acres of modeled upland habitat are in the project's temporary disturbance footprint, and approximately 0.4 acre of aquatic habitat and 6.0 acres of upland habitat are in the permanent disturbance footprint.

The project alignment is within the range of the snake. Suitable breeding aquatic (freshwater wetlands) and upland habitat (grassland, riparian) has been mapped within the action area, and there is one documented occurrence within the action area. In the action area, suitable habitat and the snake occurrence are located at the San Francisco International Airport West-of-Bayshore property, located between Angus Avenue in San Bruno and the Millbrae Station.

Effects of the Action

Effects of the action are all consequences to listed species or critical habitat that are caused by the project, including the consequences of other activities that are caused by the project. A consequence is caused by the project if it will not occur but for the project and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action.

The project will result in the temporary and permanent loss of suitable habitat for the butterflies, frog, and snake. Temporary habitat loss is any ground disturbance that can be restored to pre-disturbance conditions within 1 year. Permanent habitat loss includes ground disturbance that will last more than 1 year or any habitat conversion from suitable to non-suitable.

Table 2 shows maximum habitat loss for the 5 federally listed species addressed in this biological opinion. Adverse effects or impacts on species habitat are expressed as the maximum estimated acreage of suitable habitat affected by construction and operation of the project. Habitat models were developed to estimate habitat suitability and the presence of federally listed species is assumed in the absence of surveys.

Table 2 Maximum Temporary and Permanent Suitable Habitat Loss

Species	Habitat Type	Maximum Temporary Habitat Loss (acres)	Maximum Permanent Habitat Loss (acres)
Callippe silverspot butterfly	Occupied breeding and rearing	0.0	0.0
Bay checkerspot butterfly	Potentially suitable breeding and rearing	0.0	0.0
Mission blue butterfly	Nectaring and dispersal	31	66
California red-legged frog	Aquatic	0.1	0.4
	Refugia/foraging	0.1	6.0
San Francisco garter snake	Aquatic	0.1	0.4
	Refugia/foraging	0.1	6.0

Butterflies

The project is anticipated to affect the butterflies where suitable habitat is identified in the action area. The butterflies are reasonably certain to occur on all modeled habitat in the project footprint which is 97 acres of nectaring and dispersal habitat (Table 2).

The construction of a radio communications tower will result in the permanent loss of less than 0.1 acre, and the temporary loss of 0.1 acre, of nectaring and dispersal habitat on San Bruno Mountain. The radio communications tower is located just north of MK Pipelines, Inc. on Bayshore Boulevard. The impacted location is at the bottom of San Bruno Mountain, to the north of the main, occupied hilltop habitat and is partially fragmented by private homes off San Bruno Avenue (e.g., Firth Park).

Construction of the East Brisbane LMF will result in the permanent loss of 65.7 acres, and the temporary loss of 30.6 acres, of modeled nectaring and dispersal habitat which occurs between the currently occupied habitat on San Bruno Mountain and the potentially suitable breeding habitat at Bayview Park. The loss of habitat will be offset by compensatory habitat mitigation which will provide for the additional protection of 66 acres of listed butterfly habitat or 198 acres of restoration to known occupied and protected habitat. This will occur through the development of permittee responsible mitigation site(s), purchase of species credits at a Service- approved conservation or mitigation bank, and/or performing restoration activities on protected lands.

Eggs or larvae are not expected to be affected by the project, but there is potential for dispersing adults to be injured or killed as a result of project construction. Injury and mortality could result from the following:

- Collisions with or crushing of adults feeding on nectar plants by vehicles or equipment operating during the adult flight season (late February to late July)
- Disturbance and displacement of individuals from noise, vibration, and air turbulence.

Train operation has the potential to increase the risk of vehicle-related mortality in the area, as some individuals could be struck by a passing train. However, because most movement distances for these butterfly species are short, train collision is likely to be low.

The checkerspot and the mission have small home ranges and are unlikely to disperse far from the hilltop portions of the mountain where breeding occurs. McKechnie et al. observed that only 1.7 percent of males and 4.8 percent of female checkerspots moved a distance of approximately

1,600 feet (Service 2009). These figures are consistent with observations made by Weiss (1996, p. 93) who reported that adult movement declined with increasing distance with only about 5 percent moving between 656 to 984 feet. (200 to 300 meters). Mission are described as weak fliers, but are capable of 400–600-meter flights or farther between habitat patches (MacDonald et al. 2012). The callippe is known to disperse longer distances and thus has the greatest potential for collision. The callippe moves at least 0.8 mile between habitat patches and likely can move farther (1.5 miles) in multiple movement sequences (Service 2009b: page 23).

Train maintenance vehicles or staff could crush adults during inspections, emergency repairs, or vegetation management activities. Use of herbicides for weed abatement during operations or maintenance activities could affect butterfly host plants and nectar plants outside the ROW if applied near populations (e.g., drift effect). Chemical runoff from trucks or equipment along the ROW for access roads could leach into soils and reduce the vigor of or kill host plants and nectar plants. Construction could introduce nonnative invasive plant species that could permanently degrade grassland habitat by displacing the butterflies' host and nectar plants.

To avoid and minimize adverse effects on the butterflies from the project, the Authority has proposed general and species-specific conservation measures including but not limited to pre-construction surveys, Biological Monitors, establishment of ESAs, Weed Control Plan, Biological Resources Management Plan, and water and dust palliative measures. Suitable habitat for the butterfly that is temporarily disturbed will be restored to pre-disturbance conditions following construction. Compensatory mitigation, as described in the *Description of the Project*, for the butterflies will be implemented for permanent impacts to suitable nectaring and dispersal habitat between San Bruno Mountain and Bayview Park. This component of the action will have the effect of protecting and managing lands for the species' conservation in perpetuity. The compensatory lands will provide suitable habitat for breeding, feeding, or sheltering commensurate with or better than habitat lost as a result of the project. Providing this compensatory habitat mitigation will offset the loss of habitat and may contribute to other recovery efforts for the species.

California Red-Legged Frog

The project is anticipated to affect the frog where suitable habitat is identified in the action area. Of the 14.3 acres of modeled habitat in the project footprint, frogs are reasonably certain to occur in approximately 6.6 acres (0.5 acres of modeled aquatic habitat and 6.1 acres of modeled upland habitat). Modeled habitat that overlaps with the action area is made up of aquatic and upland land cover types that exist primarily as small patches of stream, wetland, grassland, and riparian habitat along the otherwise highly developed railway corridor with one exception: the West-of-Bayshore property west of the San Francisco International Airport. This approximately 80-acre parcel is an intact, remnant freshwater marsh, grassland, and scrub community that is occupied by a population of frogs.

The amount of modeled habitat that overlaps with the project footprint occurs to the west of the Caltrain alignment between Center Street and San Felipe Avenue in San Bruno. The modeled habitat occurs in a narrow strip of undeveloped land that is made up of non-native grassland, riparian scrub, and small patches of wetland and constructed watercourse. Several small creeks that drain the nearby San Bruno neighborhoods contribute run off to this narrow strip of land. Runoff water is then moved by gravity through culverts under the Caltrain and BART ROWs and into the West-of-Bayshore property.

Frogs are not expected to be present on the remaining 7.7 acres of modeled habitat due to distance from suitable aquatic breeding habitat, fragmentation by roads and other infrastructure, and development density.

There is potential for individuals to be injured or killed as a result of project construction and relocation. Injury and mortality could occur from the following:

- Construction-related ground disturbance (e.g., grading, earth-moving, vibration, excavation, exclusion fencing) and vehicle and equipment operation that could crush, entomb, or physically harm individual frogs.
- Construction activities may result in the degradation, destruction, or dewatering of an aquatic feature containing frog adults, juveniles, or eggs.
- Dispersing frogs may become entrapped in construction materials or in excavation(s).
- Disturbance and displacement of individuals from noise and vibration.
- Capture, transport, and release of individual frogs found within the construction site.

Train O&M activities have the potential to injure or kill frogs. Trains can strike an individual that has entered the railway. The use of chemicals and hazardous substances during construction (e.g., oils, gasoline) may cause frog mortality if individuals enter aquatic habitat that has been contaminated by accidental spills or other vehicle and equipment leaks. The introduction of nonnative plant species to upland habitat could reduce frog dispersal because dense herbaceous vegetation could impede movement. Conservation measures such as exclusion fencing will reduce potential to injure or kill frogs.

Amphibian pathogens and parasites can be carried between habitats on the hands, footwear, or equipment of fieldworkers, spreading such pathogens or parasites to novel localities containing species that have had little or no prior contact with them. Construction could introduce nonnative diseases that could kill frogs. One example is chytridiomycosis, an infectious disease that affects amphibians worldwide. It is caused by the chytrid fungus (*Batrachochytrium dendrobatidis*), a fungus capable of causing sporadic deaths in some amphibian populations and 100 percent mortality in others. Conservation measures from *The Declining Amphibian Task Force Fieldwork Code of Practice* (DAPTF 1998) will be implemented to prevent the introduction and spread of amphibian diseases and parasites.

The modeled habitat to the west of the Caltrain ROW the West-of-Bayshore property, because it is occupied and in proximity to the railway, is the only location where there is the likelihood of a small increase to existing train strike potential because of the increase in the number of trains under project operations. The West-of-Bayshore property is located between Highway 101 and the San Francisco International Airport. As noted above, the increase in potential for strike is related to an increase in the number of trains and not any other change in connectivity or habitat suitability.

To minimize and avoid the effects of the project on the frog, the Authority has proposed general and frog-specific conservation measures, including pre-construction surveys, daily surveys, exclusion fencing, and Biological Monitors. Security fencing will be designed to exclude the species from accessing the ROW to avoid injury and mortality of individuals from vehicle or train strikes. Suitable habitat for the frog that is temporarily disturbed will be restored to pre-disturbance conditions following construction, and large continuous swaths of habitat will remain intact adjacent to the project. Compensatory mitigation, as described in the *Description of the Project*, for the frog will also be implemented for permanent impacts on suitable habitat. This component of the action will have the effect of protecting and managing lands for the species'

conservation in perpetuity. The compensatory lands will provide suitable habitat for breeding, feeding, or sheltering commensurate with or better than habitat lost as a result of the project. Providing this compensatory habitat mitigation will offset the loss of habitat and may contribute to other recovery efforts for the species.

San Francisco Garter Snake

The project is anticipated to affect the snake where suitable habitat is identified in the action area. The snake is reasonably certain to occur on all modeled habitat in the project footprint, which is 6.6 acres (0.5 acre of modeled aquatic habitat and 6.1 acres of modeled upland habitat). Modeled habitat is made up of aquatic and upland land cover types that exist primarily as small patches of stream and riparian habitat along the otherwise highly developed railway corridor with one exception: the West-of-Bayshore property west of the San Francisco International Airport. This approximately 80-acre parcel is an intact, remnant freshwater marsh, grassland, and scrub community that is occupied by snakes.

There is potential for individuals to be injured or killed as a result of project construction and relocation. Injury and mortality could occur from the following:

- Construction-related ground disturbance (e.g., grading, earth-moving, vibration, excavation, exclusion fencing) and vehicle and equipment operation that could crush, entomb, or physically harm individual snakes.
- Construction activities may result in the degradation, destruction, or dewatering of an aquatic feature and could limit prey items and escape habitat for the snake.
- Dispersing snakes may become entrapped in construction materials or in excavation(s).
- Disturbance and displacement of individuals from noise and vibration.
- Capture, transport, and release of individual snakes found within the construction site.
- Chemicals and hazardous substance leaks during construction (e.g., oils, gasoline) may cause mortality of snakes and their prey if individuals enter aquatic habitat that has been contaminated by accidental spills or other vehicle and equipment leaks.

Train O&M activities have the potential to injure or kill snakes. Trains can strike an individual that has entered the railway. Occupied snake habitat is located east of the project footprint at the West-of-Bayshore property which is located between Highway 101 and the San Francisco International Airport. Between Highway 101 and the occupied marsh complex runs the existing railway for Caltrain and the BART ROW. Specifically, BART's cement fence serves as the western-most boundary to the marsh complex. BART's cement fence is considered a complete barrier to western movement of the snake. However, several culverts under the Caltrain and BART railways provide connectivity to the ruderal grassland patches on the western side of the Caltrain ROW. Once on the western side of the Caltrain ROW, snakes could enter the Caltrain railway through the existing cyclone fence. As noted above, the increase in potential for strike is related to an increase in the number trains and not any other change in connectivity or habitat suitability.

To minimize and avoid the effects of the project on the snake, the Authority has proposed general and snake-specific conservation measures, including pre-construction surveys, daily surveys, exclusion fencing, and Biological Monitors. Security fencing will be designed to exclude the species from accessing the ROW to avoid injury and mortality of individuals from vehicle or train strikes. Suitable habitat for the snake that is temporarily disturbed will be

restored to pre-disturbance conditions following construction, and large continuous swaths of habitat will remain intact adjacent to the project. Compensatory mitigation, as described in the *Description of the Project*, for the snake will also be implemented for permanent impacts on suitable habitat. This component of the action will have the effect of protecting and managing lands for the species' conservation in perpetuity. The compensatory lands will provide suitable habitat for breeding, feeding, or sheltering commensurate with or better than habitat lost as a result of the project. Providing this compensatory habitat mitigation will offset the loss of habitat and may contribute to other recovery efforts for the species.

Compensatory Habitat

As described in the *Description of the Project*, the Authority is proposing to provide compensatory habitat as part of the project. This compensatory habitat mitigation is intended to offset the effect on the species of the project's anticipated incidental take, resulting from the permanent and temporary loss, modification, and/or degradation of habitat described above. The compensatory habitat proposed will be in the form of placing conservation easements with long-term management plans on compensatory mitigation sites and/or the purchase of species habitat credits at a Service- approved mitigation or conservation bank. If these options are unavailable, the Service can approve appropriate restoration activities on land already protected and conserved for the species where the species is known to occur.

The amount of suitable habitat for each species that will be provided as compensatory habitat is as follows:

- butterflies – 66 acres newly conserved land or 198 acres of restoration activities on land already protected
- frog, aquatic– 1.2 acres
- frog, upland – 6.1 acres
- snake, aquatic – 1.2 acres
- snake, upland – 6.1 acres

This component of the action will have the effect of protecting and managing lands for the species' conservation in perpetuity. The compensatory lands will provide suitable habitat for breeding, feeding, or sheltering commensurate with or better than habitat lost as a result of the project. Providing this compensatory habitat mitigation will offset the loss of habitat and may contribute to other recovery efforts for the species.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the project are not considered in this section because they require separate consultation pursuant to Section 7 of the Act.

The Service does not have specific information regarding future non-federal actions within the project action area.

Conclusion

After reviewing the current status of the butterflies, the frog, and the snake; the environmental baseline for the action area; the effects of the project; and the cumulative effects, it is the Service's biological opinion that the construction of the San Francisco to San Jose Project

Section, as proposed, is not likely to jeopardize the continued existence of these species. The Service reached this conclusion because the project-related effects on the species, when added to the environmental baseline and analyzed in consideration of all potential cumulative effects, will not result in precluding recovery or appreciably reducing the likelihood of survival of these species based on the following:

- 1) The conservation measures are designed to avoid or minimize and offset adverse impacts on these species and their habitat.
- 2) Project activities that will result in temporary and permanent impacts to species habitat only occur on a small percentage of habitat within the action area and a small percentage of habitat throughout the full range of these species.
- 3) Protection of habitats with compensatory mitigation will preserve and/or restore habitat in the same recovery areas (as applicable) affected by construction and operation of the project.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by Service regulations at 50 CFR 17.3 as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is defined by the same regulations as an act which actually kills or injures wildlife. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the Authority so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, for the exemption in section 7(o)(2) to apply. The Authority has a continuing duty to regulate the activity covered by this incidental take statement. If the Authority (1) fails to assume and implement the terms and conditions or (2) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Authority must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR §402.14(i)(3)].

Amount or Extent of Take

Butterflies

The Service anticipates that incidental take of the butterflies will be difficult to detect due to their life history and ecology. The butterflies inhabit host plants (dwarf plantain, denseflower Indian

paintbrush, English plantain, purple owl's-clover, exserted paintbrush, johnny jump-up, silver lupine, summer lupine, manycolored lupine) and spend most of their lifespan in the egg, larva, or pupa stage, making them difficult to detect. Therefore, the amount of habitat for these species that will be impacted as a result of the project will be used as a surrogate for quantifying take. The Service anticipates that dispersing adult butterflies within the 31 acres of nectaring and dispersal habitat that will be temporarily disturbed and the 66 acres of nectaring and dispersal habitat that will be permanently removed by the project could be subjected to incidental take in the form of injury, killing, harm, or harassment. The Service does not anticipate mortality of larvae, pupae, or eggs due to the lack of host plants within the project footprint.

California Red-Legged Frog

The Service anticipates that incidental take of the frog will be difficult to detect due to its life history and ecology. Specifically, the frog can be difficult to locate due to their cryptic appearance and finding a dead or injured individual is unlikely due to their relatively small size. Losses of the frog may be difficult to quantify due to seasonal fluctuations in their numbers, random environmental events, changes in their habitat, or additional environmental disturbances. Therefore, the amount of habitat for the frog that will be impacted as a result of the project will be used as a surrogate for quantifying take. The Service anticipates that all frogs, in all life stages, within 0.4 acre of suitable aquatic breeding habitat and 6.1 acres of suitable upland and refugia habitat that will be disturbed by the project could be subjected to incidental take in the form of injury, mortality, capture, harm, or harassment.

San Francisco Garter Snake

The Service anticipates that incidental take of the snake will be difficult to detect due to its life history and ecology. The snake can be difficult to locate due to their cryptic appearance and finding a dead or injured individual is unlikely due to their relatively small size. Losses of the snake may be difficult to quantify due to seasonal fluctuations in their numbers, random environmental events, changes in their habitat, or additional environmental disturbances. The Service anticipates that all snakes within 0.4 acre of suitable aquatic habitat and 6.1 acres of suitable upland and refugia habitat that will be disturbed by the project could be subjected to incidental take in the form of injury, mortality, capture, harm, or harassment.

The Service cannot precisely state the number of individuals within the project area due to the reasons mentioned above. In order to develop an estimate of the number of snakes within the project area, we will use the population estimates developed by Wood, et al. (2020) on the nearby West-of-Bayshore property. Wood et al. estimated 1,317 snakes on the 180-acre property (100 acres upland, 80 acres wetland), or 16 snakes per wetland acre. This project will disturb 0.4 acres of suitable wetland habitat which, based on the population estimate of 16 snakes per wetland acres, could contain 6 snakes. Therefore, the Service anticipates that 6 snakes will be subject to incidental take in the form of injury, mortality, capture, harm or harassment.

Upon implementation of the following Reasonable and Prudent Measures, these levels of incidental take associated with the San Francisco to San Jose Project Section in the form of harm, harassment, injury, and death of the butterflies and harm, harassment, capture, injury, and death of the snake and frog caused by habitat loss, construction activities, and O&M activities will become exempt from the prohibitions described in section 9 of the Act. No other forms of take are exempted under this opinion.

Effect of the Take

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to jeopardize the continued existence of the butterflies, the frog, and the snake.

Reasonable and Prudent Measures

All necessary and appropriate measures to avoid or minimize effects on the butterflies, the snake, and the frog resulting from implementation of the San Francisco to San Jose Project Section have been incorporated into the project's conservation measures. Therefore, the Service believes the following reasonable and prudent measure is necessary and appropriate to minimize incidental take of the butterflies, the frog, and the snake:

- 1) All conservation measures, as described in the *Description of the Project* section of this biological opinion, shall be fully implemented and adhered to. Further, this reasonable and prudent measure shall be supplemented by the terms and conditions below.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the Authority must ensure compliance with the following terms and conditions, which implement the reasonable and prudent measure described above. These terms and conditions are nondiscretionary.

- 1) The Authority will include full implementation and adherence to the conservation measures described in the *Description of the Project* section of this biological opinion as a condition of any permit or contract issued for the project.
- 2) The Authority will require that all personnel associated with this project are made aware of the conservation measures and the responsibility to implement them fully.
- 3) In order to monitor whether the amount or extent of incidental take anticipated from implementation of the project is approached or exceeded, the Authority will adhere to the reporting requirements described in the *Description of the Project*. Should this anticipated amount or extent of incidental take be exceeded, the Authority must immediately reinstate formal consultation, as per 50 CFR 402.16(a).
 - a. For those components of the action that will result in habitat degradation or modification whereby incidental take in the form of harm is anticipated, the Authority will provide a precise accounting of the total acreage of habitat impacted to the Service on a monthly and annual basis as described in the reporting section of the *Description of the Project*.
- 4) The San Joaquin Valley Division Supervisor at the Sacramento Fish and Wildlife Office, (916) 414-6544, should be included in all reporting and Service notification referenced in the *Description of the Project*.
- 5) Because it is likely that the Authority will not begin construction on the project for a number of years, the Authority will confer with the Service no less than 1 year before the start of project construction to assess any changes to the project, the species baseline in the action area, and potential changes to the effects from the project on listed species. This process will ensure that the assessment of impacts and proposed avoidance and minimization measures within this biological opinion are still accurate and reflect existing conditions on the ground.

Salvage and Disposition of Individuals:

Injured listed species must be cared for by a licensed veterinarian or other qualified person(s), such as the Service-approved biologist. Dead individuals must be sealed in a resealable plastic bag containing a paper with the date and time when the animal was found, the location where it was found, and the name of the person who found it, and the bag containing the specimen frozen in a freezer located in a secure site, until instructions are received from the Service regarding the disposition of the dead specimen. The Service contact person is the San Joaquin Valley Division Supervisor at the Sacramento Fish and Wildlife Office at (916) 414-6544.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a project on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service recommends the following actions:

- 1) The Authority should continue to work with the Service to assist us in meeting the goals of the *Recovery Plan for Serpentine Soil Species of San Francisco Bay Area* (Service 1998), *Recovery Plan for Mission Blue Butterfly* (*Icaricia icariodes missionensis*) *Recovery Plan Amendment* (Service 2019b), *Recovery Plan for the California Red-Legged Frog* (*Rana aurora draytonii*) (Service 2002), and the *Recovery Plan for the San Francisco Garter Snake* (*Thamnophis sirtalis tetrataenia*) (Service 1985).
- 2) The Authority should continue to work with the Service to implement the conservation recommendations in the *Species Status Assessment for the Callippe Silverspot Butterfly* (*Speyeria callippe callippe*) (Service 2020a) and the *5-Year Review Callippe Silverspot Butterfly* (*Speyeria callippe callippe*) (Service 2020b).

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION—CLOSING STATEMENT

This concludes formal consultation on the California High-Speed Rail System: San Francisco to San Jose Project Section. As provided in 50 CFR §402.16(a), reinitiation of consultation is required and shall be requested by the federal agency or by the Service where discretionary federal involvement or control over the action has been retained or is authorized by law, and:

- 1) If the amount or extent of taking specified in the incidental take statement is exceeded;
- 2) If new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered;
- 3) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion; or written concurrence, or

- 4) If a new species is listed or critical habitat designated that may be affected by the identified action.

If you have any questions regarding this biological opinion, please contact Maggie Sepulveda, Senior Fish and Wildlife Biologist, at margaret_sepulveda@fws.gov or (916) 414-6512 or Patricia Cole, Supervisor, San Joaquin Valley Division, at patricia_cole@fws.gov or (916) 414-6544, or the letterhead address

Sincerely,

Michael Fris
Field Supervisor

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PERSONAL COMMUNICATIONS

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APPENDIX C: NATIONAL MARINE FISHERIES SERVICE BIOLOGICAL OPINION, MARCH 18, 2022



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
650 Capitol Mall, Suite 5-100
Sacramento, California 95814-4700

Refer to NMFS No: WCRO-2021-02307

March 18, 2022

Serge Stanich
Director of Environmental Services,
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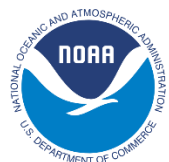
Re: Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson-Stevens
Fishery Conservation and Management Act Essential Fish Habitat Response for the
California High Speed Rail San Francisco to San Jose Project Section

Dear Mr. Stanich:

Thank you for your letter of September 13, 2021, requesting initiation of consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 et seq.) for the California High Speed Rail (HSR) Authority's San Francisco to San Jose Project Section.

The enclosed biological opinion is based on our review of the proposed action as detailed in the provided biological assessment, and its effects on the federally listed threatened Central California Coast steelhead (*Oncorhynchus mykiss*) distinct population segment (DPS) and the southern DPS of North American green sturgeon (*Acipenser medirostris*), and their designated critical habitats. Based on the best available scientific and commercial information, NMFS concludes that the project is not likely to jeopardize the continued existence of these federally listed species or destroy or adversely modify their critical habitat. NMFS has included an incidental take statement with reasonable and prudent measures, and terms and conditions that are necessary and appropriate to avoid, minimize, or monitor the incidental take of federally listed fish that will occur with project implementation.

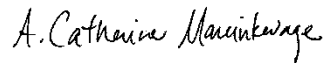
Thank you, also, for your request for consultation pursuant to the essential fish habitat (EFH) provisions in section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA)(16 U.S.C. 1855(b)) for this action. Enclosed we also provide NMFS's review of the potential effects of the proposed action on EFH for Pacific Coast Salmon, Pacific Coast Groundfish, and Coastal Pelagic Species, as designated under the MSA. The document concludes that the project will adversely affect the EFH of these fisheries in the action area and has included EFH Conservation Recommendations.



As required by section 305(b)(4)(B) of the MSA, the Authority must provide a detailed response in writing to NMFS within 30 days after receiving an EFH Conservation Recommendation. Such a response must be provided at least 10 days prior to final approval of the action if the response is inconsistent with any of NMFS EFH Conservation Recommendations unless NMFS and the Authority have agreed to use alternative time frames for the Authority's response. The response must include a description of measures proposed by the agency for avoiding, minimizing, mitigating, or otherwise offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the Conservation Recommendations, the Authority must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS over the anticipated effects of the action and the measures needed to avoid, minimize, mitigate, or offset such effects (50 CFR 600.920(k)(1)). In your response to the EFH portion of this consultation, we ask that you clearly identify the number of Conservation Recommendations accepted.

Please contact Katie Schmidt at the California Central Valley Office at (916) 542-3515 or katherine.schmidt@noaa.gov if you have any questions concerning this consultation, or if you require additional information.

Sincerely,



Cathy Marcinkevage
Assistant Regional Administrator for
California Central Valley Office

Enclosure

cc: To the File: ARN 151422-WCR2018-SA00467

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UNITED STATES DEPARTMENT OF COMMERCE
 National Oceanic and Atmospheric Administration
 NATIONAL MARINE FISHERIES SERVICE
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**Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion and Magnuson–Stevens
 Fishery Conservation and Management Act Essential Fish Habitat Response**

California High Speed Rail San Francisco to San Jose Project Section

NMFS Consultation Number: WCRO-2021-02307

Action Agency: California High Speed Rail Authority

Affected Species and NMFS’s Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species?	Is Action Likely To Jeopardize the Species?	Is Action Likely to Adversely Affect Critical Habitat?	Is Action Likely To Destroy or Adversely Modify Critical Habitat?
Central California Coast steelhead (<i>Oncorhynchus mykiss</i>)	Threatened	Yes	No	Yes	No
North American Green Sturgeon (<i>Acipenser medirostris</i>), Southern Distinct Population Segment	Threatened	Yes	No	Yes	No

Fishery Management Plan That Identifies EFH in the Project Area	Does Action Have an Adverse Effect on EFH?	Are EFH Conservation Recommendations Provided?
Pacific Coast Salmon	Yes	Yes
Pacific Coast Groundfish	Yes	Yes
Pacific Coast Coastal Pelagic Species	Yes	Yes

Consultation Conducted By: National Marine Fisheries Service, West Coast Region

Issued By: *A. Catharine Marcinkevage*
 Cathy Marcinkevage
 Assistant Regional Administrator for California Central Valley Office

Date: March 18, 2022



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ABBREVIATIONS AND ACRONYMS

μPa	micropascal
ACID	Anderson Cottonwood Irrigation Dam
AMMs	avoidance and minimization measures
Authority	California High Speed Rail Authority
BA	biological assessment
BART	Bay Area Rapid Transit
BMPs	best management practices
BRMP	biological resources management plan
Caltrans	California Department of Transportation
CCC	Central California Coast
CCMP	Comprehensive Conservation and Management Plan
CCVO	California Central Valley Office
CDFW	California Department of Fish and Wildlife
CMP	compensatory mitigation plan
CMs	conservation measures
CPS	coastal pelagic species
CWA	Clean Water Act
dB	decibel
DPS	distinct population segment
DQA	Data Quality Act
EFH	essential fish habitat
EIR/EIS	Environmental Impact Report/Environmental Impact Statement
EMMA	Environmental Mitigation Management and Assessment system
ESA	Endangered Species Act
FRA	Federal Railroad Administration
HAPCs	Habitat Areas of Particular Concern
HCP	habitat conservation plan
HSR	High Speed Rail
IAMFs	impact avoidance and minimization features
ICF	ICF International, Inc.
ITS	incidental take statement
LID	low impact development
LMF	light maintenance facility
LWM	large woody material
MMPA	Marine Mammal Protection Act
MOU	memorandum of understanding
mph	mile per hour
MSA	Magnuson-Stevens Fishery Conservation and Management Act
nDPS	Northern distinct population segment
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NTU	nephelometric turbidity unit
OCS	overhead contact system
OHWM	ordinary high water mark

opinion	biological opinion
PAHs	polycyclic aromatic hydrocarbons
PBF	physical or biological feature
PCBs	polychlorinated biphenyls
PCE	primary constituent element
PFMC	Pacific Fishery Management Council
Porter-Cologne Act	Porter-Cologne Water Quality Control Act
RMS	root mean square
ROW	right-of-way
RPMs	reasonable and prudent measures
RRP	restoration and revegetation plan
SCVWD	Santa Clara Valley Water District
sDPS	Southern distinct population segment
SEL	sound exposure level
SFBDE	San Francisco Bay Delta Estuary
SPCCP	spill prevention control and countermeasures plan
SWPPP	stormwater pollution prevention plan
SWRCB	State Water Resources Control Board
TCE	temporary construction easements
TPSS	traction power substation
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
WEAP	worker environmental awareness program
WOTUS	waters of the United States

1. INTRODUCTION

This Introduction section provides information relevant to the other sections of this document and is incorporated by reference into Sections 2 and 3, below.

1.1. Background

The National Marine Fisheries Service (NMFS) prepared the biological opinion (opinion) and incidental take statement (ITS) portions of this document in accordance with section 7(b) of the Endangered Species Act (ESA) of 1973 (16 U.S.C. 1531 et seq.), as amended, and implementing regulations at 50 CFR part 402.

We also completed an essential fish habitat (EFH) consultation on the proposed action, in accordance with section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1801 et seq.) and implementing regulations at 50 CFR 600.

We completed pre-dissemination review of this document using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (DQA) (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). The document will be available within two weeks at the National Oceanic and Atmospheric Administration (NOAA) Library Institutional Repository (<https://repository.library.noaa.gov/welcome>). A complete record of this consultation is on file at the NMFS California Central Valley Office (CCVO).

1.2. Consultation History

July 14, 2011: The Federal Railroad Administration (FRA) sent a copy of a memorandum of understanding (MOU) to NMFS and to the United States Fish and Wildlife Service (USFWS) designating the California High Speed Rail Authority (Authority) to act on behalf of the FRA as a non-federal representative and providing that the Authority has assumed FRA's responsibilities under Federal environmental laws for the California High Speed Rail (HSR) project (U.S. Department of Transportation and Federal Railroad Administration 2011).

October 25, 2016: NMFS staff attended a tour of the proposed San Francisco to San Jose alignment route.

July 23, 2019: The State of California signed a MOU with the FRA in which, pursuant to 23 U.S.C. 327(a)(2)(B), the FRA assigned, and the State (acting through its California State Transportation Agency and the Authority) assumed, all of FRA's responsibilities for environmental review, consultation, or other actions required or arising under listed Federal environmental laws, including the ESA, for the assigned railroad projects, including projects necessary for the design, construction, and operation of the HSR system (California State Transportation Agency 2019).

October 1, 2020: The Authority requested a species list from NMFS for the San Francisco to San Jose HSR Project Section, via email.

October 14, 2020: NMFS provided an official species list to the Authority for the San Francisco to San Jose HSR Project Section (Authority 2021a), which identified the following NMFS trust resources:

- Threatened Central California Coast (CCC) steelhead, *Oncorhynchus mykiss*, distinct population segment (DPS; 62 FR 43937, 8/18/1997) and its critical habitat (70 FR 52488, 9/2/2005).
- Threatened Southern distinct population segment (sDPS) of North American green sturgeon, *Acipenser medirostris* (71 FR 17757, 4/7/2006) and its critical habitat (74 FR 52300, 10/9/2009).
- Pacific Coast Salmon - Coho and Chinook EFH.

November 16, 2020: The Authority shared a draft biological assessment (BA) with NMFS and requested that NMFS review and provide comments on the project information completeness before they submitted a formal ESA/MSA consultation request.

December 3, 2020: NMFS returned initial comments and questions on the provided draft material, via email.

January 28, 2021: A coordination meeting was held between NMFS, Authority, and ICF International, Inc. (ICF) consulting staff to go over responses to comments and questions raised by NMFS on the provided draft materials. The sDPS green sturgeon determination was changed to 'likely to adversely affect', NMFS requested a detailed list/table of all waterbodies crossed by the preferred alternative, and NMFS requested more information on impacts and minimization measures for the Visitacion Creek area specifically. NMFS staff also recommended the Authority investigate whether coverage under the Marine Mammal Protection Act (MMPA) may be needed for pinniped interactions, due to construction's proximity to the marine and estuarine waters of San Francisco Bay.

March 23, 2021: Authority staff contacted NMFS Protected Resources Division in Long Beach, California, via email to inquire whether the construction in and adjacent to San Francisco Bay estuarine and marine waters for the San Francisco to San Jose Project Section would require marine mammal harassment incidental take coverage under the MMPA. In this inquiry, the Authority proposed that marine mammal interactions were not likely to occur at the planned construction locations after assessing the potential for marine mammal interactions (including pinniped), and that applying for MMPA take coverage was not necessary to proceed.

March 25, 2021: NMFS staff, Penny Ruvelas, confirmed that, given the project description and estimated potential impacts to marine mammals provided by the Authority, via email, it was unlikely the project section would need to apply for an incidental harassment authorization or letter of authorization under the MMPA for marine mammal interactions during construction. However, she clarified that NMFS does not provide concurrence or informally consult on MMPA determinations when action agencies decide not to apply for coverage.

August 10, 2021: The Authority submitted the revised draft BA to NMFS for additional questions or comments.

August 20, 2021: NMFS returned the revised draft BA with minor suggested edits.

September 13, 2021: The Authority requested formal ESA/MSA consultations for the San Francisco to San Jose HSR Project Section, via email to the CCVO's electronic consultation request system. The submitted consultation packet also included maps of the proposed route and wetland delineations (Authority 2021e, f, g, h), preliminary designs and figures (Authority 2021i, b, d), applicable design standards/criteria (Authority 2012, Authority 2014, 2019c), a specific report on Visitacion Creek (Walter 2018), proposed conservation measures (Authority 2021c), a revised steelhead impacts matrix, and other appendices. The Authority also requested that the MSA consultation also include:

- EFH for Pacific Coast groundfish
- EFH for Pacific Coast coastal pelagic species

September 23, 2021: The Authority submitted the revised impact and mitigation acreages for Table 5-3 (Authority 2021j) to replace Table 5-3 in the BA.

September 30, 2021: The Authority submitted the final inclusive BA (Authority 2021i) for the section to NMFS, via email.

October 14, 2021: NMFS reviewed all provided materials, including the final BA, and considered the informational requirements for formal ESA/EFH consultation for the San Francisco to San Jose HSR Project Section to have been met. NMFS sent a sufficiency notice via email to the Authority and indicated that formal consultation was initiated on September 30, 2021, the date that the final BA was received.

February 1, 2022: NMFS raised concerns that all of the temporary and permanent impacts to green sturgeon habitat were underestimated in the proposed mitigation acreages and NMFS suggested accounting all impacts to tidally influenced waterways as impacts to green sturgeon critical habitat. The Authority agreed to this approach and that an update was required to BA Table 5-3 to reflect this change, via email.

February 8, 2022: NMFS requested a mutually agreed upon extension, via email, for this opinion until March 1, 2022, as the internal review process had been delayed. The Authority agreed to the proposed extension date, via email.

February 28, 2022: NMFS requested another mutually agreed upon extension, via email, for this opinion until March 22, 2022, as the internal review process had been delayed.

March 1, 2022: NMFS sent a list of minor issues requiring clarification in the project description section of the BA, via email.

March 2, 2022: The Authority again agreed to the proposed extension date, via email.

March 8, 2022: Authority staff provided clarification on the list of issues identified by NMFS in the project description section of the BA, via email. NMFS acknowledged the list and changed the corresponding language in this opinion to reflect the clarifications.

1.3. Proposed Federal Action

Under the ESA, “action” means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (50 CFR 402.02). Under the MSA, Federal action means any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken by a Federal agency (50 CFR 600.910). Through a memorandum of understanding signed July 1, 2019, pursuant to 23 U.S.C. 327(a)(2)(B), the State of California (acting through its California State Transportation Agency and the Authority) assumed all of FRA’s responsibilities for environmental review, consultation, or other action required or arising under listed Federal environmental laws, including the ESA, for the HSR system. The FRA funded the environmental review and preliminary engineering for the HSR system, as well as the construction activities of the first section to break ground (the Merced to Fresno Project Section (Authority and FRA 2018, NMFS 2019a)).

1.3.1. Project Section Overview

The Authority proposes to construct, operate, and maintain the HSR San Francisco to San Jose Project Section, which is one of eight independent project sections comprising Phase I of the HSR system in California. The HSR system would be an electronically powered, steel-wheel-on-steel-rail system with state-of-the-art safety, signaling, and automatic train control systems. The trains would be capable of operating at speeds of up to 220 miles per hour (mph) where the alignment has a fully grade-separated, dedicated track, and speeds up to 110 mph on blended system infrastructure. The statewide system’s purpose is to provide a transit connection between the major population centers of the San Francisco Bay Area with the Los Angeles/Southern California metropolitan region and urban centers in the California Central Valley at final build out. When completed, the nearly 800-mile train system would provide new passenger rail service to more than 90 percent of the state’s population (Authority 2019b, a, 2021i). However, each section of the HSR system has been designed to have independent utility regardless of whether other sections are completed, principally through the inclusion of logical termini and local benefits (Authority 2009).

This corridor encompasses three urban counties: San Francisco, San Mateo, and Santa Clara, California. The proposed San Francisco to San Jose Project Section would connect logical termini at planned passenger stations in the cities of San Francisco, Millbrae, and San Jose, California, and therefore achieve transit connection between two major economic, financial, and cultural centers in the Peninsula of the San Francisco to San Jose, hereafter referred to as the San Francisco-San Jose Area. If other project sections of the HSR system are not completed, the infrastructure in this section would be used by regional and intercity services to improve their capacity, reliability, and performance. If no other transportation investments were made in this area, the utility and significance of a convenient, high-speed transit connection that could reduce congestion on regional freeways and serve both the major employment centers and the two international airports along this section become increasingly critical. Implementation of the San Francisco to San Jose Project Section also enables early, incremental improvements to the

existing train services in coordination with Caltrain, which also benefits adjoining communities by reducing local traffic congestion and improving public safety in the existing rail corridor through the proposed grade separation. By using lightweight, electrified trains compatible with HSR lines and equipment, Caltrain can move towards expanded modern electric service and operate with faster services within its San Francisco Peninsula lines (Authority 2021i).

The proposed action consists of the Authority's Preferred Alternative, Alternative A (Figure 1). Alternative A was identified as the most appropriate route to accomplish project goals while minimizing adverse impacts in the San Francisco to San Jose Project Section Draft Environmental Impact Report/Environmental Impact Statement (EIR/EIS; (Authority 2019b, a)). Alternative A consists of:

- 42.9 miles of existing Caltrain track currently able to support high speed electrical service
- Modification of approximately 14.5 miles of existing Caltrain track to support HSR trains

The project would operate on a predominantly two-track system primarily within the existing Caltrain right-of-way (ROW), utilizing existing and in-progress infrastructure improvements developed by Caltrain for its Caltrain Modernization Program, including electrification of the Caltrain corridor between San Francisco and San Jose. Required track modifications to enable high speed travel will include curve straightening, track center modifications, and super-elevation¹ of 33 percent of existing tracks. Because the alignment relies heavily on shared track already within the existing Caltrain system, the proposed action mostly entails track modifications on the existing system so it supports higher train speeds. Therefore, these track modifications will expand the existing track footprint minimally, by 1 to 3 feet in width, within the existing Caltrain ROW. The blended system would consist of predominantly ballasted track of varying profiles. Low, near-the-ground tracks would be at grade; higher tracks would be elevated on embankment (earthen fill graded to a slope on either side or supported by retaining walls) and structure (viaduct); and below-grade tracks would extend through four existing short tunnels in San Francisco. Ballast would be composed of granite or similar rock and subballast would be composed of rock similar to roadway construction. This section does not require additional passing tracks beyond those already existing.

Seven existing train stations or platforms throughout the route are proposed to be modified to accommodate HSR service, and new HSR infrastructure will be built at the Millbrae Bay Area Rapid Transit (BART)/Caltrain Station. Station modifications/redesigns will include:

New HSR platforms or station reconfigurations at the existing 4th and King Street (

- Figure 2) and Millbrae (Figure 3) stations
- Bayshore Caltrain Station will be relocated and modified to accommodate the East Brisbane LMF
- Modification to San Bruno and Hayward Park Caltrain stations due to track shifts
- Modifications to Broadway and Atherton Caltrain stations to remove hold-out rule

¹ Super-elevation is the vertical distance between the height of the inner and outer track rails at curves. Super-elevation is used to partially or fully counteract the centrifugal force acting radially outward on a train when it is traveling along the curve.

East Brisbane LMF will include:

- Approximately 100-acre facility, including storage areas for reserve equipment, workshops, and office space
- Speed transition tracks approximately 1,400 feet long
- Maintenance yard with 17-yard tracks and eight shop tracks
- 400-space surface parking lot for automobiles and trucks
- Access road connecting facility to realigned Tunnel Avenue
- Power generator, sewage system, cistern, collection point, and electrical substation

Several safety improvements and additional communication radio towers will be installed in existing passenger train infrastructure to accommodate HSR train service; other alignment and ancillary features include:

- Approximately 38 at-grade road crossings with safety modifications
- Two new structures, two replaced structures, seven modified structures, and three retaining walls
- New perimeter safety fencing along 7.3 miles of ROW
- Installation of 20 communication radio towers for operation (approximately 10 feet by 20 feet fenced areas), mostly co-located at existing facilities such as Caltrain traction power substations (TPSS), switching stations, or paralleling stations

Electrical interconnections required for operation:

- Existing overhead contact system that supports 130 to 140 miles of electrified train tracks, powered by a 25-kilovolt, 60-Hertz, single-phase, alternating current supply system consisting of TPSS
- Relocation of 9.4 miles of overhead contact system poles and wiring
- One switching station and paralleling stations
- Equipment upgrades at traction power facilities (additional transformers)

The majority of the proposed action will be contained primarily within the existing Caltrain ROW. However, in certain locations along the Caltrain corridor (e.g., the Brisbane LMF, communication radio towers, Millbrae Station), the Authority would need to acquire temporary construction easements (TCE) and permanent ROW in addition to the existing Caltrain ROW to build and operate components of the blended system. The East Brisbane LMF would require placing a portion of Visitacion Creek into an underground culvert along its current alignment, such that the maintenance yard, maintenance building, and other associated facilities would be built above the underground culvert. Track modifications associated with the East Brisbane LMF would also require demolishing and relocating the Tunnel Avenue overpass and widening the bridge crossing at Guadalupe Valley Creek.

Operation of the blended system, once modified and upgraded for high speed, electric train travel, would be 1) limited freight service (approximately three round trips per day) between San Francisco and San Jose using the same tracks, 2) Caltrain passenger service, and 3) HSR passenger service. In the blended portions of the system, HSR and Caltrain would operate at speeds of up to 110 mph and would have a coordinated schedule to allow both services to

efficiently serve their respective stations. HSR trains would be able to pass Caltrain trains in existing four-track segments and at the Millbrae Station.

Although the exact vehicle type has not yet been selected, the environmental analyses considered the effects associated with HSR vehicles produced in the world that meet the Authority's safety and operational criteria (Authority 2014). The Authority is considering an electric multiple unit concept, in which several train cars (including both end cars) would contain traction motors, rather than a locomotive hauled train (i.e., one engine in the front and one in the rear). Each train car would have an active suspension, and each powered car would have an independent regenerative braking system, which returns power to the power system. The body would be made of strong but lightweight materials and would have an aerodynamic shape to minimize air resistance, much like a curved airplane body.

The East Brisbane LMF would support San Francisco terminal station operations by dispatching freshly inspected and serviced trains and crews to begin revenue service throughout the day, along with providing daily, monthly, and quarterly maintenance of HSR trainsets. Maintenance activities would include train washing, interior cleaning, wheel truing, testing, and inspections. These activities may occur between runs or as a pre-departure service at the start of the revenue day. Additionally, the light maintenance facility would be used as a service point for any trains in need of emergency services.

For a full description of the auxiliary surface transportation modifications and components of the proposed action (i.e., state highway and local roadway modifications, freight/passenger railroad modifications, bridge reconstructions, TPSS components, and communication system installation), see BA Chapter 2 (Authority 2021i).

The parts of the proposed action that are most likely to affect species and critical habitat under NMFS jurisdiction are the proposed crossings of above-grade or elevated track segments that span over waterways containing estuarine or freshwater habitats (those existing or requiring modification) or the parts of the proposed action that would directly modify such habitats, like the East Brisbane LMF. These locations are identified in greater detail in the Action Area description (Section 2.3).

We considered, under the ESA, whether or not the proposed action would cause any other activities and determined that it would not because 1) the project sections do not rely on other sections for operations to commence at a local level, thus the construction and operations of other sections were determined not to be consequences of this proposed action, and 2) all Caltrain electrification upgrades were independently planned and would happen regardless of future HSR service on the system.



Figure 1. Proposed San Francisco to San Jose Project Section HSR route, Alternative A (dark blue solid line) between San Francisco, California, and Scott Boulevard, San Jose, California (Authority 2021i).

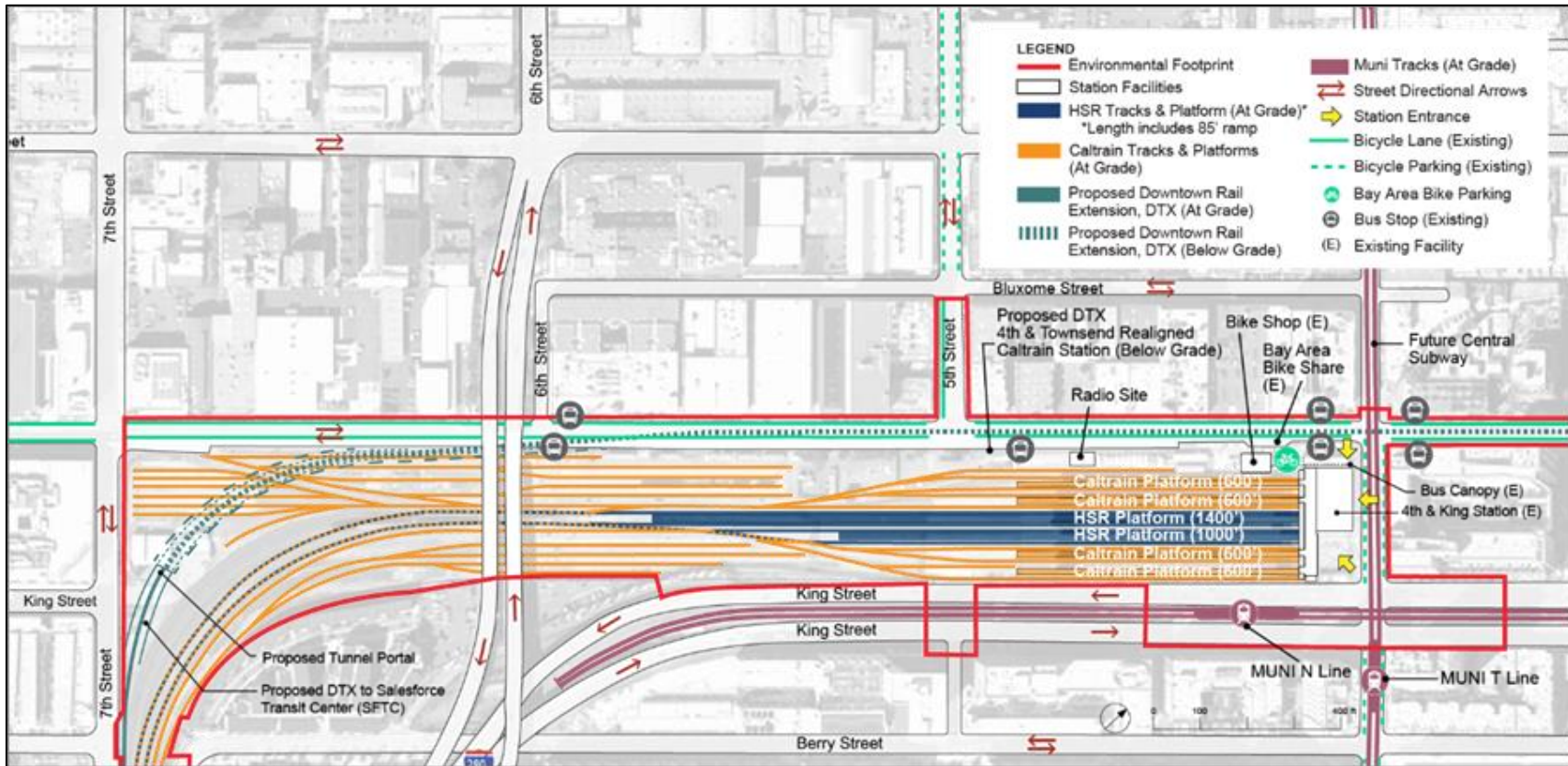


Figure 2. Proposed modifications to 4th and King Street Station, an interim terminal station until access to the Salesforce Transit Center is available (Authority 2021i).

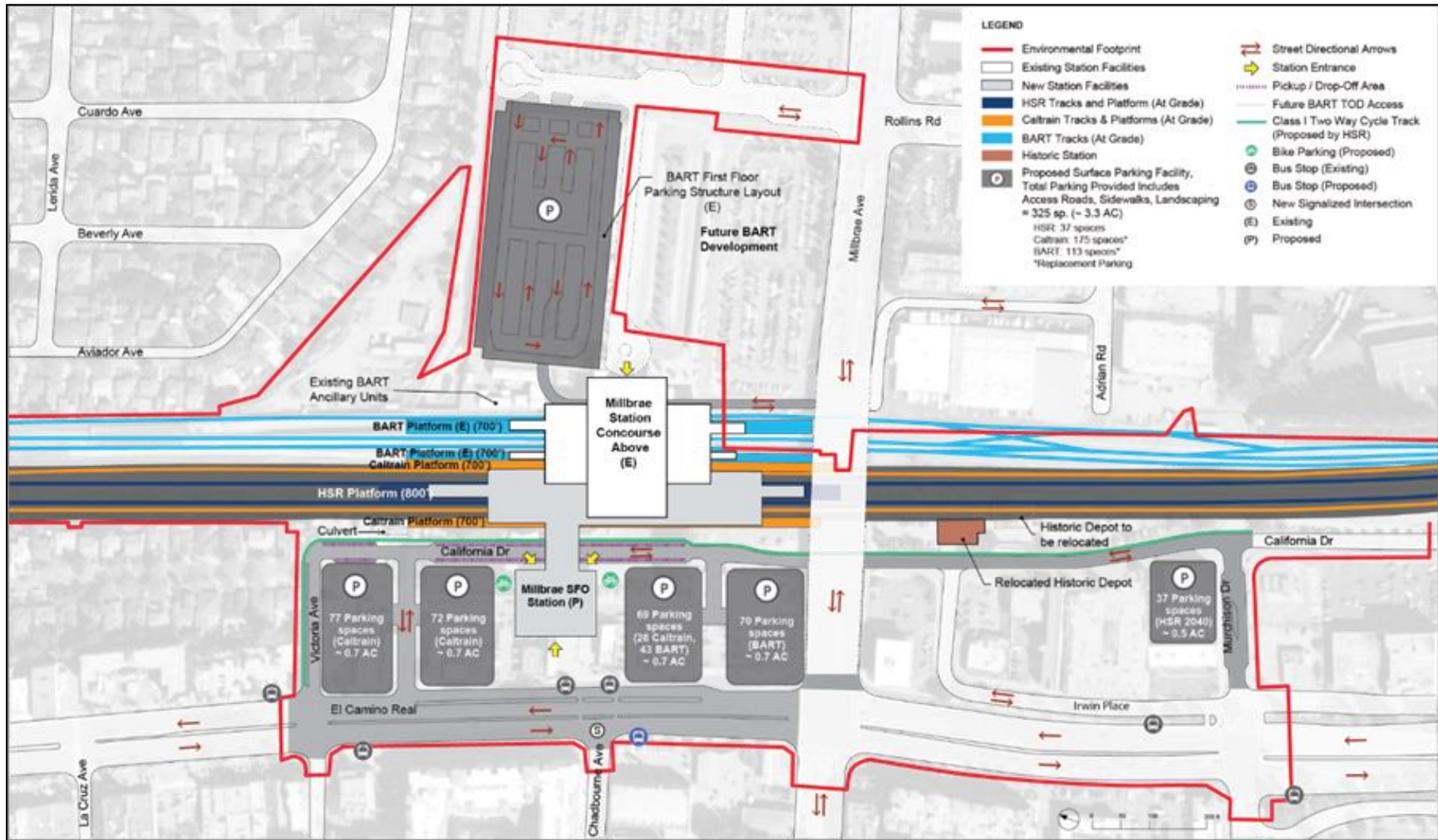


Figure 3. Proposed modifications to BART Millbrae Station Plan (Authority 2021i).



Figure 4. Proposed design of new East Brisbane LMF and Tunnel Avenue reroute and new overpass (Authority 2021i).

1.3.2. Construction

The Authority's general approach to project construction is a phased approach. Construction would likely proceed concurrently along the proposed Project Section and would typically take place 5 days a week with 8-hour days, approximately 250 days per year (except for track realignment within the Caltrain corridor, which would need to occur within established work windows, which include weekdays (outside of AM and PM peak hours), weeknights, and weekends). Given the size and complexity of the project, the design and construction work could be divided into several procurement packages. In general, the procurement would be grouped as follows:

- Civil/structural infrastructure, including design and construction of passenger stations, maintenance facilities, wayside facilities, utility relocations, and roadway modifications
- Trackwork, including design and construction of direct fixation track and subballast, ballast, ties and rail installation, switches, and special trackwork
- Core systems, such as traction power, train controls, communications, the operations center, and the procurement of trainsets

The major track and alignment work in the San Francisco to San Jose Project Section is expected to take three years from mobilization to finishing major activities, and demobilization and restoration of affected areas are expected to take one additional year. Construction of the East Brisbane LMF is projected to occur over a two to three years period and will require substantial amounts of cut and fill to create a level surface. Station and maintenance facility modification and redesigns are expected to take less time and be finished before the track modifications are complete. Rail and safety construction and then testing will occur after these two phases and last approximately four years.

During final design, the Authority and its contractors would conduct several pre-construction activities to optimize construction staging and management. These activities include the following:

- Conducting geotechnical investigations to define precise geologic, groundwater, and seismic conditions along the alignment. The results of this work would guide final design and construction methods for foundations, stations, and aerial structures.
- Identifying construction laydown and staging areas used for mobilizing personnel, stockpiling materials, and storing equipment for building HSR or related improvements. In some cases, these areas would also be used to assemble or prefabricate components of guideway or wayside facilities before transport to installation locations. Field offices and temporary jobsite trailers would also be located at the staging areas. Construction laydown areas are part of the project footprint that is evaluated for potential environmental impacts; however, actual use of the area would be at the discretion of design-build contractor. After completing construction, the staging and laydown areas would be restored to pre-construction condition.

- Initiating site preparation and demolition, such as clearing, grubbing, and grading, followed by the mobilization of equipment and materials. Demolition would require strict controls so that adjacent buildings, infrastructure, and natural and community resources are not damaged or otherwise affected by the demolition efforts.
- Relocating utilities prior to construction. The contractor would work with the utility companies to relocate or protect in place high-risk utilities, such as overhead tension wires, pressurized transmission mains, oil lines, fiber optical conduits or cables, and communications lines or facilities prior to construction.
- Implementing temporary, long-term, and permanent road closures to reroute or detour traffic away from construction activities. Handrails, fences, and walkways would be provided for the safety of pedestrians and bicyclists.
- Conducting other studies and investigations, as needed, such as surveys of local business to identify usage, delivery, shipping patterns, and critical times of the day or year for business activities, as well as necessary cultural resource investigations, and historic property surveys. This information would help develop construction requirements and worksite traffic control plans and identify potential alternative routes and resource avoidance plans.

Temporary staging would occur primarily within the existing Caltrain ROW, except for temporary staging areas and TCEs for the construction of the East Brisbane LMF and Millbrae Station. Track modifications would mostly be performed by track-mounted equipment, and construction materials (e.g., rail, ties, ballast) would be delivered by rail. Modifications to existing Caltrain station platforms would be isolated to each Caltrain station and associated parking lots, which are within the existing Caltrain ROW. At-grade crossing improvements would not require separate construction staging areas.

There are two locations where construction staging areas greater than 5 acres outside the existing Caltrain ROW would be required:

- Brisbane LMF—Construction of the East Brisbane LMF would require TCEs (approximately 74 acres) to establish equipment and materials storage areas close to construction sites for the LMF and the realigned Tunnel Avenue overpass.
- Millbrae BART Station—Construction would require approximately 8 acres of TCE east and west of the Millbrae Station to establish equipment and materials storage areas close to construction sites, build a new HSR station concourse and platforms, build overhead circulation elements between the new station and platforms, and modify roadways.

Land needed for temporary construction activities would be leased from landowners, taken out of its current use, used temporarily for construction, and restored to its pre-construction state after construction is completed. Construction would require the temporary use of 90.7 acres of land outside the Caltrain ROW. TCEs would typically be on roadway rights-of-way, shoulders of the existing railroad tracks, backyards, or vacant areas adjacent to structures that are used for residential, commercial, mixed use, industrial, public facilities, and parks/open-space purposes.

These TCEs would be used for construction equipment and materials staging; no precasting yards or batch plants for concrete manufacturing would be required for project construction.

Major types of construction activities for the project include demolition, grubbing, and earthwork; trackwork; station modifications; construction of the Brisbane LMF; construction of aerial structures; and roadway modifications. The first stage of construction would involve the demolition of building and roadway structures directly affected by the HSR system. Several activities would need to be conducted before demolition work can commence, including:

- Relocation of building occupants and roadways
- Completion of a demolition survey and demolition plan
- Removal and disposal of hazardous materials in a safe and controlled manner, if any hazardous materials such as asbestos are identified
- Obtaining permits from the Bay Area Air Quality Management District

After mobilizing and setting up the construction staging areas, the contractor would commence with clearing and grubbing areas of new ROW in advance of the major structures, roadway and utility relocations. This activity (clearing and grubbing) consists of the removal of topsoil, trees, minor physical objects, and other vegetation from the construction site with use of specialized equipment for raking, cutting, and grubbing.

Construction would also involve earthwork, which includes both excavation and embankment. Excavation is the removal of soils by use of mechanical equipment and embankment is the placing and compacting of soils for the construction process with use of mechanical equipment. The HSR system seeks to balance the volume of soils needed for excavation and embankment and to minimize the input of materials from quarries and disposal of materials outside of the ROW.

Overall, earthwork activities for the Project Section would be minor because construction would occur mostly on the existing at grade Caltrain alignment. The exceptions are earthwork required for construction of the Brisbane LMF. Construction would require the disposal of excavated materials. Construction would reuse 22 percent of excavated materials suitable for embankment construction when permissible (Authority 2019c).

The primary track modifications in the Project Section would be for curve straightening to allow for increased operational speeds on the corridor. Track realignments of less than 1 foot would be performed by track-mounted equipment that would operate along the existing Caltrain tracks as it adjusts track alignment and ballast; these track realignments would not require relocation of overhead contact system (OCS) poles and would be completed within several days at any given location. Track realignments of less than 10 feet would be done at night or on weekends over several work windows to allow continued passenger service; relocation of OCS poles would be required, and speed restrictions would be imposed until the track realignment is completed. For realignments of more than 10 feet, a parallel track and new OCS poles would be built first and then connected to the existing track. The existing track profile would require modification to

allow for increased operational speeds on the corridor, including raising or lowering the profile up to and greater than 6 inches. There are several types of vertical adjustments that could occur:

- Raising or lowering the profile less than 6 inches requires changes to the ballast layer only. OCS poles can remain in place, and only the contact wire would be adjusted.
- Raising or lowering the profile more than 6 inches requires reconstruction of the railbed (ballast and subballast layers). Reconstruction of the railbed for conventional ballast track entails the installation of the roadbed, subballast, ballast, ties, and rail with rail fasteners. OCS poles would need to be reconstructed.
- Ballast will be composed of granite or similar rock. Subballast will be composed of rock similar to roadway construction.

New aerial structures needed for this section would be limited to: (1) the East Brisbane LMF lead-in tracks; (2) the realigned Tunnel Avenue overpass; (3) and either widening existing bridges or building parallel bridges through the four tracking areas of Millbrae Station. A typical aerial structure foundation pile cap is supported by an average of four large-diameter (5 to 9 feet) bored piles. Depth of piles depends on the geotechnical conditions at each pile site. Pile construction can be achieved by using rotary drilling rigs, and either bentonite slurry or temporary casings may be used to stabilize pile shaft excavation. The estimated pile production rate is 4 days per pile installation. Additional pile installation methods available to the contractor include bored piles, rotary drilling cast-in-place piles, driven piles, and a combination of pile jetting and driving.

Following completion of the piles, pile caps can be built using conventional methods supported by structural steel: either precast and pre-stressed piles or cast-in-drilled-hole piles. For pile caps built near existing structures such as railways, bridges, and underground drainage culverts, temporary sheet piling (i.e., temporary walls) can be used to minimize disturbances to adjacent structures. Sheet piling installation and extraction would likely be achieved using hydraulic sheet piling machines.

Typical aerial structures of up to 90 feet would be built using cast-in-place bent caps and columns supported by structural steel and installed upon pile caps. A self-climbing formwork system may be used to build piers and portal beams more than 90 feet high. The self-climbing formwork system is equipped with a winched lifting device, which is raised up along the column by hydraulic means with a structural frame mounted on top of the previous pour. In general, a 3-day cycle for each 12-foot pour height can be achieved. The final size and spacing of the piers depend on the type of superstructure and spans they are supporting.

The selection of superstructure type would consider the loadings, stresses, and deflections encountered during the various intermediate construction stages, including changes in static scheme, sequence of tendon installation, maturity of concrete at loading, and load effects from erection equipment. Accordingly, the final design would depend on the contractor's selected means and methods of construction, such as full-span precast, span-by-span, balanced cantilever segmental precast, and cast-in-place construction on falsework. These superstructure

construction methods are described in full detail in the San Francisco to San Jose Project Section Constructability Assessment Report (Authority 2021b) and are summarized as follows:

- Full-span precast construction—Box girders would be precast and pre-stressed in advance as a full span and stored in a precasting yard. The 110-foot precast segments, weighing around 900 tons, would be transported along the previously built aerial guideway using a special gantry system.
- Span-by-span precast segmental construction—Shorter box girder segments would be precast and pre-stressed and stored in a precasting yard. These segments, limited to 12-foot segments weighing less than 70 tons, would likely be individually transported to the construction site by ground transportation. Once the gantry system is in place, construction would involve hoisting the segments from the ground and installing and tensioning the pre-stressing tendons to create the box girder.
- Balanced cantilever segmental construction—In locations where construction would occur over existing facilities that prevent equipment and temporary supports on the ground, balanced cantilever segmental construction may be used. Under this construction method, box girder segments (12-foot segments weighing less than 70 tons) that are either precast or cast in place would be placed in a symmetrical fashion around a bent column. The segments would be anchored at the ends by cantilever tendons in the deck slab, with midspan tendons balancing the weight between two cantilevers. Precast segments would be precast off-site, transported to the construction site, and installed incrementally onto a portion of the existing cantilever using ground cranes, hoisting devices, or a self-launching gantry. Segments can also be cast in place and installed two at a time, one at each end of the balanced cantilever. Segments generated by casting in place are generally longer than those in precast construction because they do not need to be transported to the construction site.
- Cast in place construction on falsework—The method involves creating a suspended formwork with either a launching girder or gantry system. Once the formwork is in position and reinforcements and pre-stressing are placed, concrete is poured and the pre-stressing is stressed. The formwork is then removed and moved to the next segment.

Construction of road crossings and bridges would be similar to the approach for aerial structures. The superstructure would likely be built using precast, pre-stressed, concrete girders and cast-in-place deck. Approaches to bridges would be earthwork embankments, mechanically stabilized earth wall, or other retaining structures. Crossings of existing railroads, roads, and the HSR would be built on the line of the existing road or offline at some locations. When built online, the existing road would be closed or temporarily diverted. Where HSR would cross over existing railroads, the Authority would coordinate with the rail operators to avoid operational effects during construction. The most common type of roadway modification within the Project Section would be the installation of four-quadrant gates at at-grade crossings, required at 38 at-grade crossings. The installation of four quadrant gates at each at grade crossing would occur within roadway rights of way over a period of 4 to 6 months, with the greatest level of construction activity occurring over a period of 2 to 4 weeks.

Construction of the project would also involve roadway reconstructions at several locations. Portions of Tunnel Avenue and the existing Tunnel Avenue grade separation in Brisbane would require relocation. Construction of the new Tunnel Avenue overpass would occur prior to removing the existing Tunnel Avenue roadway and overpass from operation, which would maintain access to Tunnel Avenue from Bayshore Boulevard throughout the construction process. Roadway work associated with the project would be done using conventional methods in the following sequence as appropriate: demolition, utility relocation, excavation, grading, placing aggregate base, building concrete curb and gutter, and placing concrete or asphalt concrete top surface base and top surfaces. It is anticipated that full and partial street closures would be needed for the reconstruction of roadways. However, it is assumed that major diversions to the existing roadways to be grade separated would be avoided or minimized if they are necessary. Detours and temporary traffic control measures would be required so traffic circulation could be maintained during construction.

1.3.3. Operations

The construction plan is based on the phased implementation strategy for Phase 1 of the HSR system, which assumes that (Authority and FRA 2018, Authority 2019b, a):

- HSR Valley-to-Valley service would be operational in 2029
- Phase 1, which would connect San Francisco with Los Angeles via the Central Valley, would be operational by 2033
- The analysis in this document is based on impact assessment in 2029 (initial operation) and 2040 (operations after initial ridership build up)

Phase 2, which would subsequently extend service to Sacramento and San Diego for full system operation, would occur after the 2040 Phase 1 system operations envisioned in the Draft EIR/EIS.

Consistent with the California High-Speed Rail Authority Sustainability Policy (Authority 2020), the Authority proposes to continue to implement sustainability practices that inform and affect the planning, siting, designing, construction, mitigation, operation, and maintenance of the HSR system. In summary, the Authority's criteria for meeting its sustainability policy for its infrastructure and HSR service are:

- Net-zero greenhouse gas and criteria pollutant emissions in construction
- Operating the system entirely on renewable energy
- Net-zero energy, Leadership in Energy and Environmental Design platinum facilities
- Planning for climate change adaptation and resilience
- Prioritizing life-cycle considerations

- Applicable design standards, including compliance with laws, regulations, and industry standard practices

The following information includes proposed operations throughout the HSR system, which provides context to the proposed operations in the San Francisco to San Jose Project Section. The conceptual HSR service plan for Phase 1 describes service from Anaheim/Los Angeles through the Central Valley from Bakersfield to Merced and northwest into the Bay Area (Authority 2009, Authority 2019a, Authority and FRA 2018). Subsequent stages of the HSR system include a southern extension from Los Angeles to San Diego via the Inland Empire and an extension from Merced north to Sacramento.

Train service would operate in diverse patterns between various terminals. Three basic service types are envisioned:

- Express trains, which would serve major stations only, providing fast travel times between Los Angeles and San Francisco during the morning and afternoon peak
- Limited-stop trains, which would skip selected stops along a route to provide faster service between stations
- All-stop trains, which would focus on regional service

Most trains would provide limited-stop services and offer a relatively fast run time along with connectivity among various intermediate stations. Numerous limited-stop patterns would be provided to achieve a balanced level of service at the intermediate stations. The service plan envisions at least four limited-stop trains per hour in each direction, all day long, on the main route between San Francisco and Los Angeles. Each intermediate station in the Bay Area, Central Valley between Fresno and Bakersfield, Palmdale in the High Desert, and Sylmar and Burbank in the San Fernando Valley would be served by at least two limited-stop trains every hour—offering at least two reasonably fast trains an hour to San Francisco and Los Angeles. Selected limited-stop trains would be extended south of Los Angeles as appropriate to serve projected demand.

Including the limited-stop trains on the routes between Sacramento and Los Angeles, and Los Angeles and San Diego, and the frequent-stop local trains between San Francisco and Los Angeles/Anaheim, and Sacramento and San Diego, every station on the HSR network would be served by at least two trains per hour per direction throughout the day and at least three trains per hour during the morning and afternoon peak periods. Stations with higher ridership demand would generally be served by more trains than those with lower estimated ridership demand.

The service plan provides direct train service between most station pairs at least once per hour. Certain routes may not always be served directly, and some passengers would need to transfer from one train to another at an intermediate station, such as Los Angeles Union Station, to reach their destination. Generally, the Phase 1 conceptual operations and service plans offer a wide spectrum of direct service options and minimize the need for passengers to transfer.

In 2029, the assumed first year of Phase 1 HSR operation, two trains per hour would operate during peak and one train per hour off peak between San Francisco and Bakersfield. When Phase 1 operations occur, the following service is assumed:

- Two peak trains per hour from San Francisco and Los Angeles (one in off peak)
- Two peak trains per hour from San Francisco and Anaheim (one in off peak)
- Two peak trains per hour from San Jose and Los Angeles
- One peak train per hour from Merced and Los Angeles
- One train per hour (peak and off peak) from Merced and Anaheim

1.3.4. Maintenance

The Authority would be a tenant operating within the Caltrain ROW for the blended portions of the Project Section. The Peninsula Corridor Joint Powers Board would continue to perform regular maintenance along the track and railroad ROW as well as on the power systems, train control, signaling, communications, and other vital systems required for the safe operation of the blended system. Maintenance methods would be like those currently used for the existing Caltrain system and would involve:

- Inspection and routine maintenance of the track and ballast, including tamping; OCS; structures; and signaling, train control, and communications components
- Inspections and daily maintenance of the stations and the LMF
- Maintenance of the ROW including culvert and drain cleaning, vegetation control, litter removal, and other inspection that would typically occur monthly to several times a year

The Authority would regularly perform maintenance along the dedicated track and railroad ROW as well as on the power systems, train control, signaling, communications, and other vital systems required for the safe operation of the HSR system. Maintenance methods are expected to be similar to existing European and Asian HSR systems, adapted to the specifics of the California HSR. However, the FRA would specify standards of maintenance, inspection, and other items in a set of regulations (i.e., Rule of Particular Applicability) to be issued in the next several years, and the overseas practices may be amended in ways not currently foreseen. The brief descriptions of maintenance activities provided in the following subsections are thus based on best professional judgment about future practices in California.

The track at any point would be inspected several times each week using measurement and recording equipment aboard special measuring trains. These trains are of similar design to the regular trains but would operate at a lower speed. They would run between midnight and 5 a.m. and would usually pass over any given section of track once in the night.

Most adjustments to the track and routine maintenance would be accomplished in a single night at any specific location with crews and material brought by work trains along the line. When rail

resurfacing (i.e., rail grinding) is needed, several times a year, specialized equipment would pass over the track sections at 5 to 10 mph.

Approximately every 4 to 5 years, ballasted track would require tamping. This more intensive maintenance of the track uses a train with a succession of specialized cars to raise, straighten, and tamp the track, using vibrating “arms” to move and position the ballast under the ties. The train would typically cover a 1-mile-long section of track in the course of one night’s maintenance.

Slab track, the track support type anticipated at elevated sections, would not require this activity. No major track components are expected to require replacement through 2040.

Other maintenance of the ROW, aerial structures, culverts, drains, and bridge sections of the alignment would include culvert and drain cleaning, vegetation control, litter removal, and other inspection that would typically occur monthly to several times a year.

The OCS along the ROW would be inspected nightly, with repairs being made when needed; these would typically be accomplished during a single night maintenance period. Other inspections would be made monthly. Many of the functions and status of substations and smaller facilities outside the trackway would be remotely monitored. However, visits would be made to repair or replace minor items and would also be scheduled several times a month to check the general site. No major component replacement for the OCS or the substations is expected through 2040.

Visual inspections of the structures along the ROW and testing of fire/life safety systems and equipment in or on structures would occur monthly, while inspections of all structures for structural integrity would be conducted at least annually. Steel structures would require painting every several years. Repair and replacement of lighting and communication components of tunnels and buildings would be performed on a routine basis. No major component replacement or reconstruction of any structures is expected through 2040.

Inspection and maintenance of signaling and train control components would be guided by FRA regulations and standards to be adopted by the Authority. Typically, physical in field inspection and testing of the system would be conducted four times a year using hand-operated tools and equipment. Communication components would be routinely inspected and maintained, usually at night, although daytime work may be undertaken if the work area is clear of the trackway. No major component replacement of these systems is expected through 2040.

Fencing and intrusion protection systems would be remotely monitored, as well as periodically inspected. Maintenance would take place as needed; however, fencing and intrusion protection systems are not expected to require replacement before 2040.

1.3.5. Proposed Conservation Measures

The Authority proposes to employ a variety of best management practices (BMPs) and avoidance and mitigation measures (AMMs), also known as conservation measures (CMs), to reduce or avoid adverse impacts to a listed species and the habitats upon which they depend. The proposed CMs that are directly applicable to listed species and habitats under NMFS jurisdiction

(CCC steelhead, sDPS green sturgeon, critical habitat, and EFH) are reproduced below, though other proposed CMs will also be employed that are also expected to protect and conserve NMFS trust resources. A full description of all CMs proposed by the Authority is available in Appendix 2-B: Conservation Measures (Authority 2021c).

The Authority categorized conservation measures into either general minimization measures to be implemented for all activities (e.g., AMM-GEN-1) or resource-specific minimization measures for each affected species or species group (e.g., AMM-FISH-1 for steelhead and sturgeon). General avoidance and minimization measures will be implemented in all relevant aspects of construction and operation of the proposed action while species specific measures will only be implemented in areas supporting the listed or sensitive resource.

AMM-FISH-1: General Fish Protection Measures

The Authority will implement general protection measures to protect and minimize effects on listed fish and their habitat during construction.

- **General design:** The following measures will be implemented during the design phase:
 - Temporary night lighting of overwater structures (if needed) will be designed such that illumination of the surrounding water is avoided.
 - Temporary construction areas (e.g., staging, storage, parking, and stockpiling areas) will be located outside of channels and riparian areas wherever feasible.

The Authority will coordinate with NMFS and request review of design within 2 years of construction. NMFS may comment on and advise the Authority with respect to the impact of design on species listed under the ESA. The Authority has committed as part of the proposed action to using low-impact development methods for stormwater treatment, including locations that could otherwise contribute polluted stormwater to streams that provide habitat for fish listed under the ESA (see: AMM-GEN-18). Such measures may consist of pervious hardscapes (for pollutant-generating areas such as parking lots, maintenance yards, etc.), bioswales, infiltration basins, rain gardens, and any and all other design measures that will capture and treat polluted runoff before it reaches sensitive natural waterways.

- **Bank stabilization and erosion control:** The following measures will be implemented during design and construction phases to minimize habitat disturbance from bank stabilization activities:
 - Temporarily fence areas of natural riparian vegetation that can be avoided with high-visibility ESA fence to enforce avoidance.
 - Use “soft” approaches to bank erosion control to the extent possible (e.g., vegetative plantings, placement of large woody debris). Minimize hard bank protection methods (e.g., revetment/riprap) wherever feasible.

- Avoid the use of wood treated with creosote or copper-based chemicals, or use of materials incorporating “rubber” tire material, in bank stabilization efforts.
- Use quarry stone, cobblestone, or their equivalent for erosion control along rivers and streams, complemented with native riparian plantings or other natural stabilization alternatives that will maintain a natural riparian corridor, where feasible. Cobble size, types and spacing of riparian plantings, and other details on riparian restoration activities will be provided in the restoration and revegetation plan (RRP) described in AMM-GEN-28 (see below).
- Revegetate temporarily disturbed areas with native plants to resemble the existing vegetation.

AMM-FISH-2: Work Windows

Near-water and in-water work will be conducted within specified work windows based on date, channel inundation, and water temperature. Work windows will include the general periods when effects on migrating juvenile and adult CCC steelhead would be minimal. Additionally, in-water work will be allowed when salmonid use is temperature limited (defined as 1 week of average water temperature of 75 degrees Fahrenheit [°F] or more); and work would be allowed in the channel and on the floodplain when channels are dry or ponded. During work windows, work will only be allowed in the channel from 1 hour after sunrise until 1 hour before sunset.

- Near-water or over-water work is defined as construction activities other than impact pile driving occurring within the floodplain, but not in the wetted channel (e.g., located between the wetted channel and the landside toe of the bordering levees or over the wetted channel). In-water work is defined as work within the wetted channel.
- The near-water construction work window for nontidal channels is proposed to be April 30 through December 1. For in-water work in nontidal channels, the construction work window is proposed to be June 15 through October 15. These periods may be extended subject to concurrence from NMFS that reinitiation of consultation would not be required.
- If channels are dry or ponded (i.e., lack continuous flow), or water temperatures average 75°F or more for 7 consecutive days, in-water and near-water work is proposed to proceed outside the work windows stated above. NMFS would be notified if sites with these conditions are present during construction, so that fish presence could be ascertained, and a fish capture and relocation strategy (referred to as ‘fish rescue’ in Authority documents (Authority 2021i, c)) is performed if necessary.

AMM-FISH-3: Underwater Sound Control Plan

The Authority will develop and implement an underwater sound control plan outlining specific measures to avoid and minimize the effects of impact pile driving within 200 feet of habitat for ESA-listed fish. Effects will be minimized by limiting the period during which impact pile driving may occur and by limiting or abating underwater noise generated during impact pile driving.

The underwater sound control plan will be provided to NMFS for review and approval at least 1 month prior to in-water impact pile driving. The plan would evaluate the potential effects of impact pile driving on listed fish in the context of the following interim underwater noise thresholds established for disturbance and injury of fish (Caltrans 2015, 2019).

- Mortality threshold for fish of all sizes includes a peak sound pressure level of 206 decibels (dB) relative to 1 micropascal (μPa)
- Injury threshold for fish less than 2 grams is 183 dB (re: 1 μPa) cumulative sound exposure level, and 187 dB (re: 1 μPa) cumulative sound exposure level for fish greater than 2 grams
- Disturbance threshold for fish of all sizes is 150 dB root mean square (re: 1 μPa)

The underwater sound control plan will restrict in-water work to the in-water work window specified in permits issued by the fish and wildlife agencies, and to daylight hours between 1 hour after sunrise and 1 hour before sunset with a 12-hour break between pile driving sessions.

The underwater noise generated by impact pile driving will be abated using the best available and practicable technologies. Examples of such technologies include, but are not limited to, the use of cast-in-drilled-hole rather than driven piles; the use of vibratory rather than impact pile driving equipment; using an impact pile driver to proof piles initially placed with a vibratory pile driver; and noise attenuation using pile caps (e.g., wood or micarta). Specific techniques selected for employment onsite will be selected based on site-specific conditions.

In addition to primarily using vibratory pile driving methods and establishing protocols for attenuating underwater noise levels produced during in-water construction activities, the Authority will develop and implement operational protocols for when impact pile driving is necessary. These operational protocols will be used to minimize the effects of impact pile driving on listed fish. These protocols may include, but not be limited to, the following:

1. monitoring the in-water work area for fish that may be showing signs of distress or injury as a result of pile-driving activities and stopping work when distressed or injured fish are observed;
2. initiating impact pile driving with a “soft-start,” such that pile strikes are initiated at reduced impact and increase to full impact over several strikes to provide fish an opportunity to move out of the area;
3. restricting impact pile-driving activities to specific times of the day and for a specific duration to be determined through coordination with the fish and wildlife agencies (i.e., NMFS); and
4. if more than one pile-driving rig is employed, initiating pile-driving activities in a way that provides an escape route and avoids “trapping” fish between pile drivers in waters exposed to underwater noise levels that could potentially cause injury.

The Authority incorporated these protocols with the expectation that they will help to avoid and minimize the overall extent, intensity, and duration of potential underwater noise effects associated with impact pile-driving activities to fish.

AMM-FISH-4: 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 will prepare a dewatering plan, which would be subject to review and approval by the applicable regulatory agencies (such as NMFS). The plan will incorporate measures to minimize turbidity and siltation. The project biologist would monitor the dewatering 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 will conduct pre-activity surveys to determine the presence or absence of listed species within the affected waterbody. In the event that listed species are detected during pre-activity surveys, the project biologist will relocate the species, consistent with any regulatory authorizations applicable to the species.

Dewatering will be accomplished through flow diversion, which involves isolating the in-water work area through placement of sandbags or equivalent structures, channeling the stream through an alternate course that may be either a portion of the stream channel, or an artificial structure such as a pipe, or a constructed artificial channel; and then dewatering the work area. To minimize adverse impacts on fish habitat, the first preference is to limit dewatering to a portion of the stream channel (e.g., by first performing work in dewatered habitat on one side of the channel, then restoring flow, and then dewatering the other side of the channel). Any alternate course created in CCC steelhead designated critical habitat must meet NMFS (2011) and CDFG (2009) fish passage requirements. At all dewatering sites, at the conclusion of work for the season, water is allowed to reenter the work area, the isolating structures are removed, and the alternate flow path is dewatered and decommissioned; all alterations to the stream are removed prior to the beginning of the rainy season.

AMM-FISH-5: Fish Capture and Relocation (Rescue and Salvage) Plan

Construction within waterways may entail temporary dewatering to minimize potential impacts on fisheries and minimize potential erosion, sediment loss, scour, or increases in turbidity. Fish relocation operations may occur at any in-water construction site that occurs in modeled steelhead or green sturgeon habitat, or habitat identified by project biologists during pre-construction surveys where dewatering and resulting isolation of fish may occur. Fish capture and relocation plans will be developed by the Authority and would include detailed procedures for fish relocation to minimize the number of individuals of listed fish species subject to stranding during dewatering. The plans will identify the appropriate procedures for removing fish from construction zones and preventing fish from reentering construction zones prior to dewatering and other construction activities. A draft plan will be submitted to the fish and wildlife agencies for review and approval before dewatering begins. A written response from NMFS would be required before in-water construction activities with the potential for stranding fish can proceed.

All fish relocation activities will be conducted under the guidance of a qualified fish biologist and in accordance with required permits. At each crossing of modeled habitat, the fish relocation plan will identify the appropriate procedures for excluding fish from the construction zone and for removing fish from areas subject to dewatering. The primary procedure would be to block off the construction area and use seines (nets) or dip nets to collect and remove fish, although electrofishing techniques may also be authorized under certain conditions. It is critical that fish capture and relocation operations begin as soon as possible and be completed within 48 hours after isolation of a construction area to minimize potential predation and adverse water quality impacts (high water temperature, low dissolved oxygen) associated with confinement. Block nets, sandbags, or other temporary exclusion methods could be used to exclude fish or isolate the construction area prior to the fish removal process. Since work would be performed during the in-water work window (see: AMM-FISH-1) when fish use is expected to be minimal, exclusion barriers would not be expected to have additional adverse consequences to typical fish migration patterns. The exclusionary devices will be removed before the end of the work window. The appropriate fish exclusion or collection method will be determined by a qualified fish biologist, in consultation with a designated fish and wildlife agency biologist, based on site-specific conditions and construction methods. Capture, release, and relocation measures will be consistent with the general guidelines and procedures set forth in Part IX of the most recent edition of the California Salmonid Stream Habitat Restoration Manual (currently, CDFG (2010)) to minimize impacts on listed species of fish and their habitat.

All fish capture and relocation operations will be conducted under the guidance of a fish biologist meeting the qualification requirements (refer to the following subsection, Qualifications of Fish Relocation Personnel). The following discussion addresses proposed fish collection, holding, handling, and release procedures of the plan. Unless otherwise required by project permits, the Authority will provide the following:

- A minimum 48-hour notice to NMFS of dewatering activities that are expected to require fish relocation.
- Unrestricted access for NMFS agency personnel to the construction site for the duration of implementation of the fish relocation plan.
- Temporary cessation of dewatering if fish relocation workers determine that water levels may drop too quickly to allow successful relocation of fish.
- A work site that is accessible and safe for fish relocation workers.

Qualifications of Fish Relocation Personnel

Personnel active in fish relocation efforts would include at least one person with a 4-year college degree in fisheries or biology or a related degree. This person also must have at least 2 years of professional experience performing fisheries field surveys and fish capture and handling procedures affecting juvenile salmonids and sturgeons. The person would have completed an electrofishing training course such as Principles and Techniques of Electrofishing (USFWS, National Conservation Training Center) or similar course, if electrofishing is to be used. To

avoid and minimize the risk of injury to fish, attempts to seine or net fish would always precede the use of electrofishing equipment.

Seining and Dipnetting

Fish capture and relocation operations would begin immediately after isolating the work area. If the enclosed area is wadeable (less than 3 feet deep), fish can be herded out within the work area by dragging a seine (net) through the enclosure prior to final closure of the downstream end of the isolation area. Depending on conditions, this process may need to be conducted several times. The net or screen mesh would be no greater than 0.125 inch, with the bottom edge of the net (lead line) securely weighted down to prevent fish from entering the area by moving under the net.

After isolation of the work area is complete, remaining fish in the enclosed area would be removed using seines, dip nets, electrofishing techniques, or a combination of these depending on site conditions. Dewatering activities would also conform to the guidelines specified in the Dewatering subsection.

Following each sweep of a seine through the enclosure, the fish relocation team will do the following:

- Carefully bring the ends of the net together and pull in the wings, so that the lead line is kept as close to the substrate as possible.
- Slowly turn the seine bag inside out to reveal captured fish, so that fish remain in the water as long as possible before transfer to an aerated container.
- Follow the procedures outlined in Electrofishing and relocate fish to a predetermined release site.

Dipnetting is best suited for small, shallow pools in which fish are concentrated and easily collected. Dip nets will be made of soft (nonabrasive) nylon material and small mesh size (0.125 inch) to collect small fish.

At sites where fish exclusion barriers remain in place for longer than 1 week, the isolated area will be checked for fish presence at weekly intervals.

Electrofishing

After conducting the herding and netting operations, electrofishing may be necessary to remove as many fish as possible from the enclosure. Electrofishing will be conducted in accordance with NMFS electrofishing guidelines (NMFS 2000) and other appropriate fish and wildlife agency guidelines. Electrofishing would be conducted by one or two 3- to 4-person teams, with each team having an electrofishing unit operator and two or three netters. At least three passes would be made through the enclosed cofferdam areas to remove as many fish as possible. Fish initially will be placed in 5-gallon buckets filled with river water. Following completion of each pass, the electrofishing team will do the following:

- Transfer fish into 5-gallon buckets filled with clean river water at ambient temperature.
- Hold fish in 5-gallon buckets equipped with a lid and an aerator, and add fresh river water or small amounts of ice to the fish buckets if the water temperature in the buckets becomes more than 2°F warmer than ambient river waters.
- Maintain a healthy environment for captured fish, including low densities in holding containers to avoid effects of overcrowding.
- Use water-to-water transfers whenever possible.
- Release fish at predetermined locations.
- Segregate larger fish from smaller fish to minimize the risk of predation and physical damage to smaller fish from larger fish.
- Limit holding time to about 10 minutes, if possible.
- Avoid handling fish during processing unless absolutely necessary. Use wet hands or dip nets if handling is needed.
- Handle fish with hands that are free of potentially harmful products, including but not limited to sunscreen, lotion, and insect repellent.
- Avoid anesthetizing or measuring fish.
- Note the date, time, and location of collection; species; number of fish; approximate age (e.g., young-of-the-year, yearling, adult); fish condition (dead, visibly injured, healthy); and water temperature.
- If positive identification of fish cannot be made without handling the fish, note this and release fish without handling. If the fish is a salmonid or sturgeon, photograph it prior to release.
- In notes, indicate the level of accuracy of visual estimates to allow appropriate reporting to the appropriate fish and wildlife agencies (e.g., “Approx. 10–20 young-of-the-year steelhead”).
- Release fish in appropriate habitat either upstream or downstream of the enclosure, noting release date, time, and location.
- Stop efforts and immediately contact the appropriate fish and wildlife agencies if mortality during relocation or the limits on take (harm or harassment) of federally listed species exceeds the Authority’s authorized take limits.
- Place dead fish of listed species in sealed plastic bags with labels indicating species, location, date, and time of collection, and store them on ice.

- Freeze collected dead fish of listed species as soon as possible and provide the frozen specimens to the appropriate fish and wildlife agencies, as specified in the permits.
- Sites selected for release of relocated fish either upstream or downstream of the construction area would be similar in temperature to the area from which fish were relocated, contain ample habitat, and have a low likelihood of fish reentering the construction area or being impinged on exclusion nets/screens.

All equipment used in fish capture and relocation activities must be sterilized prior to use to avoid introductions of aquatic invasive species and limit the spread of disease and parasites. Disinfection protocols are described by California Department of Fish and Wildlife (CDFW; (2016)).

Dewatering

Dewatering will be performed as specified in AMM-FISH-4 in association with fish relocation operations. A dewatering plan will be submitted as part of the stormwater pollution prevention plan (SWPPP)/Water Pollution Control Program detailing the location of dewatering activities, equipment, and discharge point. Dewatering pump intakes will be screened to prevent entrainment of juvenile or parr-sized salmonids in accordance with NMFS screening criteria for salmonid fry (NMFS 1997), including the following:

- Perforated plate: screen openings would not exceed 3/32 inch (2.38 mm), measured in diameter.
- Profile bar: screen openings would not exceed 0.0689 inch (1.75 mm) in width.
- Woven wire: screen openings would not exceed 3/32 inch (2.38 mm), measured diagonally (e.g., 6–14 mesh).
- Screen material shall provide a minimum of 27 percent open area.

During the dewatering process, a qualified biologist or fish relocation team will remain on-site to observe the process and remove additional fish using the previously described relocation procedures.

Contingency Plans

If fish capture and relocation activities cannot be conducted effectively or safely by fish relocation workers and surveys observe five or more juvenile sturgeon or steelhead², dewatering must stop until the fish biologist can contact NMFS to discuss incidental take scenarios and surveys show that fish have left the area. It may be necessary to begin the dewatering process prior to fish relocation. During the dewatering process, a qualified biologist or fish relocation team would be on-site with the aim of minimizing the number of fish that become trapped in

² The presence of at least five steelhead would indicate that the area is exceptionally important to steelhead and that there is high potential for a larger number of fish in the area; thus, the threshold of five is a precautionary value.

isolated areas or impinged on pump screen(s) or isolation nets. In the event that the proposed methods are found to be insufficient to avoid undue losses of fish, the qualified biologist would modify these methods or implement alternative methods to minimize subsequent losses.

In the event that an adult sturgeon or steelhead is found in an area proposed for fish capture/relocation for dewatering, NMFS personnel would immediately be notified and work would stop until the fish biologist and NMFS agree upon a course of action.

Final Inspections and Reporting

Upon dewatering to water depths at which neither electrofishing nor seining can effectively occur (e.g., less than 3 inches/0.1 meter), the fish relocation team will inspect the dewatered areas to locate any remaining fish. Collection by dip net, data recording, and relocation would be performed as necessary according to the procedures outlined previously in Electrofishing. The fish relocation team would notify the Authority when the fish relocation has been completed and construction can recommence. The results of the fish capture and relocation operations (including date, time, location, comments, method of capture, fish species, number of fish, approximate age, condition, release location, and release time) will be reported to the appropriate fish and wildlife agencies as specified in the pertinent permits.

1.3.5.1 Pertinent General CMs

Proposed general CMs are derived largely from impact avoidance and minimization features (IAMFs) incorporated into project design as described in the EIR/EIS prepared for the San Francisco to San Jose Project Section (Authority 2019b, a). The Authority designed these general CMs/AMMs/IAMFs with the intent to benefit federally listed species as well as with the intent to minimize project impacts on other biological and aquatic resources. Again, pertinent general CMs are summarized below, for full details see BA Appendix 2-B (Authority 2021c).

AMM-GEN-1: Designate Project Biologist, Designated Biologists, Species-Specific Biological Monitors and General Biological Monitors

At least 15 days prior to the onset of activities, the Authority will seek the approval of relevant resource agencies to designate project biologists and biological monitors, based on their qualifications and experience. Project biologist(s) will be responsible for ensuring the timely implementation of the biological AMMs as outlined in the biological resources management plan (BRMP), and for guiding and directing the work of the designated biologists and biological monitors. Designated biologists will be responsible for directly overseeing and reporting the implementation of general and species-specific conservation measures. General biological monitors will be responsible for conducting worker environmental awareness program (WEAP) training, implementing general conservation measures, conducting compliance monitoring, and reporting their compliance monitoring activities. No ground-disturbing project activities (e.g., geotechnical investigations, utility realignments, creation of staging areas, initial clearing and grubbing) will begin until the Authority has received written approval from NMFS that the biologists and biological monitors relevant to the regulatory authority and action area of each stated agency are approved to conduct the work.

AMM-GEN-2: Prepare WEAP Training Materials and Conduct Construction Period WEAP Training

A WEAP will be developed and trainings and training updates conducted by designated biologists or general biological monitors. WEAP training materials will, at a minimum, include a discussion of:

- the Federal ESA the California Endangered Species Act, the Bald and Golden Eagle Protection Act, the Migratory Bird Treaty Act, California Fish and Game Code Section 1600, Porter-Cologne Water Quality Control Act (Porter-Cologne Act), and the Clean Water Act (CWA);
- the consequences and penalties for noncompliance with these laws and regulations and project permits; identification and value of special-status plants, special-status wildlife, jurisdictional waters, and special-status plant communities;
- the contact person in the event of the discovery of a dead or injured wildlife species;
- hazardous substance spill prevention and containment measures; and
- conservation measures including the location of planned AMMs.

The WEAP training materials will be created and then submitted to the Authority for review and approval. All construction staff will attend the WEAP training prior to beginning work on-site and would attend the WEAP training on an annual basis thereafter. Fact sheet information will be duplicated in a wallet-sized format and be provided in other languages as necessary to accommodate non-English-speaking workers. Updates and a synopsis of the training will be provided during the daily safety (“tailgate”) meeting. Maintenance crews will be required to attend a contractor education and environmental training class annually. On an annual basis, the Authority would certify that WEAP training had been provided to all construction personnel.

AMM-GEN-3: Prepare and Implement a Biological Resources Management Plan

Prior to construction activities, the designated biologist will prepare the BRMP, which would include a compilation of the biological resources CMs/AMMs applicable to the San Francisco to San Jose Project Section. All project environmental plans, such as the RRP and weed control plan, would be included as appendices to the BRMP. The implementation of these measures will be tracked through final design, construction, and operation phases. The BRMP will be created and submitted to the Authority for review and approval prior to any ground-disturbing activity.

AMM-GEN-4: Delineate Equipment Staging Areas and Traffic Routes

Prior to any ground-disturbing activity, the Authority will establish staging areas for construction equipment in areas that minimize effects on sensitive biological resources, including habitat for listed species, seasonal wetlands, and wildlife movement corridors. Staging areas (including any temporary material storage areas) will be located in areas that will be occupied by permanent facilities, where practicable.

AMM-GEN-5: Establish Environmentally Sensitive Areas and Nondisturbance Zones

Prior to any ground-disturbing activity in a work area, the project biologist will use flagging to mark environmentally sensitive areas that support listed species or aquatic resources and are subject to seasonal restrictions, or establish exclusionary fencing, as needed. The purpose of the flagging and fencing will be explained at WEAP training and during worker tailgate sessions.

AMM-GEN-6: Conduct Monitoring of Construction Activities

From on-site or remotely, a designated biologist will direct the work of general biological monitors who will be present on-site during initial ground-disturbing activities and for all construction activities conducted within or adjacent to identified environmentally sensitive areas and nondisturbance zones. General biological monitors will also conduct daily biological “sweeps” to verify that no listed species are located within the area to be disturbed during that day’s scheduled activities. The general biological monitor(s) will advise the contractor on methods that may minimize or avoid impacts on federally listed species, including all required species-specific measures.

AMM-GEN-7: Establish and Implement a Construction Compliance Reporting Program

The project biologist will prepare monthly and annual reports documenting compliance with all CMs/AMMs/IAMFs, mitigation measures, and requirements set forth in regulatory agency authorizations. The Authority will review and approve all compliance reports prior to submittal to the regulatory agencies. Daily compliance reports will be submitted to the Authority via the Environmental Mitigation Management and Assessment system (EMMA) within 24 hours of each monitoring day. Noncompliance events will be reported to the Authority the day of the occurrence. If agency personnel visit the construction footprint in accordance with AMM-GEN-32, the project biologist will prepare a memorandum within 1 day of the visit that memorializes the issues raised during the field meeting. This memorandum would be submitted to the Authority via EMMA and any issues regarding regulatory compliance raised by agency personnel would be reported to the Authority and the contractor.

AMM-GEN-9: Prepare a Compensatory Mitigation Plan for Species and Species Habitat

The Authority will prepare a compensatory mitigation plan (CMP) that sets out the compensatory mitigation that will be provided to offset permanent and temporary impacts on federal and state-listed species and their habitats from project impacts. The CMP will 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 permanent and temporary impacts on species and species habitat and description of the process that would be used to confirm impacts. Actual impacts on species and habitat could differ from estimates and, should this occur, adjustments would be made to the compensatory mitigation that would be provided.
 - An overview of the strategy for mitigating impacts on species. The overview will include the ratios to be applied to determine mitigation levels and the resulting mitigation totals.
 - A description of habitat restoration or enhancement projects, if any, that would contribute to compensatory mitigation commitments.
 - A description of the success criteria that will 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 will 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 will be used in the management of species habitat.
 - A description of financial assurances that will be provided to demonstrate that the funding to implement mitigation is assured.

AMM-GEN-10: Conduct Operations and Maintenance Period WEAP Training

Prior to initiating operations and maintenance activities, personnel will attend a compliance reporting training session arranged by the Authority. At a minimum, operations and maintenance WEAP training materials would include information similar to that provided during the construction WEAP.

AMM-GEN-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, or creation actions at a mitigation site, the Authority will 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 will obtain any necessary regulatory authorizations prior to conducting habitat restoration, enhancement, or creation activities, including authorization under the Federal ESA or California Endangered Species Act, Cal. Fish and Game Code Section 1600 et seq., the CWA, and the Porter-Cologne Act.

AMM-GEN-12: Undocumented Contamination Plan

Prior to construction, the Authority will prepare a CMP addressing provisions for the disturbance of undocumented contamination. Undocumented contamination could be encountered during construction activities, and the Authority would work closely with local agencies to resolve any such encounters and address necessary clean-up or disposal.

AMM-GEN-13: Dispose of Construction Spoils and Waste

During ground-disturbing activities, the Authority may temporarily store excavated materials produced by construction activities in areas at or near construction sites within the project footprint. Where practicable, the Authority will return excavated soil to its original location to be used as backfill. Any excavated waste materials unsuitable for treatment and reuse will be disposed at an off-site location, in conformance with applicable state and federal laws.

AMM-GEN-14: Restrict Stockpiling and Redistributing Excavated Soil

Excavated materials will be stockpiled and redistributed as follows:

- Contractors will temporarily store excavated materials produced by ground-disturbing activities in designated stockpile areas at or near the excavation site and within the project footprint or another authorized location, or
- The collection, stockpiling, and redistribution of topsoil will be conducted as described in the RRP.

AMM-GEN-15: Transport of Materials

During construction, the contractor will comply with applicable state and federal regulations, such as the Resource Conservation and Recovery Act, Comprehensive Environmental Response, Compensation, and Liability Act, the Hazardous Materials Release Response Plans and Inventory Law, and the Hazardous Waste Control Act. Prior to construction, the contractor will prepare a hazardous materials and waste plan describing responsible parties and procedures for hazardous waste and hazardous materials transport.

AMM-GEN-16: Permit Conditions

During construction, the contractor will comply with the State Water Resources Control Board (SWRCB) CWA Section 402 General Permit conditions and requirements for transport, labeling,

containment, cover, and other BMPs for storage of hazardous materials during construction. Prior to construction, the contractor will prepare a hazardous materials and waste plan describing responsible parties and procedures for hazardous waste and hazardous materials transport, containment, and storage BMPs that would be implemented during construction.

AMM-GEN-17: Maintain Construction Sites

Prior to any ground-disturbing activity, the Authority will prepare a construction site BMP field manual. The BMP field manual will contain standard construction site housekeeping practices required to be implemented by construction personnel for the following topics: temporary soil stabilization, temporary sediment control, wind erosion control, non-stormwater management, waste management and materials control, rodenticide use, and other general construction site cleanliness measures. All construction personnel will receive training on BMP field manual implementation prior to working within the project footprint.

AMM-GEN-18: Prepare and Implement an Operational Stormwater Management Plan

Prior to construction, the contractor will prepare an operational stormwater management and treatment plan. During the detailed design phase, each receiving stormwater system's capacity to accommodate project runoff will be evaluated. As necessary, on-site stormwater management measures, such as detention or selected upgrades to the receiving system, will be designed to provide adequate capacity and to comply with the design standards in the latest version of Authority Technical Memorandum (Authority 2012). To the extent feasible, stormwater treatment will employ bioretention/biofiltration with a sand/compost mix in filter columns as part of the treatment system for impervious surfaces designated for vehicle use, as described by McIntyre et al. (2015), McIntyre et al. (2016). If this method is not feasible, stormwater treatment will use another method or measure that would have equal or greater effectiveness in removing known toxins to aquatic species, including steelhead.

On-site stormwater management facilities will be designed and built to capture runoff and provide treatment prior to discharge of pollutant-generating surfaces, including station parking areas, access roads, new road over- and underpasses, reconstructed interchanges, and new or relocated roads and highways. Low-impact development techniques will be used to detain runoff on-site and to reduce off-site runoff such as constructed wetland systems, biofiltration and bioretention systems, wet ponds, organic mulch layers, and planting soil beds; vegetated systems (biofilters), such as vegetated swales and grass filter strips, will be used where appropriate.

AMM-GEN-19: Work Barriers

Prior to construction (any ground-disturbing activities), the contractor will verify to the Authority through preparation of a technical memorandum the use of work barriers. Nominal design variances, such as the addition of a plastic barrier beneath the ballast material to limit the potential release of volatile subsurface contaminants, may be implemented in conjunction with site investigation and remediation.

AMM-GEN-20: Spill Prevention Plan

Prior to construction (any ground-disturbing activities), the Authority will prepare a CMP addressing spill prevention. A spill prevention, control, and countermeasure plan (or spill prevention and response plan if the total aboveground oil storage capacity is less than 1,320 gallons in storage containers greater than or equal to 55 gallons) will prescribe BMPs to prevent hazardous material releases and clean-up of any hazardous material releases that may occur.

AMM-GEN-21: Prepare and Implement Hazardous Materials Plans

Prior to operations and maintenance activities, the Authority will prepare hazardous materials monitoring plans. These would use as a basis a source such as a hazardous materials business plan as defined in Title 19 California Code of Regulations and a spill prevention, control, and countermeasure plan.

AMM-GEN-22: Prepare and Implement a Construction Stormwater Pollution Prevention Plan

Prior to construction (any ground-disturbing activities), the contractor will comply with the SWRCB Construction General Permit requiring preparation and implementation of a SWPPP. The construction SWPPP will propose BMPs to minimize potential short-term increases in sediment transport caused by construction, including erosion control requirements, stormwater management, and channel dewatering for affected stream crossings. These BMPs will include measures to incorporate permeable surfaces into facility design plans where feasible and would address how treated stormwater will be retained or detained on-site. Other BMPs will include strategies to manage the amount and quality of overall stormwater runoff. The construction SWPPP will include measures to address, but are not limited to, the following:

- Hydromodification management to verify maintenance of pre-project hydrology by emphasizing on-site retention of stormwater runoff using measures such as flow dispersion, infiltration, and evaporation (supplemented by detention where required). Additional flow control measures will be implemented where local regulations or drainage requirements dictate.
- Implementing practices to minimize the contact of construction materials, equipment, and maintenance supplies with stormwater.
- Limiting fueling and other activities using hazardous materials to areas distant from surface water, providing drip pans under equipment, and daily checks for vehicle condition.
- Implementing practices to reduce erosion of exposed soil, including soil stabilization, regular watering for dust control, perimeter siltation fences, and sediment catchment basins.
- Implementing practices to maintain current water quality, including siltation fencing, wattle barriers, stabilized construction entrances, grass buffer strips, ponding areas, organic mulch layers, inlet protection, storage tanks, and sediment traps to arrest and settle sediment.

- Where feasible, avoiding areas that may have substantial erosion risk, including areas with erosive soils and steep slopes.
- Using diversion ditches to intercept surface runoff from off-site.
- Where feasible, limiting construction to dry periods when flows in waterbodies are low or absent.
- Implementing practices to capture and provide proper off-site disposal of concrete wash water, including isolation of runoff from fresh concrete during curing to prevent it from reaching the local drainage system, and possible treatments (e.g., dry ice).
- Developing and implementing a spill prevention and emergency response plan to handle potential fuel or hazardous material spills.

The SWPPP will be implemented by the construction contractor as directed by the qualified SWPPP practitioner or designee. As part of that responsibility, the effectiveness of construction BMPs would be monitored before, during, and after storm events. Records of these inspections and monitoring results will be submitted to the local regional water quality control board as part of the annual report required by the Statewide Construction General Permit.

AMM-GEN-23: Prepare and Implement an Industrial Stormwater Pollution Prevention Plan

Prior to construction of any facility classified as an industrial facility, the Authority will comply with existing water quality regulations. The stormwater general permit requires preparation of a SWPPP and a monitoring plan for industrial facilities that discharge stormwater from the site, including vehicle maintenance facilities associated with transportation operations. To the extent feasible, stormwater treatment will employ bioretention/biofiltration with a sand/compost mix in filter columns as part of the treatment system for impervious surfaces designated for vehicle use, as described by McIntyre et al. (2015), McIntyre et al. (2016). If this method is not feasible, stormwater treatment will use another method or measure that would have equal or greater effectiveness in removing known toxins to aquatic species, including steelhead. The permit includes performance standards for pollution control.

AMM-GEN-24: Seasonally Restrict Storage of Material and Equipment in Areas Subject to Flooding

Material and equipment storage on the active floodplain of a river will be limited to the restricted period from April 15 to October 31. From November 1 to April 14, equipment may enter into the restricted river channel areas but must be removed daily and stored outside the areas subject to flooding.

AMM-GEN-25: Clean Construction Equipment

Prior to any ground-disturbing activity, the Authority will ensure that all equipment entering the work area is free of mud and plant materials. The Authority will establish vehicle cleaning locations designed to isolate and contain organic materials and minimize opportunities for weeds and invasive species to move in and out of the project footprint. Cleaning may be done by

washing with water, blowing with compressed air, brushing, or other hand cleaning. The cleaning areas will be located to avoid impacts on surface waters, and appropriate SWPPP BMPs will be implemented to further control any potential for the spread of weeds or other invasive species.

AMM-GEN-26: Prepare and Implement a Weed Control Plan

Prior to any ground-disturbing activity during the construction phase, the project biologist will develop a weed control plan, subject to review and approval by the Authority, with the purpose of minimizing and avoiding the spread of invasive weeds during ground-disturbing activities during construction and operations and maintenance. Weed control treatments may include application of permitted herbicides and manual and mechanical removal methods. Use of hand removal or controlled burning will be preferred over mechanical removal; use of mechanical removal will be preferred over herbicide treatment.

AMM-GEN-27: Prepare and Implement an Annual Vegetation Control Plan

Prior to initiating operations and maintenance activities, the Authority will prepare an annual vegetation control plan 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 will 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 may be controlled by chemical, thermal, biological, cultural, mechanical, structural, and manual methods. Only Caltrans-approved herbicides may be used in the vegetation control plan. Pesticide application will 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 will be treated where requested by County Agricultural Commissioners. The vegetation control plan would be updated each winter and completed in time to be implemented no later than April 1 of each year.

AMM-GEN-28: Prepare and Implement a Restoration and Revegetation Plan

A RRP for upland vegetation will be prepared and implemented. The RRP would describe the restoration and revegetation of habitat for federally listed species where vegetation or soil has been temporarily disturbed. Restoration activities include, but are not limited, to grading landform contours to approximate pre-disturbance conditions, returning soil to its original location wherever possible, stockpiling and spreading of topsoil, removal of invasive plant species, stabilizing soil surfaces with mulch or straw certified as weed-free, and revegetating disturbed areas using native plant species to the extent practicable. During construction activities, the Authority will implement the RRP in temporarily disturbed areas. The RRP will be submitted to NMFS for review and approval of the portions relevant to the regulatory authority and action area of each stated agency prior to its implementation.

AMM-GEN-29: Establish Monofilament Restrictions

Prior to any ground-disturbing activity, the project biologist will verify that plastic monofilament netting (erosion control matting) or similar material is not being used as part of erosion control

activities. The project biologist will identify acceptable material for such use, including: geomembranes, coconut coir matting, tackified hydroseeding compounds, and rice straw wattles (e.g., Earthsaver wattles: biodegradable, photodegradable, burlap). Within developed or urban areas, the project biologist may allow exceptions to the restrictions on the type of erosion control material if the project biologist determines that the construction area is of sufficient distance from natural areas to ensure the avoidance of potential impacts on wildlife.

AMM-GEN-31: Work Stoppage

During construction activities, the project biologist will have stop work authority to protect any federally listed wildlife species within the project footprint. This work stoppage will be coordinated with the Authority or its designee, and ground-disturbing activities in the construction area(s) where the potential construction activity could result in take of listed species will be suspended (but work may continue in other areas). The suspension will continue until the individual leaves voluntarily, is relocated to an approved release area using NMFS-approved handling techniques and relocation methods, or as required by NMFS for those resources under each agency's regulatory authority. Any such work stoppages and the measures taken to facilitate the removal of the species, if any, will be documented in a memorandum prepared by the project biologist and submitted to the Authority within 2 business days of the work stoppage.

AMM-GEN-32: Facilitate Agency Access

If requested before, during, or upon completion of construction activities, the Authority or its designee will allow access by the USFWS, NMFS, United States Army Corps of Engineers (USACE), CDFW, and SWRCB or other resource agency staff to project lands (including mitigation lands) where these lands are under permittee control with 24-hour notice. To address any safety issues, all visitors need to check in with the resident engineer prior to accessing the construction site.

AMM-GEN-33: Flood Protection Plan

Prior to construction, the contractor will prepare a flood protection plan. The project section will be designed both to remain operational during flood events and to minimize increases in 100- or 200-year flood elevations, as applicable to locale. Design standards will:

- establish track elevation to prevent saturation and infiltration of stormwater into the subballast, minimize development within the floodplain to such an extent that water surface elevation in the floodplain will not increase by more than 1 foot, or as required by state or local agencies, during the 100- or 200-year flood flow (as applicable to locale),
- avoid placement of facilities in the floodplain or those that raise the ground with fill above the base flood elevation, and
- design floodplain crossings to maintain a 100-year floodwater surface elevation of no greater than 1 foot above current levels, or as required by state or local agencies, and so that project features within the floodway itself would not increase existing 100-year

floodwater surface elevations in Federal Emergency Management Agency–designated floodways (or as otherwise agreed upon with the county floodplains manager).

The impacts of pier placement on floodplains and floodways will be further minimized by:

- Designing site crossings to be as nearly perpendicular to the channel as feasible to minimize bridge length.
- Orienting piers to be parallel to the expected high-water flow direction to minimize flow disturbance.
- Elevating bridge crossings at least 3 feet above the high-water surface elevation to provide adequate clearance for floating debris, or as required by local agencies.
- Conducting engineering analyses of channel scour depths at each crossing to evaluate the depth for burying the bridge piers and abutments. Implement scour-control measures to reduce erosion potential.
- Using quarry stone, cobblestone, or their equivalent for erosion control along rivers and streams, complemented with native riparian plantings or other natural stabilization alternatives to restore and maintain a natural riparian corridor.
- Placing bedding materials under the stone protection at locations where the underlying soils require stabilization as a result of stream-flow velocity.
- Reviewing and coordinating with NMFS where bank stabilization practices will occur in suitable habitat for threatened or endangered species under NMFS jurisdiction.

AMM-GEN-34: Conduct Land Cover and Habitat Verification

Under supervision of the project biologist, designated biologists or general biological monitors will verify the mapped land cover and habitats for federally listed species. Throughout the project footprint, this verification will be conducted prior to ground-disturbing activities.

AMM-GEN-35: Conduct “Take” Notification and Reporting

The USFWS, NMFS, or both will be notified as soon as practicable, but no later than within 24 hours, by telephone and email, after discovery of a project-related accidental death or injury of a federally or state-listed species during project-related activities.

AMM-GEN-36: Restore Temporary Riparian Impacts

Within 90 days of completing construction in a work area, the project biologist will 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 will be obtained from stock originating from local sources to the extent feasible. The project biologist will monitor restoration activities consistent with provisions in the RRP.

AMM-GEN-37: Restore Aquatic Resources Subject to Temporary Impacts

Within 90 days of the completion of construction activities in a work area, the Authority will begin to restore aquatic resources that were temporarily affected by the construction. Aquatic resources are those resources considered waters of the U.S. under the federal CWA or waters of the state under the Porter-Cologne Act. As set out in the RRP (AMM-GEN-28), such areas will 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 will be removed, and the affected features would be restored. The Authority will revegetate affected aquatic resources using appropriate native plants and seed mixes (from local vendors where available) and conduct maintenance monitoring consistent with the provisions of the RRP.

AMM-GEN-40: Develop and Implement an Environmental Management System

To the extent feasible, the Authority is committed as part of the proposed action to identifying, avoiding, and minimizing hazardous substances in the material selection process for construction, operation, and maintenance of the HSR system. The Authority will use an environmental management system to describe the process that would be used to evaluate on an annual basis the full inventory of hazardous materials as defined by federal and state law and would replace hazardous substances with nonhazardous materials.

AMM-GEN-41: Minimize the Impacts of Operational Lighting on Wildlife Species

To address the permanent and intermittent impacts from artificial light at night, the Authority will implement measures to minimize the intensity and duration of operational lighting of permanent facilities (e.g., radio sites, maintenance facilities). Outdoor lighting at the LMF will be consistent with minimum Occupational Safety and Health Administration requirements established by 29 Code of Federal Regulations Section 1926.56 when the LMF is in use and would be limited to within 100 feet of the permanent facility. The Authority will minimize the duration of lighting at other operational facilities such as radio communications towers and traction control structures by using methods other than lighting (e.g., remote monitoring systems) to ensure security of facilities when they are not in use and by using shielding and downward direction.

As determined by the Authority, operational facilities, including trains, will use lighting that avoids shorter wavelengths of light (i.e., blue wavelengths). Lamps will have the lowest color temperature feasible for the desired application; green and red lighting appears to have the least wildlife impact and will be appropriate for some applications, such as security lighting (Kayumov et al. 2005, Longcore and Rich 2016).

1.3.6. Proposed Compensatory Mitigation

The Authority proposes to provide compensation and long-term habitat conservation for the permanent loss of various types of aquatic habitats that support sensitive and listed species from the project as proposed. Suitable habitat expected to be lost would be confirmed during pre-construction field surveys. An explicit goal is that compensatory mitigation ultimately provided will be commensurate with the type (freshwater/estuarine, rearing, migratory, or critical habitat) and amount of habitat lost.

CM-FISH-1: Provide Compensatory Mitigation for Permanent Impacts on CCC Steelhead Habitat, sDPS Green Sturgeon Habitat, and Essential Fish Habitat

The Authority would provide compensatory mitigation for permanent impacts on habitat for CCC steelhead, sDPS green sturgeon and EFH that is commensurate with the type (rearing, migratory, or critical habitat) and amount of habitat lost as follows:

- All rearing and migratory aquatic and riparian habitat within designated critical habitat would be protected and restored or protected and enhanced at a minimum of 2:1 (protected:affected).
- All other rearing and migratory aquatic and riparian habitat would be protected and restored or protected and enhanced at a minimum of 1:1 (protected:affected).

Unless agreed upon in coordination with NMFS, compensation would occur within the same DPS domain as the impact was incurred. Where feasible, on-site, in-kind mitigation would be prioritized, if possible. Off-site mitigation will prioritize actions recommended in local or regional conservation plans where there is coordination and approval by NMFS. Other options include the purchase of riparian and aquatic habitat credits at an NMFS-approved anadromous fish conservation bank, or another NMFS-approved conservation option, for the areal extent of riparian and suitable aquatic habitat affected by the project. 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:

- 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 suitable to offset impacts on CCC steelhead and sDPS green sturgeon habitat and EFH would be considered in the development of the CMP (AMM-GEN-9), RRP (AMM-GEN-28) and flood protection plan (AMM-GEN-33).

In addition, the Authority proposes to provide compensatory mitigation for other wetland and aquatic habitat types negatively affected by the proposed action that are otherwise not accounted for in CM-FISH-1 (habitats within direct NMFS jurisdiction), but that may also provide additional benefit to anadromous fishes through improved conditions in upstream or adjacent aquatic habitats under other agencies' jurisdictions.

CM-RIPN-1: Provide Compensatory Mitigation for Permanent Impacts on Riparian Habitat

The Authority proposes to compensate for permanent impacts on riparian habitats at a ratio of 2:1, 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, or participation in an in-lieu fee program.

CM-AQUA-1: Prepare and Implement a CMP 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. (WOTUS) under the federal CWA and waters of the state under the Porter-Cologne Act. Compensatory mitigation would prevent net loss of functions and values and 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 aquatic resources unless a higher ratio is required pursuant to regulatory authorizations issued under Sections 404/10 of the CWA/Rivers and Harbors Act or the Porter-Cologne Act:

- 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 on-site at 1:1 or off-site 1:1 if on-site mitigation is not practicable.

For 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 proposed compensatory mitigation would address the needs of the watershed or ecoregion.
- Site selection: A description of the factors considered in selecting the location and spatial extent of the mitigation site(s).

- Adaptive management plan: A management strategy to address changes in site conditions or other components of the proposed compensatory mitigation.
- Financial assurances: A description of financial assurances that would be provided for the success of compensatory mitigation.

Additional information required in a CMP as outlined in 33 Code of Federal Regulations Section 332.4(c), as deemed appropriate and necessary by 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.

2. ENDANGERED SPECIES ACT: BIOLOGICAL OPINION AND INCIDENTAL TAKE STATEMENT

The ESA establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat upon which they depend. As required by section 7(a)(2) of the ESA, each Federal agency must ensure that its actions are not likely to jeopardize the continued existence of endangered or threatened species or to adversely modify or destroy their designated critical habitat. Per the requirements of the ESA, Federal action agencies consult with NMFS, and section 7(b)(3) requires that, at the conclusion of consultation, NMFS provide an opinion stating how the agency's actions would affect listed species and their critical habitats. If incidental take is reasonably certain to occur, section 7(b)(4) requires NMFS to provide an ITS that specifies the impact of any incidental taking and includes reasonable and prudent measures (RPMs) and terms and conditions to minimize such impacts.

2.1. Analytical Approach

This biological opinion includes both a jeopardy analysis and an adverse modification analysis. The jeopardy analysis relies upon the regulatory definition of “jeopardize the continued existence of” a listed species, which is “to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species” (50 CFR 402.02). Therefore, the jeopardy analysis considers both survival and recovery of the species.

This biological opinion also relies on the regulatory definition of “destruction or adverse modification,” which “means a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species” (50 CFR 402.02).

The designations of critical habitat for CCC steelhead and sDPS green sturgeon use the terms primary constituent element (PCE) or essential features. The 2016 final rule (81 FR 7414; February 11, 2016) that revised the critical habitat regulations (50 CFR Part 424) replaced these terms with physical or biological features (which is now physical or biological features essential to the conservation of the species (PBFs); 50 CFR 424.02). The shift in terminology does not change the approach used in conducting a “destruction or adverse modification” analysis, which is the same regardless of whether the original designation identified PCEs, PBFs, or essential features. In this biological opinion, we use the term PBF to mean PCE or essential feature, as appropriate for the specific critical habitat.

The ESA section 7 implementing regulations define effects of the action using the term “consequences” (50 CFR 402.02). As explained in the preamble to the final rule revising the definition and adding this term (84 FR 44976, 44977; August 27, 2019), that revision does not change the scope of our analysis, and in this opinion we use the terms “effects” and “consequences” interchangeably.

We use the following approach to determine whether a proposed action is likely to jeopardize listed species or destroy or adversely modify critical habitat:

- Evaluate the rangewide status of the species and critical habitat expected to be adversely affected by the proposed action.
- Evaluate the environmental baseline of the species and critical habitat.
- Evaluate the effects of the proposed action on species and their habitat using an exposure-response approach.
- Evaluate cumulative effects.
- In the integration and synthesis, add the effects of the action and cumulative effects to the environmental baseline, and, in light of the status of the species and critical habitat, analyze whether the proposed action is likely to: (1) directly or indirectly reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species, or (2) directly or indirectly result in an alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species.
- If necessary, suggest a reasonable and prudent alternative to the proposed action.

2.2. Rangewide Status of the Species and Critical Habitat

This opinion examines the status of each species that would be adversely affected by the proposed action. The status is determined by the level of extinction risk that the listed species face, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. This informs the description of the species' likelihood of both survival and recovery. The species status section also helps to inform the description of the species' "reproduction, numbers, or distribution" as described in 50 CFR 402.02. The opinion also examines the condition of critical habitat throughout the designated area, evaluates the conservation value of the various watersheds and coastal and marine environments that make up the designated area, and discusses the function of the PBFs that are essential for the conservation of the species.

More detailed CCC steelhead DPS and critical habitat listing information can be found at [NOAA Fisheries West Coast Region's protected species CCC steelhead page](#), and more detailed information concerning sDPS green sturgeon and their critical habitat listing information can be found at [NOAA Fisheries West Coast Region's protected species sDPS green sturgeon page](#).

Table 1. Description of species, ESA listing classifications, and summary of species status.

Species and Recovery Plan	Listing Classification and Code of Federal Regulations Citation	Status Summary
<p>Central California Coast steelhead (anadromous <i>Oncorhynchus mykiss</i>) DPS</p> <p>Final Coastal Multispecies Recovery Plan (NMFS 2016c); Volume IV: Central California Coast Steelhead (NMFS 2016d)</p>	<p>Threatened, 50 CFR 223.102</p>	<p>The CCC steelhead DPS description includes all naturally spawned anadromous <i>O. mykiss</i> (steelhead) originating below natural and man-made impassable barriers from the Russian River to and including Aptos Creek, and all drainages of San Francisco and San Pablo Bays eastward to Chippis Island at the confluence of the Sacramento and San Joaquin Rivers. Also, steelhead from two artificial propagation programs: The Don Clausen Fish Hatchery Program, and the Kingfisher Flat Hatchery Program (Monterey Bay Salmon and Trout Project) (50 CFR 223.102). As of 2016, the Don Clausen Hatchery was still in operations producing steelhead juveniles while Kingfisher Flat Hatchery operations had not occurred since 2014.</p> <p>Historically, approximately 70 populations supported the CCC steelhead DPS, with a possible abundance of nearly 100,000 spawning adults throughout its range, but since near the end of the 20th century substantial ubiquitous declines have been observed. Currently, the largest population (Russian River) may only see up to 7,000 adult returns while it is more common for most streams to host only 500 fish or less (NMFS 2016d). Their largescale decline has been attributed to a variety of factors but was primarily due to large-scale habitat degradation, historical overfishing, artificial propagation, and periodic climatic events like extended drought and poor ocean conditions. In 2016, a final recovery plan was completed for multiple coastal salmonid species, including CCC steelhead, and a recovery priority number of ‘5’ was assigned to this DPS and indicates a moderate risk of extinction (NMFS 2016d, c, 2017b). Recovery numbers are assigned based on a combination of the species’ demographic risk and their recovery potential, and lower recovery priority numbers indicate higher priority in recovery plan development and implementation.</p> <p>According to the most recent NMFS 5-year species status review (NMFS 2016a), the status of the CCC steelhead DPS has not changed since 2011, as updated information did not indicate a change in the biological risk category in either direction. The scarcity of CCC steelhead population abundance time-series data continues to hinder trend detection attempts. Steelhead still occur in the North Coastal and Interior strata and, based on more recent information, perhaps the population of the Santa Cruz Mountain stratum is larger than previously thought. However, hatchery-origin fish remain more prevalent than natural-origin fish in the Russian River, and an overall downward abundance trend was observed in one of the more robust populations, Scott Creek. Small-scale fish passage improvement and habitat restoration projects have improved habitat conditions locally; however, the DPS still faces threats throughout the region from both legacy habitat degradation and modification, as well as new urban growth, continued water diversions, and dams (NMFS 2016d).</p>
<p>North American green sturgeon</p>	<p>Threatened, 50 CFR 223.102</p>	<p>The sDPS of North American green sturgeon consists of green sturgeon originating from the Sacramento River basin and from coastal watersheds south of the Eel River (exclusive) (50 CFR 223.102), with the</p>

Species and Recovery Plan	Listing Classification and Code of Federal Regulations Citation	Status Summary
<p><i>(Acipenser medirostris)</i> sDPS</p> <p>Recovery Plan for the Southern Distinct Population Segment of North American Green Sturgeon <i>(Acipenser medirostris)</i> (NMFS 2018)</p>		<p>only known spawning population in the Sacramento River watershed (spawning observed in the mainstem of the Sacramento River and also in its tributaries the Feather River and Yuba River) (NMFS 2015, 2021). After initial ocean entry, subadult and adult green sturgeon spend most of their lives in oceanic environments where they occupy nearshore coastal waters along the entire US West Coast (Colway and Stevenson 2007, Rosales-Casian and Almeda-Jauregui 2009). Within the nearshore marine environment, sDPS green sturgeon prefer marine waters of less than 100 meters depth (Erickson and Hightower 2007), especially coastal bays and estuaries for feeding and thermal refugia (Kelly et al. 2006, Moser and Lindley 2006, Lindley et al. 2008, Kelly and Klimley 2011, Lindley et al. 2011, Schreier et al. 2016). There are no hatchery populations that augment sDPS abundance.</p> <p>A recovery priority number of a ‘5’ was assigned to the sDPS and its population trend was noted as ‘stable’ in the latest NMFS Biennial Report to Congress on the Recovery of Threatened and Endangered Species 2015-2016 (NMFS 2017b). However, this report to Congress also included a proposal to change its recovery priority number to ‘7’. There is not a reliable estimate of the historical population abundance of sDPS green sturgeon (NMFS 2018), but a recent method has been developed to estimate the annual spawning run and population size in the upper Sacramento River so the species can be evaluated relative to recovery criteria (Mora et al. 2015, Mora et al. 2018). The recovery criteria set for the sDPS is for a minimum adult population census of 3,000 or more individuals for three generations (or at least 500 individuals spawning in any given year), and to have consistent spawning occur in at least one additional location outside of the mainstem of the Sacramento River (NMFS 2018). In 2018, a total of 2,106 adults were estimated for the sDPS (NMFS 2021). Presumed sDPS green sturgeon have been documented in other river systems within the sDPS’s range from self-reported recreational catches in the San Joaquin River and Napa River. It is possible the San Joaquin River also supported spawning historically but no documentation exists to date. San Joaquin River tributaries contain habitat attributes that could also support green sturgeon; in 2017 a single adult individual was recorded in the Stanislaus River (Anderson et al. 2018) and in 2020 an adult green sturgeon was captured in a fyke trap in the San Joaquin River near the Merced River confluence (personal communication, received via email April 11, 2020 (Stuphin 2020)).</p>

Species and Recovery Plan	Listing Classification and Code of Federal Regulations Citation	Status Summary
		<p>According to the most recent NMFS 5-year species status review and the final recovery plan (NMFS 2018, 2021), some threats to the species have been reduced, such as take from commercial fisheries and removal of some passage barriers. Also, several habitat restoration actions have occurred in the Sacramento River Basin, and spawning was documented on the Feather River for the first time in 2011. However, the species viability continues to face a moderate risk of extinction because many threats have not been addressed, and the majority of spawning continues to occur in the Sacramento River mainstem. Current threats include poaching, continued habitat truncation from persisting passage impediments or dams, poor water quality and prey contamination, habitat degradation, and climate change. Therefore, no change to the status of the sDPS green sturgeon was proposed in the most recent status review; its status as ‘threatened’ remains applicable (NMFS 2021).</p>

Table 2. Description of designated critical habitat, designation date and notice, and status summary.

Critical Habitat	Code of Federal Regulations Citation	Description
CCC steelhead critical habitat	50 CFR 226.211	<p>Designated critical habitat for CCC steelhead includes a total of 1,465 miles of stream habitat and 386 square miles of estuarine habitat in 46 watersheds (70 FR 52488, September 2, 2005). This encompasses most, but not all, occupied habitat but excludes some occupied habitat based on economic considerations within its range: Russian River 5th Field HUC 1114, Bodega 5th Field HUC 1115, Marin Coastal 5th Field HUC 2201, San Mateo 5th Field HUC 2202, Bay Bridges 5th Field HUC 2203, Santa Clara 5th Field HUC 2205, San Pablo 5th Field HUC 2206, and Big Basin 5th Field HUC 3304. Critical habitat includes the stream channels in the designated stream reaches and the lateral extent as defined by the ordinary high-water line. In areas where the ordinary high-water line has not been defined, the lateral extent will be defined by the bankfull elevation (50 CFR 226.211).</p> <p>PBFs considered essential to the conservation of the species include: freshwater spawning habitat, freshwater rearing habitat, freshwater migration corridors, and estuarine areas.</p> <p>Degraded habitat conditions were one of the primary factors for listing the DPS and all life stages of CCC steelhead are still currently impaired by lack of complexity/shelter (in-stream large woody material (LWM)), high sediment loads, degraded water quality, lack of winter refugia, and reduced access to historic spawning and rearing habitats (NMFS 2016d, b, c). Habitat conditions are the most degraded in the Santa Cruz Mountains and San Francisco Bay strata. Restoration of steelhead habitat, including fish passage improvements, water conservation, and improvement of instream features has occurred periodically and improved critical habitat functionality, but only in those limited areas (NMFS 2016d). Notably, the development of the 2014 Groundwater Sustainability Management Act is expected to help alleviate the over extraction of aquifers upon which cold water fisheries such as CCC steelhead depend, though it may be some time before beneficial effects are seen.</p>

Critical Habitat	Code of Federal Regulations Citation	Description
sDPS green sturgeon critical habitat	50 CFR 226.219	<p>Critical habitat in freshwater riverine areas includes the stream channels and a lateral extent as defined by the ordinary high water line. Critical habitat includes the Sacramento-San Joaquin Delta. Critical habitat also includes the mainstem Sacramento River upstream from the I Street Bridge to Keswick Dam, the Lower Feather River from the confluence with the mainstem Sacramento River upstream to the fish barrier dam adjacent to the Feather River Fish Hatchery, and the Lower Yuba River from the confluence with the mainstem Feather River upstream to Daguerre Dam. Critical habitat in coastal marine areas includes waters out to a depth of 60 fathoms, from Monterey Bay in California, north and east to include waters in the Strait of Juan de Fuca in Washington. Coastal estuaries designated as critical habitat include San Francisco Bay, Suisun Bay, San Pablo Bay, and the lower Columbia River estuary. Certain coastal bays and estuaries in California (Humboldt Bay), Oregon (Coos Bay, Winchester Bay, Yaquina Bay, and Nehalem Bay), and Washington (Willapa Bay and Grays Harbor) are included as critical habitat for sDPS green sturgeon.</p> <p>PBFs in freshwater areas include: food resources, substrate type or size, water flow, water quality, migration corridor; water depth, and sediment quality. PBFs in estuarine habitats include: food resources, water flow, water quality, migratory corridor, water depth, and sediment quality. PBFs in nearshore coastal marine areas include: migratory corridor, water quality, and food resources.</p> <p>Widespread habitat modifications, altered river hydrographs, and loss of spawning habitat in the Sacramento and Feather Rivers were some of the reasons sDPS green sturgeon were listed as threatened (NMFS 2015, 2018, 2021). Habitat quality and accessibility factors in their freshwater range are ranked by the Recovery Team as very high threats currently impeding the recovery of the population. Large dams and flow dependent barriers in the Sacramento, Feather, and Yuba rivers have been identified as limiting the population’s access to spawning and rearing habitat, and therefore limiting reproductive potential. Water flow amount and temperature management in the Sacramento River directly relates to successful egg development and hatching; however, uncertainty and multiple species needs on this system have prevented a flow prescription for sDPS green sturgeon needs. Repeated stranding of adults, requiring their capture and relocation, after high flow events regularly occur in the Yolo and Sutter bypasses due to inadequate passage structures/modifications. In estuarine and nearshore marine environments, alteration of the prey base through the introduction of non-native species, poor water quality and sediment contamination, and shoreline development continue to degrade the habitat available to the DPS. Although the current conditions of PBFs for sDPS green sturgeon critical habitat in the Central Valley are significantly limited and degraded, the habitat remaining is considered highly valuable.</p>

2.2.1. Global Climate Change

Another factor affecting the rangewide status of CCC steelhead and sDPS green sturgeon, and the aquatic habitats upon which they depend, is climate change. Impacts from global climate change are already occurring in California. For example, average annual air temperatures, heat extremes, and sea level have all increased in California over the last century (Hayhoe et al. 2004, Moser et al. 2012, Bedsworth et al. 2018). While snowmelt from the Sierra Nevada has declined, total annual precipitation amounts have shown no discernable change (Kadir et al. 2013). Warmer temperatures associated with climate change reduce snowpack and alter the seasonality and volume of seasonal hydrograph patterns (Cohen et al. 2000). Central California has shown trends toward warmer winters since the 1940s (Dettinger and Cayan 1995), and modeling of climate change in California suggests that average summer air temperatures are expected to continue to increase (Lindley et al. 2007, Moser et al. 2012). Heat waves are expected to occur more often, and heat wave temperatures are likely to be higher (Hayhoe et al. 2004, Moser et al. 2012, Kadir et al. 2013, Bedsworth et al. 2018). Total precipitation in California may decline while critically dry years may increase (Lindley et al. 2007, Moser et al. 2012, McClure et al. 2013, Bedsworth et al. 2018). Wildfires are also expected to increase in frequency and magnitude (Westerling et al. 2006, Westerling and Bryant 2007, Allen et al. 2010, Westerling et al. 2011, Moser et al. 2012, Bedsworth et al. 2018), and are expected to negatively impact forested watersheds that remain mostly undeveloped.

In the San Francisco Bay region³, warm temperatures generally occur in July and August, but as climate change takes hold, the occurrences of these events will likely begin in June and could continue to occur in September (Cayan et al. 2012, Ackerly et al. 2018). Climate simulation models project that the San Francisco region will maintain its Mediterranean climate regime, but experience a higher degree of variability of annual precipitation during the next 50 years and years that are drier than the historical annual average during the middle and end of the twenty-first century. The greatest reduction in precipitation is projected to occur in March and April, with the core winter months remaining relatively unchanged (Cayan et al. 2012). CCC steelhead, which utilize coastal streams/hydrologic units for spawning and rearing, are almost completely dependent on annual precipitation amounts, without summer snowpack. As annual precipitation amounts vary, lessen, and/or become truncated to core winter months, the availability and accessibility of freshwater habitat is expected to greatly decrease as favorable water years become infrequent.

The Anderson Cottonwood Irrigation Dam (ACID) is considered the upriver extent of green sturgeon passage in the Sacramento River, which does depend on snowmelt during summer months. The upriver extent of green sturgeon spawning, however, is approximately 30 kilometers downriver of ACID where water temperature is higher than ACID during late spring and summer. Thus, if water temperatures increase with climate change, temperatures adjacent to ACID may remain within tolerable levels for the embryonic and larval life stages of green sturgeon, but temperatures at spawning locations lower in the river may be more affected. Their embryonic and larval life stages are most vulnerable to warmer water temperatures as both stages occur during peak summer temperatures, so this run is particularly at risk from climate warming.

³ The action area is on the interior of the San Francisco Peninsula, from downtown San Francisco to the San Jose-Santa Clara region. Both the San Francisco Bay and San Jose region exhibit similar Mediterranean climate patterns.

Estuaries, including seasonally closed lagoons, may also experience changes detrimental to the survival and success of salmonids and green sturgeon. Estuarine productivity is likely to change based on changes in freshwater flows, nutrient cycling, and sediment amounts (Scavia et al. 2002, Ruggiero et al. 2010). Continued sea level rise (0.42 to 1.67 meters by 2100) is expected to cause sandbars to form farther inland which can affect the amount of time lagoons are connected to the ocean (Dalrymple et al. 2012, Rich and Keller 2013). In marine and nearshore environments, ecosystems and habitats important to salmonids and sturgeon success are likely to experience changes in temperatures, pH, circulation, water chemistry, and food supplies (Feely et al. 2004, Osgood 2008, Abdul-Aziz et al. 2011, Doney et al. 2012, Turley 2018). The projections described above are for the mid to late 21st Century; in shorter time frames, climate conditions not caused by the human addition of carbon dioxide to the atmosphere are more likely to predominate (Cox and Stephenson 2007, Santer et al. 2011).

In summary, observed and predicted climate change effects are generally detrimental to the anadromous species under examination (McClure 2011, Wade et al. 2013), so unless offset by improvements in other factors, the status of the species and critical habitat is likely to decline over time. CCC steelhead and sDPS green sturgeon may have already experienced some detrimental impacts from climate change, especially during extended recent droughts. The threat to the existence of these anadromous fishes from global climate change will increase into the future. The climate change projections referenced above cover the time period between the present and approximately 2100. While there is uncertainty associated with projections, which increases over time, the direction of change is relatively certain (McClure et al. 2013) and should be included in baseline considerations.

2.3. Action Area

“Action area” means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). All GPS locations provided are approximate.

The San Francisco to San Jose HSR project extent begins northwest of the existing San Jose Diridon train station on Scott Boulevard (37.363521°, -121.959536°) in Santa Clara, California, and ends at the 4th and King Station (37.776653°, -122.394829°) in San Francisco, California. The action area includes all areas containing the HSR route alignment, all waterway crossings, track and bridge expansions, and all necessary features (the railway, embankments, aerial viaducts, trenches, or tunnels); new stations or station upgrades; parking lots; the Brisbane LMF (37.695636°, -122.398081°); all ancillary features (TPSS, switching/paralleling stations, and communication/control stations); the necessary electrical interconnections, infrastructure, and upgrades; general network upgrades; wildlife crossings; all necessary modifications to existing highway, roads, and other railways; all HSR permanent and temporary ROW/TCEs; and all temporary and permanent access roads. Because construction and operational impacts have potential to impact aquatic species and habitats outside of the project extent footprint through water quality and underwater sound impacts, an additional 2,000 feet around all project components, and both up and downstream of waterway crossings, is also included as part of the action area to encompass these effects.

There are at least 30 alignment interactions or crossings over waterways or drainages that are expected to have some amount of effect on species or habitats under NMFS jurisdiction. Most of these waterways are currently considered ‘constructed’ or have been reduced to stormwater drainages through prior urban/commercial/railroad development, the effects of which are considered already existing in the environmental baseline. These small waterways will drain to waterways which may contain individual steelhead or green sturgeon, their designated critical habitats, and eventually the San Francisco Bay, and are therefore included in the action area.

The proposed route (EIR/EIS Preferred Alternative A (Authority 2019a), Figure 1) will be examined from south (Scott Boulevard, closest in connection to the San Jose Diridon Station) to north (ending at the 4th and King Station), as if traveling the proposed route from San Jose to San Francisco. There are approximately twelve overcrossings of, or close proximity of HSR buildings or infrastructure to, waterways that may contain steelhead, green sturgeon, or affect their critical habitats. Locations at which interactions with species and habitats under NMFS jurisdiction are:

- 1) a crossing over Stevens Creek (37.391976°, -122.069729°; Figure 5);
- 2) a crossing over San Francisquito Creek (37.447218°, -122.170364°; Figure 6);
- 3) a crossing over San Mateo Creek (37.568884°, -122.324729°; Figure 7);
- 4) a crossing over Easton Creek (37.590098°, -122.368686°; Figure 8);
- 5) a crossing over Mills Creek (37.591883°, -122.372998°; Figure 8);
- 6) Millbrae Station and associated upgrades/modifications (37.600288°, -122.386854°; Figure 3 & Figure 9);
- 7) a crossing over Colma Creek (37.649438°, -122.410131°; Figure 10);
- 8) a crossing near Oyster Point Channel (37.668306°, -122.393015°; Figure 11);
- 9) a crossing over Guadalupe Valley Creek and the Brisbane LMF construction near Brisbane Lagoon (37.686901°, -122.398910°; Figure 4 & Figure 12)
- 10) Brisbane LMF/Visitacion Creek (37.695959°, -122.397060°; Figure 13)
- 11) a crossing near Islais Creek Channel (37.748008°, -122.393074°; Figure 14), and
- 12) a crossing near China Basin Channel/Mission Bay (37.770372°, -122.398396°; Figure 15).

The action area would also include any mitigation banks, conservation banks, or any areas restored through the payment of in-lieu fees or permittee-responsible areas restored, or funded by the Authority, to offset unavoidable adverse effects to special status species or habitats in this section. Since there are no NMFS-approved mitigation banks that offer appropriate species or habitat type credits for the impacted DPSs that also include the action area of the project within their service areas, and there are no in-lieu fee program locations identified that could provide credits suitable to offset expected impacts, the Authority expects to conduct permittee responsible restoration to offset said unavoidable impacts caused by this project section (Authority 2021i, c).

As described in Section 1.3.5 Proposed Conservation Measures of this opinion, since the CMP is being developed, the Authority has not yet selected any site(s) on which they propose to mitigate impacts to steelhead, green sturgeon, or their habitats. Therefore, it is unclear what areas would be affected by the proposed compensatory mitigation component of the Federal action and such areas cannot be included in the action area of the proposed action at this time (though proposed CM-FISH-1 does stipulate that any compensation would occur in the same DPS domain as where

the project impact was incurred). In the future, when a site(s) suitable for compensatory mitigation is confirmed, reinitiation of consultation may be warranted to analyze the effects of the compensatory mitigation portion of this proposed action, and at that time the action area will be revised to include the identified mitigation site, *or* the restoration component of the compensatory mitigation could be included under NOAA Restoration Center's programmatic approach for fisheries habitat restoration projects in California Coastal counties (NMFS 2017a) if a United States Army Corps of Engineers Clean Water Act section 404 permit is required, and ESA section 7 review would occur through that programmatic opinion process.

HSR project sections outside of the San Francisco to San Jose Project Section will be analyzed in their own biological opinions (Authority 2009, 2021i) as those sections are submitted to NMFS for review separately due to their independent utility and will not be included in the action area here.

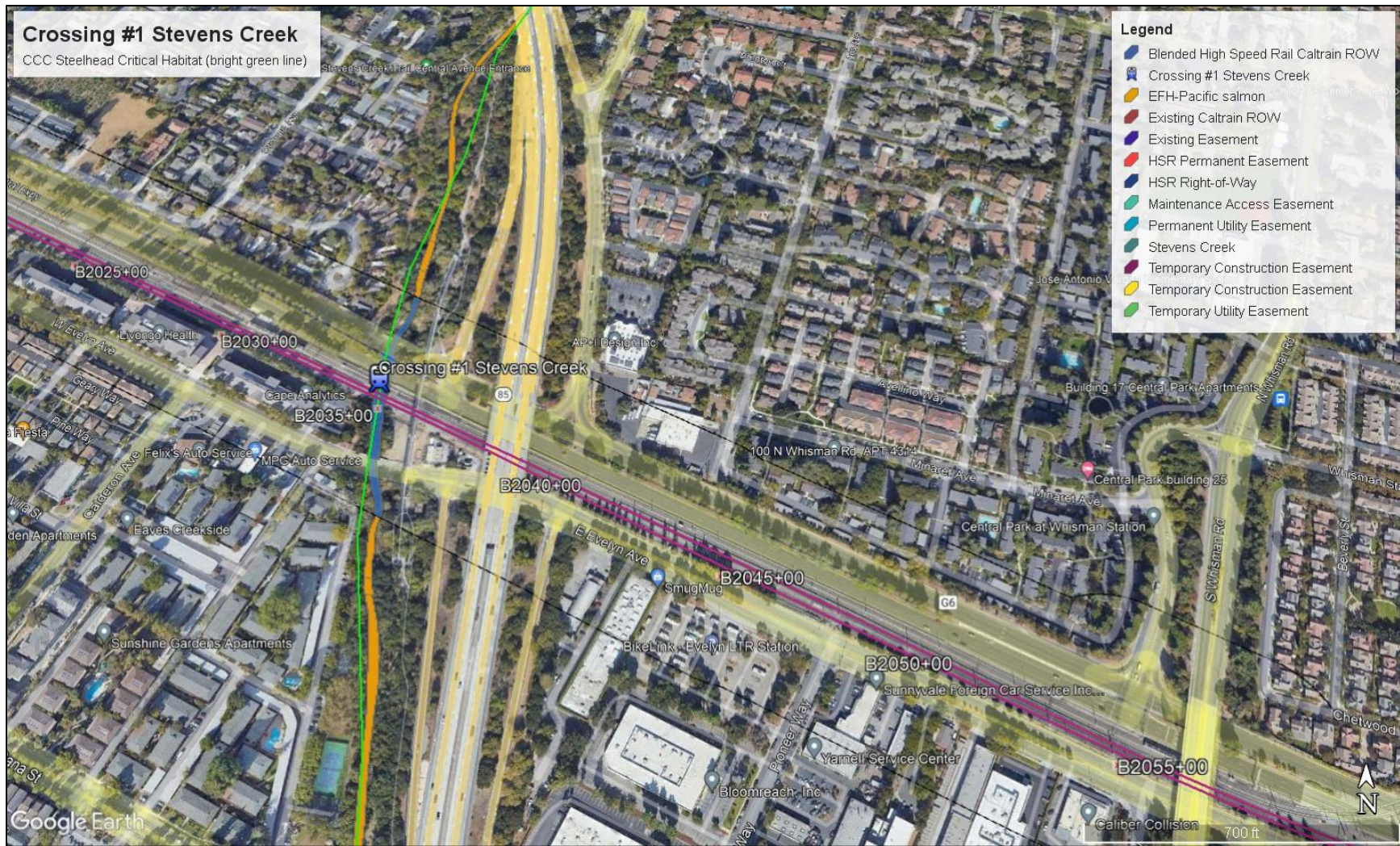


Figure 5. Stevens Creek Crossing #1. HSR to use existing at-grade tracks (maroon lines) that cross HWY 85 and Stevens Creek in Mountain View, California. Stevens Creek is CCC steelhead designated critical habitat (bright green line).



Figure 6. San Francisco Creek Crossing #2. HSR to use existing at-grade tracks (maroon lines) that cross Palo Alto Avenue and San Francisco Creek near HWY 82 in Menlo Park/Palo Alto, California. San Francisco Creek is CCC steelhead designated critical habitat (bright green line).

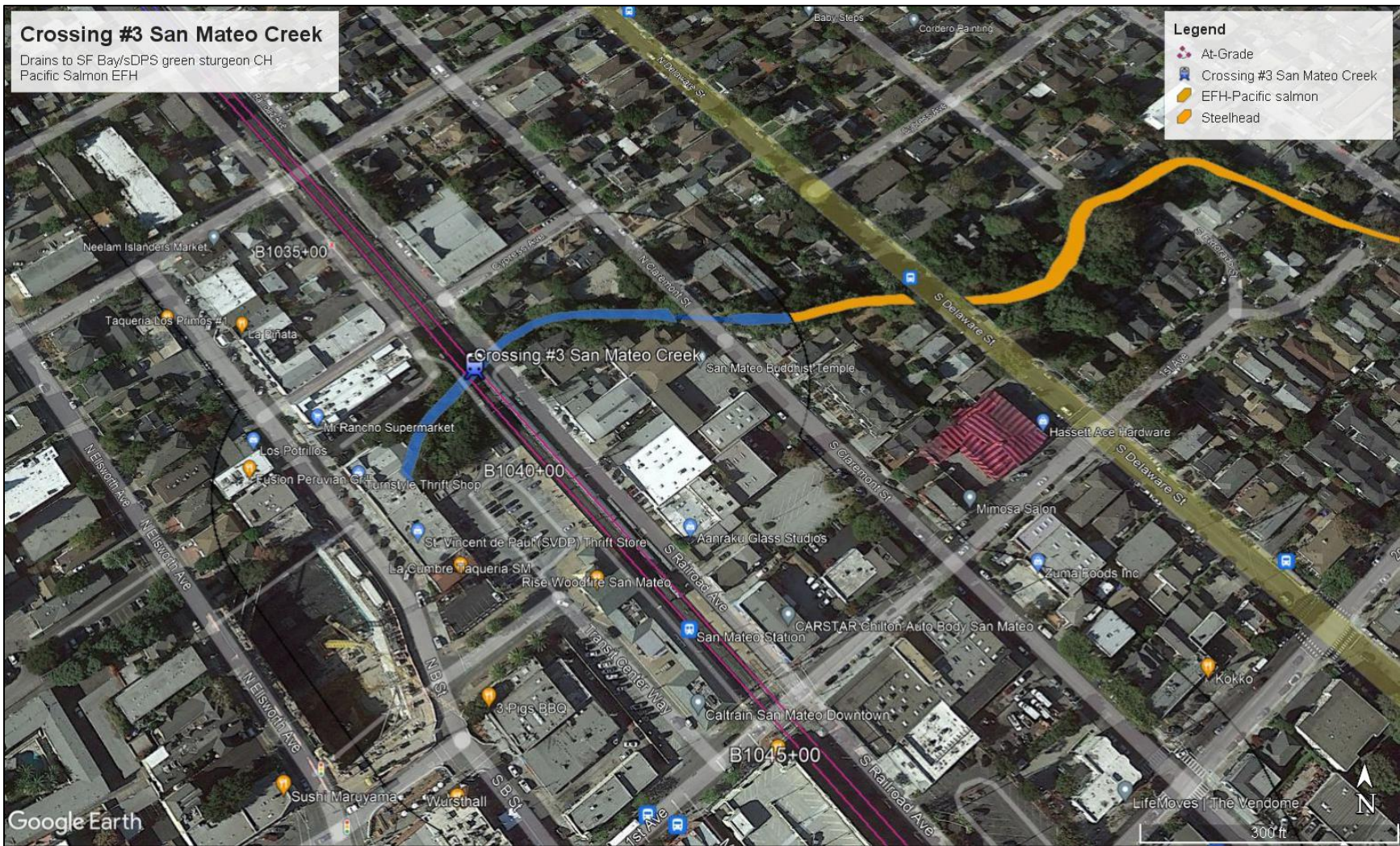


Figure 7. San Mateo Creek Crossing #3. HSR to use existing at-grade tracks (maroon lines) that cross San Mateo Creek near South Railroad Avenue and the San Mateo Station in San Mateo, California. San Mateo Creek drains to the San Francisco Bay estuarine waters (orange layer).

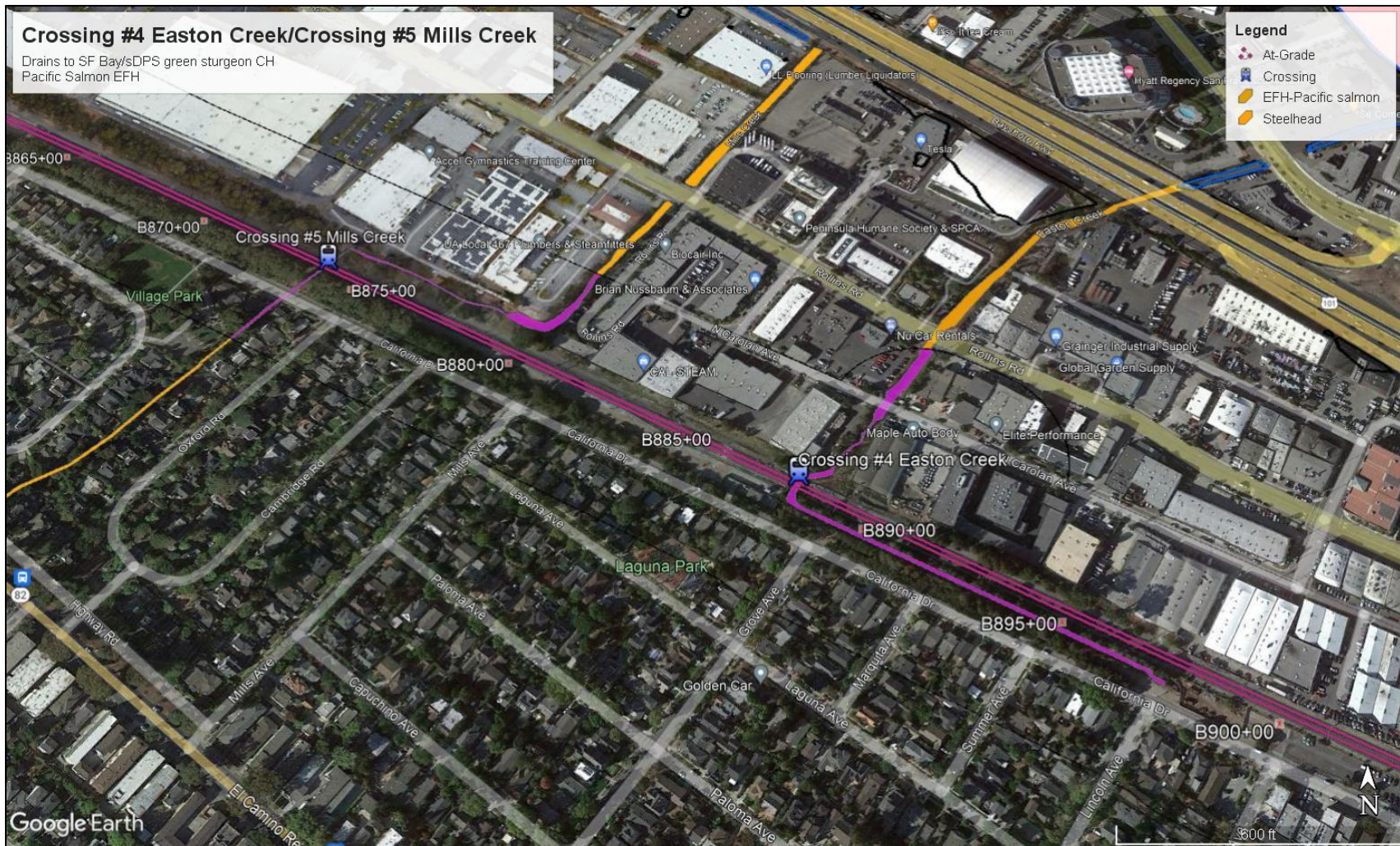


Figure 8. Easton Creek Crossing #4 and Mills Creek Crossing #5. HSR to use existing at-grade tracks (maroon lines) that parallel California Street in Burlingame, California, and cross Easton and Mills creeks. Both Easton Creek and Mills Creek drain to San Francisco Bay estuarine/marine waters and sDPS green sturgeon designated critical habitat (pink layer, upper right-hand corner).



Figure 9. Millbrae Station Location #6. HSR to use existing at-grade tracks (maroon lines) to service existing Millbrae BART Station. Areas to be altered in station redesign represented by multiple opaque layers. Highline Creek (now considered a constructed watercourse, vibrant magenta) drains to San Francisco Bay estuarine/marine waters and sDPS green sturgeon designated critical habitat (downstream of vibrant orange sturgeon layer).

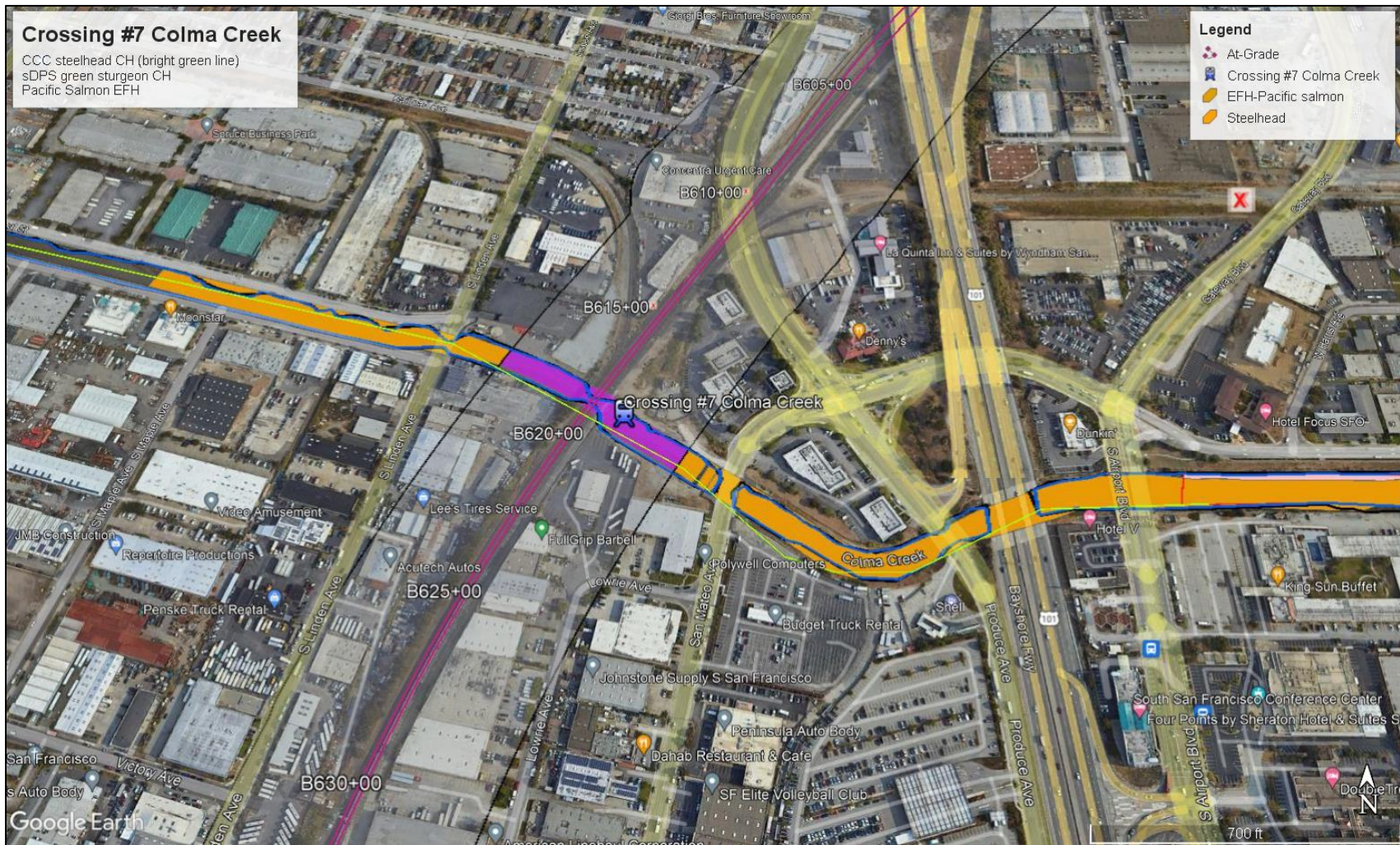


Figure 10. Colma Creek Crossing #7. HSR to use existing at-grade tracks (maroon lines) to cross Colma Creek between Linden Avenue and San Mateo Avenue west of HWY 101 in South San Francisco, California. Colma Creek is sDPS green sturgeon designated critical habitat (bright green line).

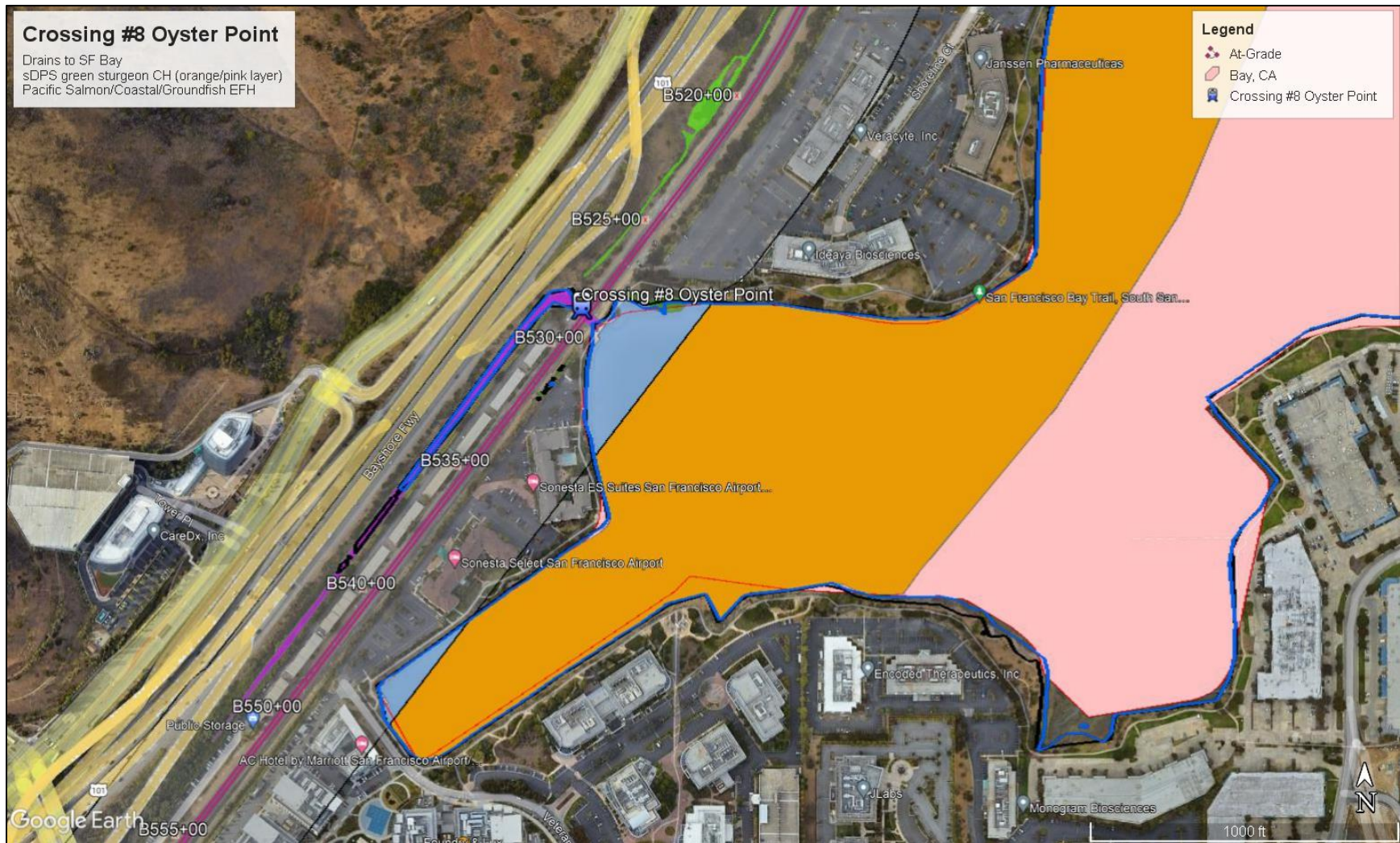


Figure 11. Oyster Point Crossing #8. HSR to use existing at-grade tracks (maroon lines) to cross an Oyster Point tidal drainage east of HWY 101 and south of Brisbane Marina in South San Francisco, California. Oyster Point Channel is considered sDPS green sturgeon designated critical habitat (blue/orange/pink layers).



Figure 12. Guadalupe Valley Creek/Brisbane Lagoon Crossing #9. HSR to use existing at-grade tracks (maroon lines) to cross the Guadalupe Valley Creek discharge outlet into Brisbane Lagoon near Tunnel and Bayshore Boulevard in Brisbane, California, south of the proposed Brisbane LMF location. These waterways are tidally influenced and are considered sDPS green sturgeon designated critical habitat (pink layer: Bay, CA).

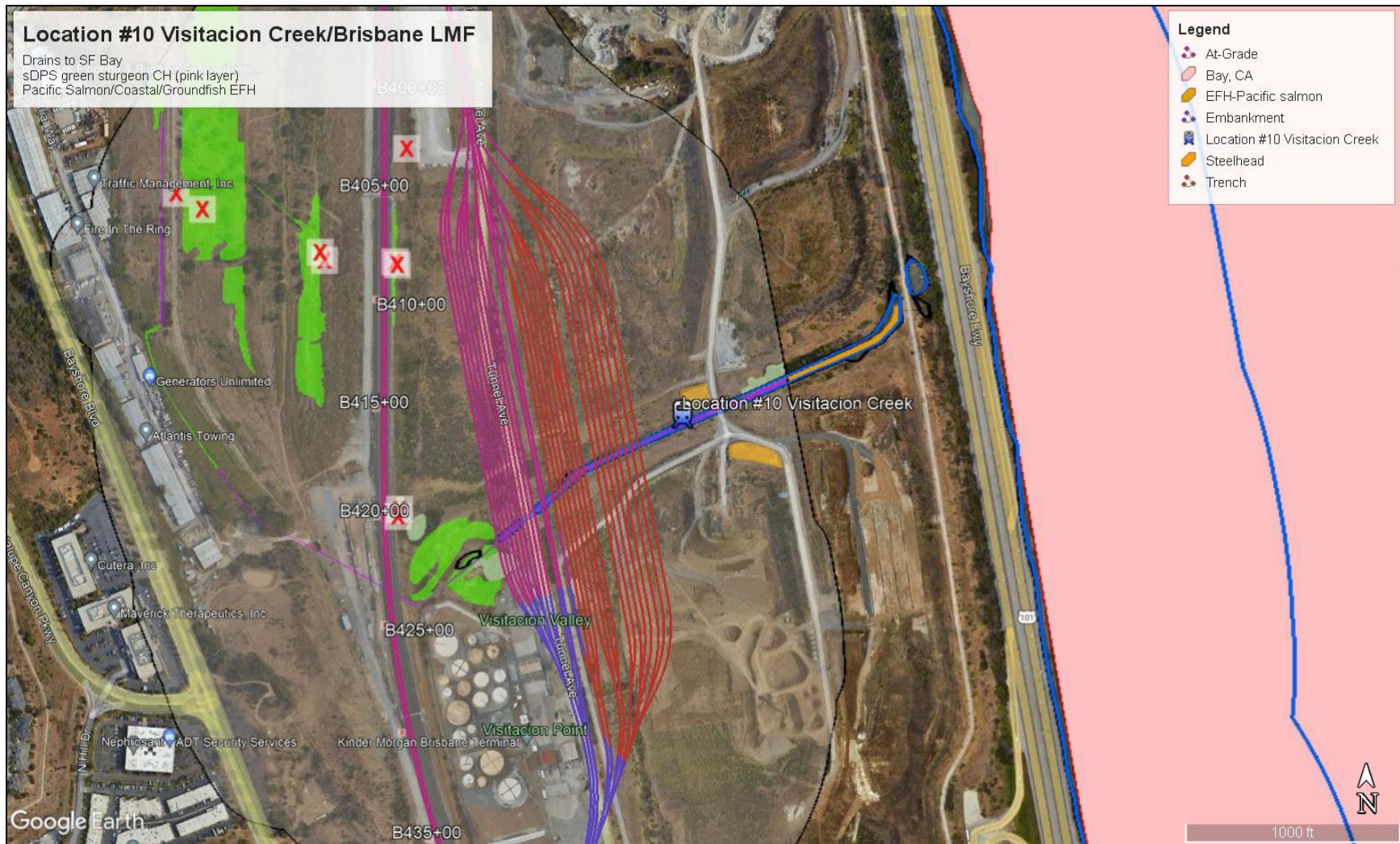


Figure 13. Visitation Creek/Brisbane LMF Location #10. HSR to use existing at-grade tracks (far left-hand side maroon lines: At-Grade) and place new track lines (red: Trench, purple: Embankment) for entrance/exit to proposed Brisbane LMF (transparent white area). Visitation Creek drains into the San Francisco Bay and is considered sDPS green sturgeon designated critical habitat because it is tidally influenced (pink layer: Bay, CA).

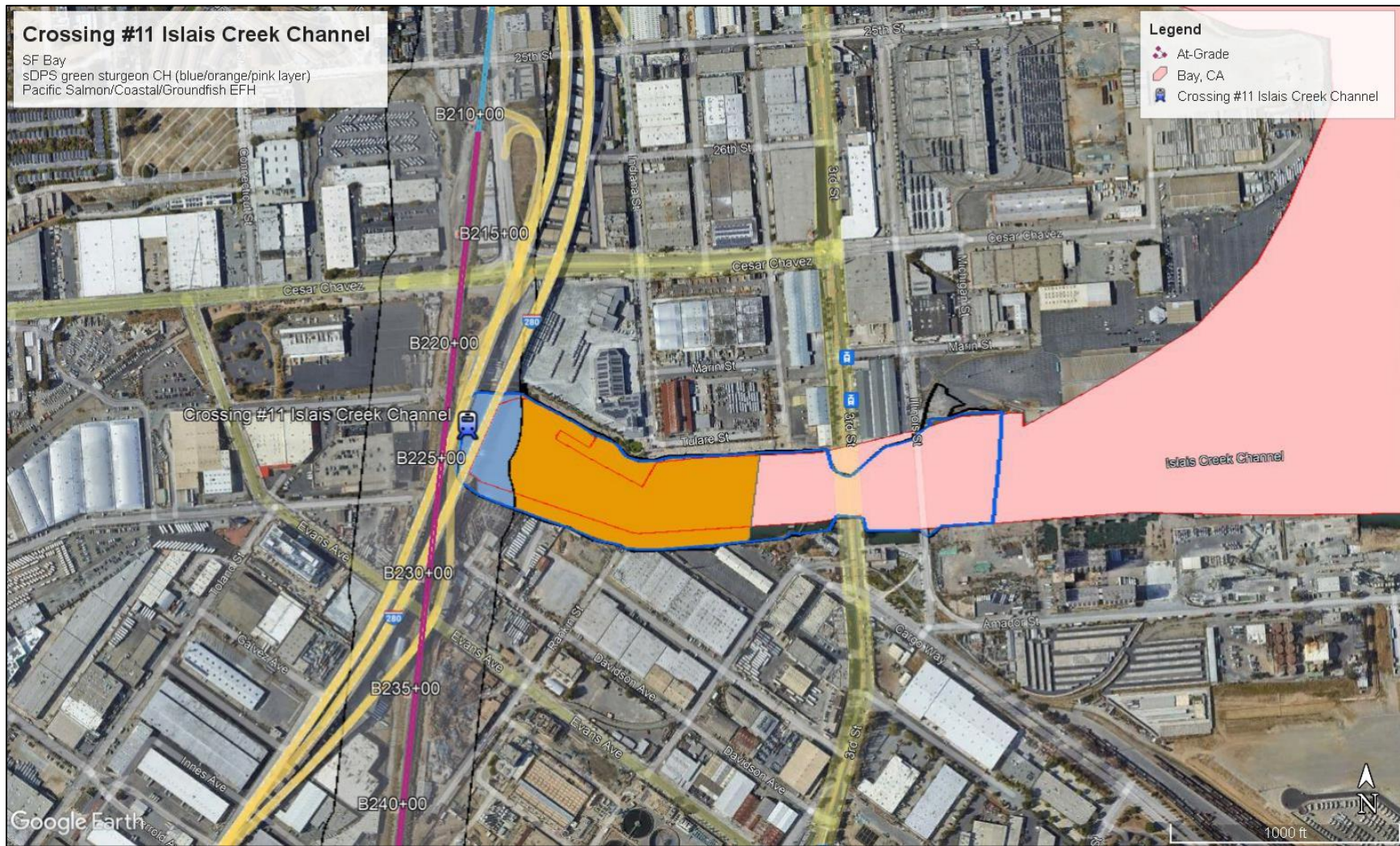


Figure 14. Islais Creek Channel Crossing #11. HSR to use existing at-grade tracks (maroon lines) to directly west of San Francisco Bay waters under HWY 280 in San Francisco, California. Islais Creek Channel is considered sDPS green sturgeon designated critical habitat (blue/orange/pink layers).

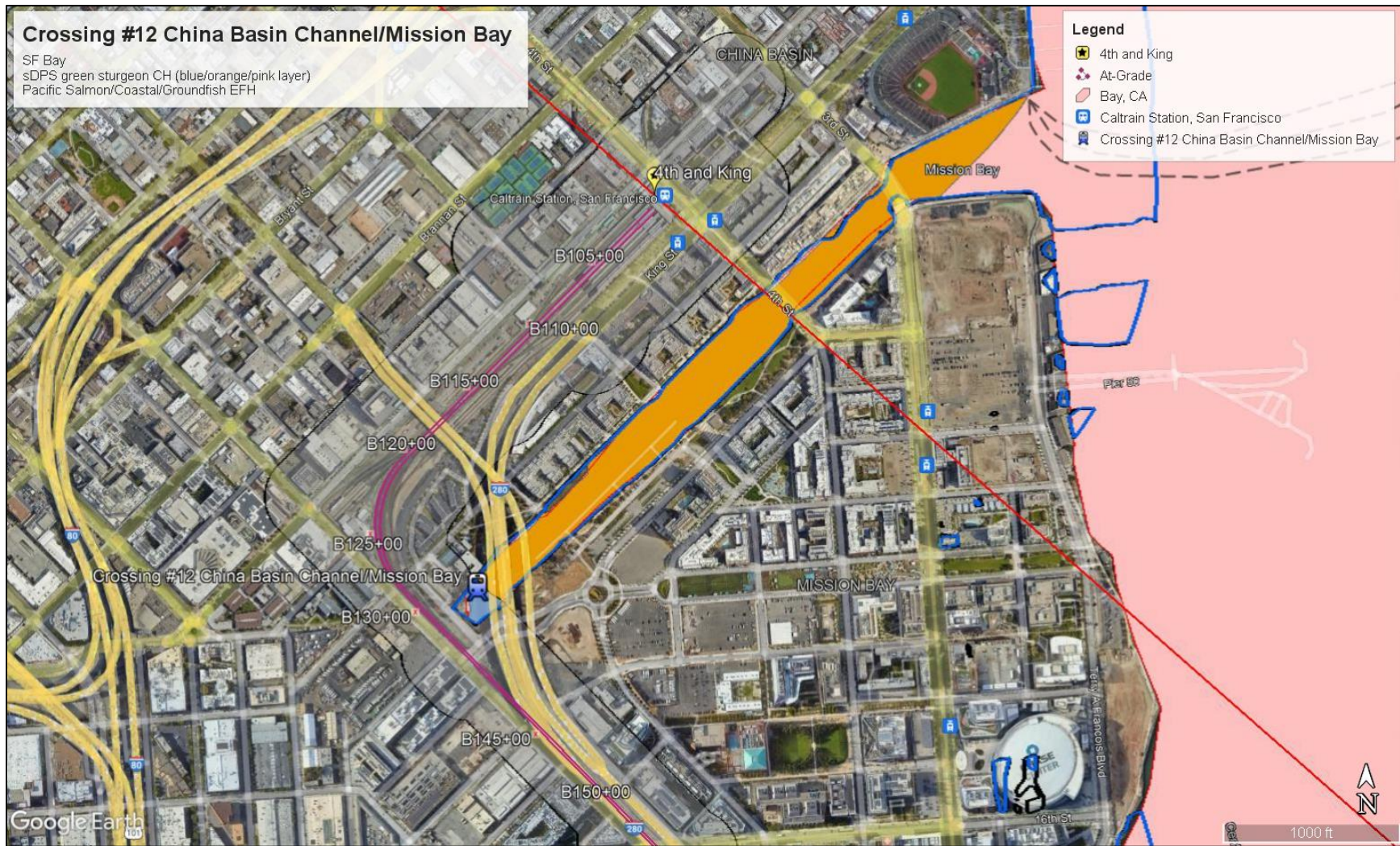


Figure 15. China Basin Channel/Mission Bay Crossing #12. HSR to use existing at-grade tracks (maroon lines) to directly west of San Francisco Bay waters near HWY 280, south of the 4th and King Station terminus, in San Francisco, California. China Basin/Mission Bay Channel is considered sDPS green sturgeon designated critical habitat (blue/orange/pink layers).

2.4. Environmental Baseline

The “environmental baseline” refers to the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the proposed action. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultations, and the impact of State or private actions which are contemporaneous with the consultation in process. The consequences to listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency’s discretion to modify are part of the environmental baseline (50 CFR 402.02).

2.4.1. Status and occurrence of listed species and critical habitat in the action area

The federally listed anadromous species under NMFS jurisdiction that use and occupy the action area are adult and juvenile CCC steelhead and adult, subadult, and juvenile sDPS green sturgeon (egg and larval stages are not expected within the bounds of the described action area).

2.4.1.1 CCC steelhead

In general, steelhead are described as a highly migratory species that exhibits a great amount of variation in the time and location spent at each life history stage compared to other members of the *Oncorhynchus* genus. Like other Pacific salmonids, they follow an anadromous life history pattern of adults spawning in freshwater streams, juveniles undergoing physiological changes that allow them to migrate, feed, and mature in the ocean, to eventually return to their natal waters to complete the cycle and reproduce. While this basic life history pattern is observed by the species, the life history strategies of steelhead are extremely variable between individuals. In addition, steelhead are iteroparous (i.e., can spawn more than once in their lifetime (Busby et al. 1996)) and therefore may be expected to emigrate back down the system after spawning. As such, the determination of the presence or absence of steelhead in the action area accounts for both upstream and downstream migrating adult steelhead (kelts).

Adult CCC steelhead express a winter-run ecotype and are considered ocean maturing. Ocean maturing adults enter freshwater with well-developed gonads ready for spawning (i.e., winter steelhead). Winter-run CCC steelhead immigrate December through April and spawn shortly thereafter (Sharpovalov and Taft 1954, Moyle et al. 2008). Adult winter steelhead freshwater presence varies but is correlated with higher flow events.

CCC steelhead spawning would be expected to occur from December through April in spawning reaches far upstream of the action area. Again, adults may be capable of iteroparity and kelts can return to the ocean after spawning. Therefore, kelt CCC steelhead may be expected in the action area as they pass through again, leaving the spawning areas for the ocean until May.

Eggs hatch in approximately 25 to 35 days depending on water temperatures, and alevins remain in the gravel redd for two to three weeks after hatching. The fry that emerge from the redd will then rear in edge water habitats and gradually move to deeper faster waters or other areas better

suited for rearing. Juvenile CCC steelhead will rear in freshwater and estuarine habitats for one to two years before completing the transition to a smolt and completing their migration out to the ocean. Many factors influence juvenile residence time; in low productivity systems juveniles may rear for more than two years to reach a minimum body size before leaving (McCarthy et al. 2009, Sogard et al. 2009). When juveniles are able to complete the physiological transition to a smolt, in the San Francisco Bay area they typically emigrate sometime between February and June, with peaks in April and May (Fukushima and Lesh 1998). Due to their extended freshwater residency, juvenile CCC steelhead may be present in the action area in any waterbody connected to San Francisco Bay estuarine waters, but especially in the Stevens Creek, San Francisquito Creek, and San Mateo Creek watersheds and adjacent connected areas.

Since the action area contains both freshwater and estuarine rearing habitat types for CCC juveniles, and migration corridors for adult CCC steelhead, individuals from these two life history classes may be encountered in the action area. Though CCC steelhead are present in the action area, their abundance has declined considerably since peak observations in the past. These populations are considered part of the Coastal San Francisco diversity strata (NMFS 2016d, a, c), which entirely lacks an estimate of adult abundance (Williams et al. 2016). The Stevens Creek population is considered an independent population while the San Francisquito Creek and San Mateo Creek populations are considered potentially independent. A population is considered independent when it has a high likelihood of persisting for 100 or more years and whose extinction risk is not substantially altered by exchanges of individuals with other populations. Both are considered essential to the recovery target set for the Interior Diversity Stratum (NMFS 2016d).

2.4.1.2 CCC steelhead critical habitat

The action area contains designated critical habitat that supports the freshwater and estuarine rearing and migration activities of CCC steelhead. PBFs include:

Freshwater rearing sites with:

Water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility;

Water quality and forage supporting juvenile development; and

Natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.

Freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.

Estuarine areas free of obstruction and excessive predation with:

Water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater;

Natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels; and

Juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation.

The proposed HSR alignment crosses Stevens Creek (Crossing #1) and San Francisquito Creek (Crossing #2) on existing railroad bridges. Both of these creeks are designated critical habitat for CCC steelhead. Stevens Creek within the action area contains freshwater rearing habitat of poor quality and migration habitat of good quality. At times, it is also tidally influenced. San Francisquito Creek within the action area similarly contains freshwater rearing habitat of poor quality and migration habitat of fair quality. It is not considered estuarine habitat. Also, all accessible reaches with estuarine habitats and channels connected to the South San Francisco Bay within the action area are CCC steelhead designated critical habitat (Crossings #6 through #12) and these areas are generally considered estuarine habitat of poor quality but migration habitat of good quality.

The waterways used by the Coastal San Francisco Bay Diversity Stratum in the action area have experienced a vast amount of change that has degraded these habitats' ability to support steelhead needs. Streams that once naturally flooded and meandered around hillsides before reaching San Francisco Bay were hardscaped and straightened into channels. Extant bayside streams currently exist in urbanized settings which required flood control modifications and channelization. Dams blocking anadromy are present on many streams and are used for water supply, aquifer recharge, or recreational activities (The Coastal Conservancy 2004). The Stevens Creek Reservoir, constructed in 1935 and located only 8 miles upstream from the creek outlet, is an impassable barrier. Similarly, the Searsville Dam, constructed in 1890 and located approximately 13 miles from the San Francisquito Creek mouth, is also an impassable barrier. Additionally, numerous partial barriers exist downstream of these impassable dams on both creeks, which affect the movement adult and juvenile steelhead. Past and current urbanization, commercial and residential development, channel modifications, a high degree of road and railway densities, riparian vegetation removal, and a lack of large wood material continue to severely impair these waterway (NMFS 2016d, c).

In the past 150 years, the diking and filling of tidal marshes has decreased the surface area of the greater San Francisco Bay by 37 percent. More than 500,000 acres of the estuary's historic tidal wetlands have been converted for farm, salt pond, and urban uses (San Francisco Estuary Project Management Committee 1994, San Francisco Estuary Partnership 2016, 2022). These changes have diminished tidal marsh habitat, increased pollutant loadings to the estuary, and degraded shoreline habitat due to the installation of docks, shipping wharves, marinas, and miles of rock riprap for erosion protection. Though extensively degraded from their natural states, due to reduced accessibility and availability, any remaining freshwater or estuarine habitat designated as critical habitat has a high intrinsic value for the recovery of the species.

2.4.1.3 sDPS green sturgeon

The sDPS of the anadromous green sturgeon occurs along the western seaboard of the US. Non-spawning adult and subadult and sDPS green sturgeon spend much of their lives existing in marine and estuarine waters, and would be expected to use accessible areas that are tidally influenced in South San Francisco Bay within the action area. Tidal waters inland of the Golden Gate Bridge are considered part of the San Francisco Bay Delta Estuary (SFBDE). Adult and subadult sDPS green sturgeon are expected to occur in relatively large concentrations during the summer and autumn months in these habitat types within the action area, but otherwise have a year-round presence. Interestingly, both sDPS and Northern DPS (nDPS) green sturgeon individuals coexist in the West Coast marine environment, but the two DPSs only enter spawning areas of their respective natal rivers (Lindley et al. 2011). So, nDPS individuals may also be encountered within the action area, but the nDPS is not listed under the ESA.

Green sturgeon are long-lived (54 to 72 years old, maximum age range (Nakamoto et al. 1995)) and relatively late-maturing (approximately 15 years of age (Van Eenennaam et al. 2006)). Adult sDPS green sturgeon enter San Francisco Bay in late winter through early spring and spawn in the Sacramento River primarily from April through early July, with peaks of activity likely influenced by factors including water flow and temperature (Heublein et al. 2008, Poytress et al. 2011, Poytress et al. 2015). Post-spawn fish may hold for several months in the Sacramento River and out-migrate in the fall or winter, or move out of the river quickly during the spring and summer months, with the holding behavior most commonly observed (Heublein et al. 2008, Mora et al. 2015, Mora et al. 2018). Post-spawn outmigration through the SFBDE is also variable, with individuals migrating to the Pacific Ocean rather quickly (2-10 days) and others remaining in the estuary for a number of months after leaving upstream holding habitats (Heublein et al. 2008).

The juvenile life stage is from completed metamorphosis to first ocean entry. It is unknown how long juveniles remain in upriver rearing habitats after metamorphosis, but they likely spend the first year in freshwater environments. The ability to transition to seawater occurs at 1.5 years of age (Allen and Cech 2007). The subadult life stage begins at the first entry to the Pacific Ocean and extends until maturity is reached. In coastal bays and estuary habitat like those in the action area, adult and subadult green sturgeon feed on shrimp, clams, crabs, and benthic fish (Moyle et al. 1995, Dumbauld et al. 2008).

The status of the sDPS green sturgeon population in the action area is reflective of the overall status of the sDPS because the DPS is typified by its single reproductive population in the Sacramento River Basin, unlike steelhead populations which may be based on their origin/natal streams. See Table 1 for more detail.

2.4.1.4 sDPS green sturgeon critical habitat

The action area contains designated critical habitat of sDPS green sturgeon where it contains parts of the SFBDE and is tidally influenced. The PBFs within the action area include:

Food resources. Abundant prey items within estuarine habitats and substrates for juvenile, subadult, and adult life stages.

Water flow. Within bays and estuaries adjacent to the Sacramento River (*i.e.*, the Sacramento-San Joaquin Delta and the Suisun, San Pablo, and San Francisco bays), sufficient flow into the bay and estuary to allow adults to successfully orient to the incoming flow and migrate upstream to spawning grounds.

Water quality. Water quality, including temperature, salinity, oxygen content, and other chemical characteristics, necessary for normal behavior, growth, and viability of all life stages.

Migratory corridor. A migratory pathway necessary for the safe and timely passage of Southern DPS fish within estuarine habitats and between estuarine and riverine or marine habitats.

Depth. A diversity of depths necessary for shelter, foraging, and migration of juvenile, subadult, and adult life stages.

Sediment quality. Sediment quality (*i.e.*, chemical characteristics) necessary for normal behavior, growth, and viability of all life stages.

The proposed HSR alignment either crosses over SFBDE waters on existing tracks and bridges (Crossing #7 Colma Creek, Figure 10 and Crossing #8 Oyster Point, Figure 11) or runs nearby and drains to such habitat, locations #6 (Millbrae Station, Figure 9) through #12 (China Basin/Mission Bay Channel, Figure 15), in the action area. In addition, new overwater structures/bridges are being placed over tidally-influenced waterways for the Tunnel Avenue reroute (Crossing #9 Guadalupe Valley Creek/Brisbane Lagoon) or such waterways are proposed for culverting and removal (Crossing #10 Visitacion Creek). Therefore, most of the alignment has potential to interact with sDPS green sturgeon SFBDE critical habitat because either: (1) the existing train tracks are so close to tidally-influenced water channels even when not directly crossing them, in many cases less than 1 mile upstream with culverts that drain to SFBDE waters; or (2) new habitat alterations will directly affect tidally-influenced waterways.

Currently, many of the PBFs of sDPS green sturgeon in the action area are degraded (NMFS 2018). In the SFBDE, habitat destruction, modifications, or curtailment are recognized as specific threats that have occurred on a wide spread scale, as referenced in the CCC steelhead critical habitat section above, through the implementation of channel control structures and impoundments, ubiquitously throughout the action area. Structures built to divert water and by upstream impoundments have changed flow patterns, channel morphology, and water depth/presence and salinity in certain areas. Localized flow patterns can impact habitat quality for the sDPS green sturgeon and flow may impact migration and movement. Non-native species introductions, global climate change, and contamination have altered the available prey base. Non-point source contamination from legacy contamination and continued inputs is a persistent threat to the functionality of the remaining critical habitat (NMFS 2015, 2018, 2021). For example, research conducted on white and green sturgeon has shown that many of the non-native food resources including the non-native overbite clam, *Corbula amurensis*, are either non-digestible (as separate issue, (Kogut 2008)) or, if digested, may expose green sturgeon to selenium at elevated concentrations compared to native clams (Linville et al. 2002, Lee et al. 2006, Linville 2006, Presser and Luoma 2010a, b, Linares-Casenave et al. 2015).

In summary, although the current conditions of listed salmonid and green sturgeon critical habitat are significantly degraded, the remaining migratory corridors and rearing and foraging habitat that remain in both the San Francisco Bay Interior watersheds and SFBDE areas are considered to have high intrinsic value for the conservation of these species.

2.4.2. Factors affecting listed species

A vast amount of urbanization has occurred throughout the action area, including a high percentage of streamside road densities. Both freight and passenger transit railroad lines are concentrated in the narrow strip of flat land between the Santa Cruz Mountains and the South San Francisco Bay (approximately 6 miles in width), along with several highways and expressways on top of urban and suburban surface streets. For example, at least 21 overwater structures ranging in size from that of a small foot bridge to the size of multiple-lane freeway overpasses and exchanges cross Stevens Creek, which is only about 12 stream miles in length in total from the base of Stevens Creek Reservoir to its exit into SFBDE waters. At least two of the overwater crossing structures support existing railroad lines. Nearly the creek's entire length is bordered by houses and subdivisions, or by roads and shopping centers, changing to freeways and other industry by the time it meets estuarine waters. Where larger riparian vegetation still remains, on average, only one mature tree makes up the riparian corridor between the freshwater channel and concrete. Some road and rail lines also encroach over or into tidal marshes via embankments or elevated trestles, in association with dikes and levees, to create artificial dry land. Ubiquitous use of these practices throughout the action area have effectively isolated the remaining marshlands and facilitated additional nearshore development.

Utilization of the water resources in the action area for human needs has also directly impacted the anadromous species that are dependent on these watersheds. In the San Jose-San Francisco Bay Area, water agencies rely on a diverse portfolio of both local and imported water sources (Ackerly et al. 2018). For example, approximately two-thirds of the action area's community water systems are small, self-sufficient and locally-sourced, and serve less than 10,000 people each (Ackerly et al. 2018), while the remaining deficit is sourced from the Sierra Nevada (Regional Water Management Group 2019) or is made available by groundwater desalination and non-potable water reuse. Local surface water flows in the action area are directly coupled to winter precipitation, which is highly variable year to year, and increasingly, climate change is affecting SWE availability from the Sierra Nevada. In an effort to address this tenuous system and increase the Bay Area's climate change resiliency, efforts are being undertaken to expand water storage and conveyance infrastructure locally while also increasing water recycling, desalination, groundwater augmentation and banking, water transfer, and stormwater harvesting abilities (Ackerly et al. 2018).

As such, there are several dams that form reservoirs to store and supply surface water for human needs as noted in the Sections 2.4.1.1 and 2.4.1.2. The existing water infrastructure and management has altered and currently controls the hydrographs experienced by steelhead in their accessible habitats, often to the detriment of oversummering steelhead juveniles. Because green sturgeon do not depend on San Jose-San Francisco Bay watersheds for spawning purposes, they are somewhat unaffected by the water management decisions of the area.

2.4.3. Conservation and restoration efforts in the action area

The Santa Clara Valley Water District (SCVWD) is the primary water resource agency that operates water conveyance infrastructure (including the Stevens Creek reservoir), performs stewardship duties, and provides flood control services in and affecting the action area. Additionally, the SCVWD was in the process of drafting a Habitat Conservation Plan (HCP); however, progress on this effort is currently on hold. Additionally, CDFW has been active in performing stream surveys, and several public interest groups, including Santa Clara Valley Audubon Society, CLEAN South Bay, Santa Clara County Creeks Coalition, and the California Nature Conservancy, are active in the watershed.

Stanford University is the largest landowner in the San Francisquito Creek watershed, occupying 8,000 acres spanning both counties. Stanford operates several water facilities in the watershed for the purpose of diverting and storing water for landscape irrigation and fire control. In 2008, Stanford submitted applications to NMFS and the U.S. Fish and Wildlife Service for ESA section 10(a)(1)(B) incidental take permits, and a draft HCP was submitted in support of their applications. In December 2012, Stanford requested that NMFS suspend the processing of their application pending completion of the Searsville Dam alternatives study to address the long-term future of the dam and reservoir. There is substantial public interest in improving the habitat for steelhead in San Francisquito Creek and its tributaries. There have been several studies aimed at assessing and improving water quality and fisheries habitat in the watershed. Additionally, there are several watershed groups active in the watershed: Acterra, Beyond Searsville Dam, and the San Francisquito Watershed Coalition (a project of Acterra). These groups conduct education, outreach and restoration activities in the greater San Francisquito watershed area (The Coastal Conservancy 2004, NMFS 2016d, c).

There are also numerous federal, public, and non-governmental organization efforts underway to conserve or restore the SFBDE, too numerous to summarize here. Though outside of the action area (but to the benefit of green sturgeon that would use the action area), the South Bay Salt Pond Restoration Project is underway to restore over 15 thousand acres of industrial salt ponds (The South Bay Salt Pond Restoration Project 2022). The first salt pond reconnection was achieved in 2006 and since then over 3 thousand acres of tidal marshes have been restored (Pearlman 2019). The SFBDE is also one of 28 estuaries in the EPA's National Estuary Program, which are place-based programs that develop and implement a Comprehensive Conservation and Management Plan (CCMP) to establish priorities on activities, research, and funding needs in each estuary. The San Francisco Estuary Partnership is currently updating the 2016 CCMP (San Francisco Estuary Project Management Committee 1994, San Francisco Estuary Partnership 2016) with the 2022 Estuary Blueprint Update.

2.4.3.1 NMFS recovery plans

Recovery is the process by which listed species and their ecosystems are restored to the point that the protections provided by the ESA are no longer necessary to ensure their continued existence. Recovering anadromous species like steelhead in the San Francisco-San Jose Area is challenging due to the area's large and expanding human population, its large percentage of landscape being highly urbanized, the increasing demand for housing that leads to development of the remaining natural and pervious (agricultural) areas, the associated amount and extent of

water use and manipulation, and legacy habitat damage that still persists and continues to inhibit steelhead population recovery (NMFS 2013, 2016d, c, 2018).

In the recovery plans for these species (NMFS 2016d, 2018), NMFS established delisting/recovery criteria for CCC steelhead and sDPS green sturgeon, including that CCC steelhead must have robust, viable populations in San Francisquito Creek and its tributaries. Though there are many more recovery actions that are directed to restore the marine, estuarine, and freshwater systems that these species depend on (described fully in their respective recovery plans), there are a series of actions/efforts that must be completed specific to these populations for them to successfully establish and persist.

Pertinent DPS-wide recovery actions for CCC steelhead in the action area include:

- Rehabilitate and reclaim tidal marsh habitat through levee breaching and tidal channel creation, develop and implement estuary inflow and enhancement guidelines.
- Enhance floodplain connectivity by finding opportunities for planned retreat of current urban development due to sea level rise, and encouraging county zoning to consider the 20-year and 100-year flood zones to identify protective and compatible land use designations.
- Improve flow conditions by working with partners to reduce stormwater runoff by removing impervious surfaces and creating or expanding flood retention land and groundwater recharge basins, minimizing impacts to fisheries resources by integrating hydro-modification concerns into development planning, and improved coordination with SWRCB to establish and manage flows that fully protect salmonids.
- Modify or remove physical passage barriers at all new crossing and upgrades to existing bridges, culverts, fills, insufficient fish ladders, etc., to accommodate 100-year flood flows and use NMFS (2011) Salmonid Passage Guidelines in their designs or retrofits.
- Improve habitat complexity and riparian conditions through fish restoration projects and funding, by working with other agencies and landowners to keep beavers on the landscape with non-lethal damage management tactics, preserving older large diameter trees for canopy cover, and developing adequately sized riparian setbacks and buffers.
- Improving water quality by reducing toxicity, pollutants, and sediment.

For the San Francisquito Creek watershed specifically:

- Develop and implement steelhead passage at Searsville Dam on Corte Madera Creek and the Upper Diversion Dam on Bear Gulch; doing so would restore access to 11 miles of historical steelhead spawning and holding habitat of high quality.
- Increase habitat complexity for the benefit of summer and winter rearing juveniles in poor quality reaches by adding large woody debris in existing pool habitats, creating side channels and flood benches, and install wood/boulder structures to increase pool frequency and volume.

- Improve riparian vegetation composition and structure to increase stream shading and large woody debris recruitment by planting native riparian species and enforcing riparian buffers.
- Inset floodplain terraces where the creek is incised and disconnected from historic floodplain; reaches currently channelized should be enhanced with constructed meanders and installations of wood and rock habitat features.

For Stevens Creek watershed specifically:

- Address passage barriers downstream of Stevens Creek Dam systematically and opportunistically, specifically by remediating concrete flood control channels in lower reaches.
- Enable steelhead passage upstream of Stevens Creek Dam, including a biologically sound passage program and/or volitional passage facilities; doing so would restore access to approximately 12 miles of historical steelhead spawning and holding habitat of high quality.
- Operate Stevens Creek Reservoir for the benefit of all life stages of steelhead with considerations towards water temperature, velocity, ramping rates, sediment transport, channel maintenance, instream habitat maintenance, and adult and smolt migratory cues.
- Reconnect floodplain habitat and increase complexity by reconnecting side channels to the active channel, including retrofits in existing development when feasible.
- Improve instream habitat downstream of the reservoir by placing large woody material, rock weirs, and boulders designed to function within the known range of flows for the benefit of all life stages. Doing so will also increase the shelter ratings and pool volumes.
- Limit or treat urban runoff to improve water quality of the Stevens Creek system, specifically inputs of trash, pesticides, urban toxicity, mercury, and polychlorinated biphenyls (PCBs).

Pertinent DPS-wide recovery actions for sDPS green sturgeon in the action area include:

- Evaluate the effects of habitat modification and/or restoration (e.g., levee alteration, channel reconnection, floodplain connectivity measures) on green sturgeon recruitment and growth in the SFBDE.
- Improve compliance and implementation of (discharge/wastewater, industrial, and stormwater) BMPs to reduce input of point and non-point source contaminants within the Sacramento River Basin, the SFBDE, and coastal bays and estuaries.

- Conduct research to identify contaminants and their concentrations in all life stages of green sturgeon and their prey base; determine the physiological toxicity of identified contaminants in green sturgeon and their prey.
- Identify current and proposed water diversions posing significant risk to individual green sturgeon through entrainment.
- Conduct research on the effects of changes in turbidity and sediment load on green sturgeon habitat in coastal bays and estuaries and consequent effects on individual growth and survival.
- Conduct research on native and nonnative prey species in coastal bays and estuaries to increase understanding on ecological dynamics and connections to green sturgeon; how native/nonnative species may compete with green sturgeon in habitat use, or how green sturgeon prey bases may change under varying climate change scenarios.
- Determine the effects of water management on green sturgeon habitat in coastal bays and estuaries, and consequent effects, if any, on individual growth and survival, through research studies.
- Evaluate the effects of habitat modification and/or restoration (e.g., levee alteration, channel reconnection, floodplain connectivity measures) on green sturgeon recruitment and growth.

2.5. Effects of the Action

Under the ESA, “effects of the action” are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action (see 50 CFR 402.02). A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (see 50 CFR 402.17). In our analysis, which describes the effects of the proposed action, we considered the factors set forth in 50 CFR 402.17(a) and (b).

This opinion will consider the consequences to CCC steelhead and sDPS green sturgeon, and to their critical habitats, caused by the proposed action as outlined in Section 1.3. These include consequences caused by construction activities, including modifying existing Caltrain tracks, widening bridges and other modifications to waterway crossings, existing station modifications/redesigns, and construction of the new Brisbane LMF, utility upgrades, ancillary alignment features, and electrical connections. In addition, these consequences include the long-term consequences of HSR structure permanence in the landscape, and consequences associated with its operation and maintenance in the action area. All of the project components and consequences are described in more detail in the 2021 HSR BA and impact table (Authority 2021i, j).

2.5.1. Consequences to individuals

2.5.1.1 General Construction activities

General construction encompasses work onsite necessary to build HSR structures or otherwise modify the existing Caltrain system to accommodate HSR operations. General construction includes activities like site preparation; creation of access ways and roads; creation of staging areas; vegetation clearing and grubbing; operation of heavy machinery (track and ballast movement/tamping); vehicles and tool use onsite; installation of falsework, BMPs, and fencing; and other types of out-of-water earthwork and excavation or fill. It also includes in-water activities such as installation of cofferdams and turbidity control curtains. General construction activities have the potential to introduce noise, vibration, artificial light, and other physical disturbances into the immediate environment in and around the construction zone that can result in the harassment of fish by disrupting or delaying their normal behaviors and use of areas, and in extreme cases causing injury or mortality. These outcomes could occur immediately or later in time. The potential magnitude of effects depends on a number of factors, including type and intensity of disturbance, the proximity of disturbance-generating activities to the water body, the timing of the activities relative to the use and occurrence of the sensitive species in question, the life stages of the species affected, and the frequency and duration of disturbance periods. Consequences associated with general construction activities are anticipated in any location in the action area where the proposed HSR alignment crosses over or is nearby waterways that contain listed individuals, and effects are considered temporary, in effect only as long as activities are ongoing.

Fish may exhibit avoidance behavior near construction activities that displace them from locations they would normally occupy due to the noise generated by the operation of construction machinery or movement of soils and rocks during earthwork periods. Depending on the innate behavior that is being disrupted, the adverse effects could vary. An example of an immediate adverse effect to individuals would be cessation or alteration of migratory behavior. For juvenile fish, this effect may also include alteration of behaviors that are essential to their maturation and survival, such as feeding or sheltering, which co-occur with their outmigration from freshwater systems. Construction interactions with tidally-influenced waters are likely to cause temporary cessation of foraging behaviors.

In the absence of migration pattern alterations, general construction disturbance may increase fish physiological stress and increase risk of mortality. Fish vacating protective habitat due to disturbance may experience increased predation rates and decreased survival rates compared to those left undisturbed, which is an example of an indirect adverse consequence from construction. In extreme cases, general construction-related effects may also include debris and/or equipment falling into the channel. Such instances could cause physical injury or death if a fish was struck or crushed, or at least, acute avoidance tactics would be taken, altering any normal behaviors and inducing a high degree of acute physiological stress.

To minimize the impacts of construction on listed salmonids, the Authority has proposed to adhere to specific seasonal work windows for in-water and near-water construction activities of the HSR system in the section (pile-driving activities and associated consequences will be discussed in Section 2.5.1.3. Vibratory and impact pile driving, below).

Proposed seasonal work windows:

- In-water work within the wetted channel for nontidal channels: June 15 – October 15
- Near-water or over-water work for nontidal channels: April 30 – December 1

Proposed daily work hours:

- In the channel or on the floodplain: 1 hour after sunrise until 1 hour before sunset

Proposed work window exceptions (with NMFS confirmation):

- When channels are dry, ponded, lack continuous flow, or
- Water temperatures average 75°F or more for 7 consecutive days

All construction activities occurring on land, such as preparing the construction footprint and staging areas, are expected to create a small amount of fugitive dust that may settle into nearby waterways. But, because of the expected small amount and limited duration (standard construction BMPs include watering dirt roads to suppress dust creation from vehicle/equipment movement), any turbidity increases caused by dust input will be a minimal impact to any fish occupying affected waters. Dust effects are expected to persist only as long as active construction is occurring and are therefore temporary.

Construction activity in or near waterways also includes the placement of structures, movement of materials, and disturbance of soils in the water channels and riparian corridor. Such disturbance is likely to temporarily mobilize sediment and increase the likelihood of erosion, possibly sending it into associated waterways at elevated rates, particularly after the first rain event. Localized increases in erosion and in-water turbidity are expected to have adverse effects on rearing steelhead present in the action area during the proposed construction windows.

CCC steelhead

Adult CCC steelhead in this area are expected to display a winter-run life history, and peak spawning activity would be expected to occur January to March. The downstream migration of kelt CCC steelhead can occur until as late as May. The action area does not contain spawning habitat, so interactions with redds and developing eggs or fry are not expected. At the locations within the action area where adult exposure could occur (Crossings #1 Stevens Creek and Crossing #2 San Francisquito Creek, and possibly Crossing #3 San Mateo Creek), the probability of adult presence during the proposed work windows is very low, almost zero. When the in-water work window commences June 15th, surviving kelts would be expected to have completed their return trip from upstream spawning areas and have exited to the ocean by May at the latest. Therefore, exposure of adult CCC steelhead to general construction effects during the in-water work window is not expected to occur. During the near- or over-water work period of April 30th through December 1st, overlap with adult migration timing would be expected to occur for a few days early in the work period (for the kelt outmigration) and for a few days in late November through December 1st as a few adult individuals may emigrate early to the spawning areas, depending on in-stream flows. Therefore, the probability of exposure increases slightly during

the near-water work window if suitable water flow and temperature conditions are also present; thus, a few adult CCC steelhead could be exposed to general construction effects during the near- or over-water work period.

Juvenile abundance in general is expected to be slightly greater than adult abundance in fish populations. In particular to steelhead, resident *O. mykiss* parents may also produce anadromous steelhead offspring in addition to juveniles produced by anadromous parents (McEwan 2001, Courter et al. 2013, Pearse and Campbell 2018) and the potential exposure probability is greater due to the fact that juvenile CCC steelhead must spend at least one year of rearing in freshwater/estuarine environments before smolting while adults mostly use freshwater streams for only limited time periods around spawning. If pools/ponding is present within the work area at any crossing or interaction location, there is a low probability juvenile CCC steelhead may be exposed during either proposed work windows since their life history requires juvenile overwintering in fresh or estuarine waters before smolting and leaving for the Pacific Ocean.

Because salmonid use of waterways is generally limited by warm water temperatures and adequate flows, the Authority has also requested an exception to the work windows for in-water and near-water construction if local water temperatures are on average 75°F or more for seven consecutive days. One study of juvenile steelhead in southern California streams reported survival and normal foraging and activity in waters that would be considered lethal (>77°F); however, cool water refugia were not available to steelhead in this study (Spina 2006), and the author notes that in other studies where microhabitat selection was possible steelhead were observed to move to their preferential water temperature ranges (Nielsen et al. 1994, Ebersole et al. 2001). If water temperatures exceed preferred steelhead temperature maximum (most studies show steelhead prefer water temperatures below 68°F) for a week or more, fish are likely to have already vacated the area to seek cool water refugia elsewhere and would no longer be present in the waterways near the construction sites to experience associated adverse effects. Seven consecutive days is ample time for individuals to move to other areas where water temperatures are more suitable or move to estuarine areas of lower temperatures. In such cases, there is no cause for construction to adhere to the work windows designed to avoid steelhead use if construction impacts to individual steelhead would not be likely. If such an environmental situation occurs prior to the in-water/near-water work window start, the Authority or its contractors will contact NMFS to confirm with staff that local water temperatures measured 75°F or more for at least seven consecutive days, that steelhead presence is not expected in the area, and that construction may commence outside of the stated work windows because additional interaction with steelhead is not expected to occur. Conversely, if water temperatures drop below 75°F again, the Authority and its contractors propose to revert back to the original work windows intended to minimize adverse construction effects to steelhead in the action area.

The typical fish responses to exposure to general construction activities described above, such as temporary disturbance and disruption of critical behaviors like migration, resting, or feeding; temporary increased physiological stress; temporary avoidance of affected areas; and increased risk of predation for juveniles, describe expected CCC steelhead juvenile responses. Any very 'late' or very 'early' adults that may travel Stevens Creek, San Francisquito Creek, or San Mateo Creek as migration corridors could be exposed to general construction activities for a few days each year in which there is overlap with the beginning and ending of the probable migration period and overwater or near-water construction (adults would not be expected during the in-

water construction work window). Since the potential exposure overlap occurs at the very extremes of observed adult steelhead migration periods, only a few individual fish displaying atypically or ‘outlier’ migration timing would be expected, at most. Adults exposed to daytime overwater or near water work activities would be expected to be startled and temporarily delay their migration through the active work area. Due to the adoption of daylight work hours for work in the channel or in a floodplain as a conservation measure, nighttime quiet hours will ensure that adult migration will not be delayed longer than one work day, in a worst-case scenario, and the potential for this effect to occur is greatly limited to a few days a year, at most. During the quiet periods each night, adult steelhead would be expected to continue their migration as normal. Therefore, general construction effects are not expected to significantly disrupt normal behavior patterns of adult CCC steelhead in the action area.

In regards to dust and sediment mobilization, high sedimentation and turbidity levels have been shown to decrease juvenile growth and survival as a result of reduced prey detection and availability, and individual physical injury rates increase in high turbidity due to increased activity in association with gill fouling and even peer aggression (Bash et al. 2001). Sigler et al. (1984), in a lab study using juvenile steelhead and coho salmon, found individuals to preferentially occupy parcels of water between 57 and 77 nephelometric turbidity units (NTU) when given a choice. This result suggests that juvenile salmonids may avoid waters of very low turbidities (i.e., very clear waters) but also have negative outcomes in turbidities higher than 77 NTU.

25 NTU is the threshold most often appearing in literature regarding the lowest amount of turbidity that will have a negative impact on salmonids, though there are inconsistencies with this generalization. Undisturbed freshwater streams not receiving active rain runoff (i.e., in flood stage) typically have average NTU readings between 20 and 50 NTUs (Klein 2003) and are considered to have relatively high water clarity and to be ideal for salmonid use. In addition, many of the affected waterways in this discussion are SFBDE waters or at least a mixture of SFBDE water and freshwater where waterways are tidally influenced, complicating estimation of background NTU levels. In a recent study, in-situ water measurements of NTUs in the eastern SFBDE showed readings on average ranging from 10 to 40 NTUs (Ade et al. 2021).

Adherence to the SWPPP and implementation and maintenance of erosion control BMPs will be especially important in preventing construction stormwater from adversely affecting steelhead even after active construction ceases for the winter period. The only channel bed disturbance expected in the action area is at Crossing #9 Guadalupe Valley Creek/Brisbane Lagoon and Location #10 Visitacion Creek, and only juvenile CCC steelhead using estuarine habitat would be encountered at these locations. Disturbed areas are to be stabilized and re-contoured so as to not cause long-term sedimentation effects after construction activities are complete. Given the proposed development of a SWPPP and the other erosion control BMPs included in the project description (AMM-GEN-22 through 25) and general Authority construction guidelines, adverse effects are expected to be minimal and would cause steelhead to avoid the area for only as long as elevated turbidities persist.

In summary, juvenile CCC steelhead are expected to experience reduced fitness due to general construction activities through disruption of normal fish behaviors and their use of the wetted habitats near active construction zones. Equipment operation, construction noise, track and

ballast movement and modifications, bridge widening, soil disturbance, general human presence, etc., in and near waterways and tidal channels is expected to elicit these responses. Throughout the duration of general construction, and based on best available information regarding relative abundance, migration timing, and life history patterns, and with adoption of the proposed work windows, NMFS estimates that no more than 5 juvenile CCC steelhead would be exposed to and be adversely affected by general construction activities each year construction activities are occurring.

sDPS green sturgeon

Individual green sturgeon may be expected at any time in tidally influenced waters of the SFBDE, or crossings/locations #6 (Millbrae Station) through # 12 (China Basin/Mission Bay Channel), though there may be a slight peak in spawning adult presence from late winter through early spring as they head towards the Sacramento River Basin. Post-spawn adult outmigration is also variable between individuals, and juvenile use of estuarine and bay waters is continuous, so work windows are not as useful in avoiding green sturgeon interactions. Therefore, adults, subadults, and juveniles could be exposed in any tidally influenced waterbody with sufficient connectivity to the SFBDE in the action area even during the proposed work windows. Also, no strong hourly or diel patterns have been observed in green sturgeon movement within bays, instead green sturgeon seem to be active at all hours. It is generally accepted that they respond more to tidal cycles than daylight hours (Moser and Lindley 2006, Lindley et al. 2008, Lindley et al. 2011), so the daily hour work schedule as proposed will not necessarily avoid green sturgeon exposure.

Overall, adult green sturgeon abundance in the action area is expected to be very low, given the current estimate of total adult population abundance for the entire DPS range (NMFS 2021), and comparing the relatively small amount of SFBDE waters that are expected to be affected by general construction to the total amount of SFBDE waters available for green sturgeon use. Subadult and juvenile presence in the action area is also expected to be low but probability of exposure is increased as subadult and juvenile abundance estimates are approximately two to five times that of the adult population estimate (NMFS 2021). Where exposure to construction activities will occur to individual green sturgeon, the typical fish responses described above, such as temporary disturbance and disruption of feeding, temporary increased physiological stress, temporary avoidance of affected areas, and increased risk of predation for juveniles, describe expected green sturgeon responses. However, unlike CCC steelhead responses, temporary elevation of in-water turbidity due to construction is not expected to impact green sturgeon negatively since they are a bottom dwelling fish that forage specifically in fine sediment environments, like mudflats or tidal sloughs, for buried prey. Spawning green sturgeon seem to avoid turbidities above 10 NTUs (Poytress et al. 2011, Gruber et al. 2012, Poytress et al. 2015), but spawning is not expected in the action area. In addition, the development and implementation of a SWPPP and other erosion control BMPs referenced above are expected to sufficiently prevent or control erosion and sediment discharge. Therefore, adverse effects to individual green sturgeon from temporary elevations in turbidity are not expected.

In summary, sDPS green sturgeon are expected to experience reduced fitness due to general construction activities through disruption of normal fish behaviors and their use of the wetted habitats near active construction zones. Equipment operation, construction noise, track and

ballast movement and modifications, bridge widening, soil disturbance, general human presence, etc., in and near waterways and tidal channels are expected to elicit these responses. Throughout the duration of general construction, based on best available information regarding relative abundance, migration timing, and foraging behavior, NMFS estimates that no more than 5 juvenile and 2 adult/subadult sDPS green sturgeon would be exposed to and be adversely affected by general construction activities.

Conclusion

The proposed in-water and near-/over-water work windows align with windows recommended by NMFS during early technical assistance meetings to avoid the majority of the time periods adult CCC steelhead would be expected to use freshwater habitats, but do not completely eliminate the probability of exposing adults and disturbing their behaviors or use of their freshwater habitats. Because juvenile steelhead utilize freshwater habitats for at least a year before leaving for the ocean, juvenile steelhead could be present in any waterbody or ponded pools near the work areas, if that waterbody is connected to a steelhead waterway at any point in the year and that waterbody has suitable water conditions, including estuarine waters. Given typical steelhead life history patterns for freshwater habitat use in the action area and the expected exposure probabilities during the proposed work windows, there is a low exposure risk to a very low number of individual adult CCC steelhead, and a moderate exposure risk to a low number of juvenile steelhead, from general construction disturbance and temporary elevations in turbidities. Adults or juveniles may be deterred from using waterways near work areas, may delay their migration, and may experience temporarily elevated stress levels due to active general construction occurring near, or over waterways. However, slight disruptions and delays to migration of less than a day are not considered significant alterations of the normal behavior of migration as adults will be able to travel through the work area undisturbed during quiet non-work nighttime periods. Juveniles may use the impacted waterways for freshwater or estuarine rearing throughout the year and may continue to be within the affected work area and be exposed throughout the work season, accumulating physiological stress from daily disturbance. Acute injury or mortality from general construction activity is not anticipated to occur because it would require an extreme event (e.g., overwater support failure resulting in debris and construction materials violently crashing down into a waterway containing listed species); a probability risk so low it is not likely to occur. Overall, adhering to the seasonal and daily work windows will substantially decrease the probability that CCC steelhead will be present in the waterways affected by construction by decreasing the amount of overlap between fish presence and construction activities, but NMFS still expects a low number of individual juvenile steelhead to experience disturbance and reduction in fitness from construction while it is ongoing.

As referenced above, the proposed work windows will not eliminate possible exposure for green sturgeon. There exists a low probability of exposing a small number of individual juvenile, subadult, or adult green sturgeon to effects of construction activities which occur over or near tidally-influenced waters. Again, acute injury is not expected, only behavioral changes and stress associated with disturbance, such as temporary cessation of foraging, movement out of the affected area, and/or elevated stress levels experienced by exposed individuals.

2.5.1.2 Contamination of waterways from construction, equipment operation, staging, storage, and equipment maintenance

All activities that involve construction near, in, or over water (including seasonally dry channels) have some potential to deliver contaminants to surface waters, likely in liquid or particulate forms. Contaminants originating from construction areas can also be delivered to surface waters through stormwater discharges or accidental spills. Contaminants may also enter the aquatic environment through disturbance, resuspension, or discharge of contaminated soil and sediments from construction sites. Introduced contamination or contamination originating from resuspension during construction activities would be expected to be temporary in nature, persisting as long as stormwater discharges continue or as long as construction is ongoing. The various locations along the proposed alignment and the Brisbane LMF location have sediments that have been affected by historical and current industrial uses such as past railroad activity, petrochemical refinement and storage, and landfill use at this location (see Authority (2019c) regarding potentially contaminated soils).

The operation of construction equipment/heavy machinery is also likely to deposit trace amounts of heavy metals throughout the construction area (Paul and Meyer 2001). Heavy metals, even in trace amounts, have been shown to alter juvenile salmonid behavior through disruptions of various physiological mechanisms including sensory dampening, endocrine disruption, neurological dysfunction, and metabolic disruption (Scott and Sloman 2004). Oil-based products used in combustion engines for both fuel and mechanical lubrication contain polycyclic aromatic hydrocarbons (PAHs), which have been known to bio-accumulate in other fish taxa and cause carcinogenic, mutagenic, and cytotoxic effects to fish (Johnson et al. 2002, Incardona et al. 2009, Hicken et al. 2011). Studies have shown that increased exposure to PAHs also results in reduced immunosuppression and therefore increases susceptibility to pathogens (Arkoosh et al. 1998, Arkoosh and Collier 2002). Resuspension of contaminated sediments may also have adverse effects on fish that encounter sediment plumes or come into contact with deposited or newly exposed sediment. Exposure to contaminated sediments, either through direct exposure (e.g., swimming through plumes of re-suspended sediment) or foraging on contaminated food sources, has the potential to harm steelhead and sturgeon (Linville et al. 2002, Lee et al. 2006, Linville 2006, Presser and Luoma 2010b, a, Linares-Casenave et al. 2015).

Though these substances can kill fish or elicit sub-lethal effects when introduced into waterways in sufficient concentrations, adverse effects from hazardous materials from HSR construction is not expected due to the proposed hazardous material and construction stormwater BMPs integrated into the proposed action to control such pollutants and the implementation of an appropriate spill prevention control and countermeasures plan (SPCCP) and adherence to a SWPPP. For example, since earthwork construction at the Brisbane LMF will involve movement and excavation of known contaminated soils (former class II landfill and former railroad freight yard: heavy metals, volatile organic compounds, methane, PAHs, PCBs, pesticides, and asbestos), onsite management, transport, and disposal of contaminated soils is anticipated and various conservation measures (HMW-IAMF#1 through 10) have been incorporated into the proposed action which pertain to the identification of contaminated areas, potential methane detection and personnel training, use of barriers to limit release of volatile subsurface contaminants, and clean-up work plans should undocumented contamination be discovered(Authority 2019c). Standard regulations regarding the proper and safe handling and

transport of hazardous materials will be followed during construction (the 1975 Federal Hazardous Materials Transportation Act, the California Hazardous Waste Control Act, the 1990 Federal Pollution Prevention Act, and the Federal Occupational Safety and Health Administration regulations). Personnel would be trained to work with hazardous materials and the appropriate type and amount of spill cleanup materials would be made available onsite. Also, the construction management plan developed for the area would contain a contingency procedure if undocumented contaminated groundwater or soil were extracted or excavated from the work area so that it is properly and safely identified, sequestered, and/or disposed of offsite at a facility equipped to handle the material (Authority 2019c). Because the Authority has anticipated the presence of existing contaminated soils at the Brisbane LMF location and has adopted multiple conservation measures, will adhere to hazardous waste and pollution prevention regulations, and is ready to prepare contingency clean-up plans should undocumented contaminated soils be encountered, release of disturbed contaminated soils into waterways and exposure to listed fishes is not expected.

In addition to handling explicitly hazardous materials, the Authority has also adopted conservation measures that are expected to avoid the introduction of construction pollutants to waterways (AMM-GEN-4, AMM-GEN-16, AMM-GEN-17, AMM-GEN-20, AMM-GEN-22, and AMM-GEN-25) and therefore will avoid exposing listed fishes to such contaminants. The construction staging areas will be established in the same footprints that will ultimately be occupied by permanent HSR facilities whenever possible to further reduce the amount of disturbance and temporary impacts to natural habitats and reduce the amount of area which may accumulate contaminants on its surface. All equipment entering work areas will be cleaned of mud and therefore also be cleaned of any adherent trace contaminant material. Equipment may enter channel areas for daily use but will be removed and stored outside areas subject to flooding or tidal influence at the end of each work day. Any equipment or vehicles to be driven/operated in the floodplain or over water will be checked and maintained daily to ensure proper working conditions and prevention of leaks, and collection pans or absorbent pads will be placed underneath stationary equipment. Construction will be limited to dry periods when waterbody flows are low or absent, whenever feasible. Refueling and other maintenance would be conducted in areas distant from surface water and equipment would be checked daily for leaks. Surface water quality would be maintained through the use of siltation fencing, wattle barriers, soil-stabilized construction entrances/exits, grass buffer strips, inlet protection, sediment traps, infiltration basins, etc. A spill prevention and emergency response plan will also be developed as part of the SWPPP. Furthermore, the Authority would comply with SWRCB general construction permit conditions to minimize the release of contaminants from the construction site to waterways. Therefore, introduction of typical construction pollutants like PAHs and heavy metals to waterways containing listed fishes will be prevented and exposure of individuals avoided.

Due to the construction pollution prevention BMPs/AMMs/CMs/IAMFs adopted by the Authority, adverse consequences to steelhead or green sturgeon from contamination associated with these activities is not expected to occur.

2.5.1.3 Vibratory and impact pile driving

Construction will require the use of both vibratory and impact pile driving at one location to install piles to support permanent structures within 200 feet of tidally influenced water (Crossing # 9 Guadalupe Valley Creek/Brisbane Lagoon), south of the Brisbane LMF. No pile driving for the installation of falsework is proposed.

Impact pile driving near or in water has the potential to kill, injure, and cause death of fishes through infection via internal injuries, or cause sensory impairments leading to increased susceptibility to predation. The pressure waves generated from driving piles into river bed substrate propagate through the water and can damage a fish's swim bladder and other internal organs by causing sudden rapid oscillations in water pressure, which translates to rupturing or hemorrhaging tissue in the bladder when the air in the swim bladder expands and contracts in response to the pressure oscillations (Gisiner 1998, McCauley et al. 2003, Hastings and Popper 2005, Popper et al. 2006, Popper and Hastings 2009). Sensory cells and other internal organ tissue may also be damaged by pressure waves generated during pile driving activities as sound reverberates through a fish's viscera (McCauley et al. 2003, Caltrans 2015). In addition, morphological changes (damage) to the form and structure of auditory organs (saccular and lagenar maculae) have been observed after intense noise exposure (Hastings and Popper 2005). Smaller fish with lower mass are more susceptible to the impacts of elevated sound fields than larger fish, so acute injury resulting from acoustic impacts are expected to scale based on the mass of a given fish. Since juveniles and fry have less inertial resistance to a passing sound wave, they are more at risk for non-auditory tissue damage (Popper and Hastings 2009) than larger fish (yearlings, subadults, and adults) of the same species. Underwater sound may also damage hearing organs that may temporarily affect hearing sensitivity, communication, and ability to detect predators or prey (Popper and Hastings 2009).

Other activities such as vibratory pile installation and heavy equipment use can produce more continuous, lower energy sounds below the thresholds associated with direct injury but may cause physiological stress or behavioral changes. Multiple studies have also shown responses in the form of behavioral changes in fish due to human-produced noises in or near waterways (Wardle et al. 2001, Slotte et al. 2004, Hastings and Popper 2005, Popper and Hastings 2009, Vracar and Mijic 2011, Martin and Popper 2016, Pavlock McAuliffe 2016, Hawkins et al. 2017, Rountree et al. 2020). The observed startle responses or subsequent emigration from the areas affected by anthropogenic sounds disrupt the normal fish activities and behaviors that were previously occurring before the disturbance (e.g., migration, holding, or feeding). In the case of juvenile fish, unnecessary movement can expose individuals to increased predation risk as they leave areas with predator escapement cover.

Based on recommendations from the Fisheries Hydroacoustic Working Group, NMFS uses an interim dual metric criteria to assess onset of injury for fish exposed to pile driving sounds (NMFS 2008, Caltrans 2015, 2019). The interim thresholds of underwater sound levels denote the expected instantaneous injury/mortality, cumulative injury, and behavioral changes in fishes. Impact pile driving is normally expected to produce underwater pressure waves at all three threshold levels. Vibratory pile driving generally stays below injurious thresholds but often introduces pressure waves that will incite behavioral changes. Even at great distances from the pile driving location underwater pressure oscillations/noises from pile driving is likely to induce

flight responses, hiding, feeding interruption, or area avoidance, effectively blocking natural fish movement and use of the affected area. For a single strike, the peak exposure level (peak) above which injury is expected to occur is 206 decibels [dB (1dB = 1 micro-pascal [$1\mu\text{Pa}$] squared per second)]. However, cumulative acoustic effects are expected for any situation in which multiple strikes are being made to an object with a single strike peak dB level above the effective quiet threshold of 150 dB. Therefore, the accumulated sound exposure level (SEL) above which injury of fish is expected to occur is 187 dB for fish greater than 2 grams in weight and 183 dB for fish less than 2 grams. If either the peak SEL or the accumulated SEL threshold is exceeded, then physical injury is expected to occur. Behavioral effects may still occur below the thresholds for injury. NMFS uses a 150 dB root-mean-square (RMS) threshold for behavioral responses in salmonids and it is assumed that pile driving sounds less than 150 dB do not result in injury. Though the dB value is the same, the 150 dB RMS threshold for behavioral effects is unrelated to the 150 dB effective quiet threshold.

The Authority included a hydroacoustic analysis in the submitted BA (Authority 2021i), using anticipated pile sizes, the current alignment design, and the hydroacoustic data available in Caltrans (2015) to estimate probable underwater pressure outcomes. All piles would be driven on land or tidal channel that had been dewatered so work could occur in the dry. The pile sizes proposed in the alignment design are 14-inch square concrete piles, 57 for the Tunnel Avenue access road bridge and 114 for a Tunnel Avenue overpass (171 14-inch piles total). Based on data provided by project engineers, the analysis assumes that up to 25 piles per day may be driven and that it would take 500 strikes to drive each pile. It is therefore assumed that up to 12,500 strikes per day could occur over the course of seven working days. Water depth in the Guadalupe Valley Creek channel is shallow, less than 3 meters.

There are no data in Caltrans (2015) for 14-inch concrete piles driven on land so underwater information was used to represent the worst-case scenario. The acoustic reference selected is 14-inch square concrete piles driven in-water at Noyo Harbor, California (Caltrans 2015), which produced a peak of 183 dB, 157 dB_{RMS}, and 146 dB_{SEL} at 10 meters. This source data is considered to reasonably and conservatively represent the sound level of a 14-inch concrete pile driven on land. Sound levels produced by piles being driven on land are typically less than those of the same size driven in water. Currently there are no data supporting fish tissue recovery between pile strikes so all strikes in one day in which the affected waterbody experiences pile driving are counted together regardless if there is a break in between strikes. After an overnight period, or after 12 hours, accumulated SEL is considered reset to zero.

Using the assumed worst-case scenario underwater sound levels above for 14-inch concrete piles driven in-water without attenuation, and 12,500 impact strikes per day, the Authority's provided hydroacoustic analysis and the NMFS Pile Driving Calculator (NMFS 2008) estimate that the distance that instantaneous mortality due to underwater pressures greater than or equal to the 206dB peak threshold is not expected to occur (peak (dB) $\geq 206 = 0$ meters). Since CCC steelhead or sDPS green sturgeon weighing less than 2 grams are not expected within the action area, the 187 dB SEL threshold will be used for this scenario. For fish above 2 grams, the distance at which injury is expected to occur due to cumulative SEL exposure greater than or equal to 187 dB is within 5 meters from the driven pile. The distance within which behavior changes are expected is 29 meters from the driven pile, where the RMS sound will be greater

than or equal to 150 dB RMS. SELs below 150 dB are assumed to not accumulate or cause fish injury, or be significantly different from ambient conditions (i.e., effective quiet).

Table 3. Estimated threshold distances to in-water adverse effects using assumed hydroacoustic metrics (183 dB peak, 146 dB SEL, 157 dB RMS) and 12,500 strikes/day, calculated by the NMFS pile driving calculator (NMFS 2008).

Underwater sound control measures	Peak (dB) ≥ 206	Cumulative SEL (dB) ≥187 Fish ≥ 2 g	RMS (dB) ≥150
No attenuation	0 meter	5 meters	29 meters
Attenuation/On-land	0 meters	3 meters	14 meters

Use of impact pile driving would be minimized through first being used only on land or in a dewatered area behind a cofferdam and then by using vibratory pile driving to the extent feasible before impact pile driving is employed. These piles are permanent structures and will not require removal. An Underwater Sound Control Plan (AMM-FISH-3), dewatering (AMM-FISH-4) and a Fish Capture and Relocation Plan (AMM-FISH-5) are also proposed as part of the project, which will help minimize exposure of fishes to underwater pressure waves from pile driving.

Underwater sound control measures/minimization measures are incorporated into CMs proposed by the Authority and to the extent feasible whenever impact pile driving is performed (e.g., dewatered cofferdams, bubble curtains, and vibration-damping pile caps). Given that at least one underwater sound measure would be employed during impact pile driving, 5 dB hydroacoustic dampening may be assumed at time of exposure (Table 3; 178 dB peak, 141 dB SEL, 152 dB RMS), which would result in reduction of the cumulative SEL threshold distance to only 3 meters from the driven pile and a reduction of RMS threshold distance to 14 meters from the driven pile (still considering 12,500 strikes per day).

The exposure, risk, and response to individual CCC steelhead and sDPS green sturgeon to pile driving effects are the same because both species have a low but equal probability of being exposed to the effects described above at the proposed location. Both green sturgeon (juvenile, subadult, or adult) and juvenile CCC steelhead may be present at any time in the Brisbane Lagoon or in tidally influenced parts of Guadalupe Valley Creek, though in low numbers, for rearing and feeding purposes. Since impact pile driving will only occur during the proposed in-water work window, it is unlikely pile driving activities will overlap with adult CCC steelhead presence. The number of individual fish affected by pile driving is expected to be small due to the life history patterns of the fishes and the existing environmental factors that limit fish use of the waterway (culverts and levees). Adverse effects associated with pile driving are potential injury and behavioral effects, for as long as the pile driving is occurring. The actual number of individuals to be adversely affected is expected to be very low with perhaps at most one or two individuals experiencing injury, especially since the injury threshold distance is within 3 meters of the driven pile when at least one attenuation minimization measure is employed or when the pile is driven on land, an extremely limited affect area. Otherwise, most fish that are exposed to elevated underwater noise will experience temporary increases to their risk of mortality from predation and reduced fitness from expending energy with a temporary reduction in feeding opportunity if they are disturbed by these activities and leave the area. Underwater noise levels would return to baseline levels following cessation of pile driving, and sound exposure would be

‘reset’ after 12 hours of effective quiet. These adverse effects would occur for a total of approximately seven days total while the required pile driving is completed.

2.5.1.4 Cofferdam installation, flow redirection, and dewatering

During the in-water work windows, cofferdams may be installed at Crossing #9 Guadalupe Valley Creek/Brisbane Lagoon and Location #10 Visitacion Creek as part of the construction of the Brisbane LMF to isolate and dewater areas below the ordinary high water mark (OHWM) as necessary, and before pile driving. Cofferdams will be installed through placement of sandbags or equivalent structures, and channel the stream through an alternate course that may be either an artificial structure such as a pipe or a constructed artificial channel. The artificial or constructed structure will meet NMFS (2011) fish passage requirements. Pumped out water will be directed or trucked to nearby infiltration pits/basins that will allow the water to return to the local water table without affecting in-stream water quality. Pump intakes would be screened to prevent the entrainment of juvenile salmonids or sturgeon from entering the pump system, screen mesh size determined according to NMFS (1997) guidelines. At the end of the work season, prior to the rainy season, water will be allowed to re-enter the work area by the isolating structures and the alternate flow pathway will be decommissioned. At the conclusion of work, prior to the end of in-water work window, water is typically allowed to reenter the work area, the isolating structures are removed, and the alternate flow path is dewatered and decommissioned. However, at conclusion of work at Visitacion Creek, most of the affected channel would be permanently culverted.

Entrapment of adult CCC steelhead or subadult/adult green sturgeon are not anticipated during cofferdam establishment or dewatering activities. Adult CCC steelhead are not expected to be exposed to cofferdam installation due to their typical life history patterns within the action area not overlapping with the proposed in-water work window. Adult and subadult green sturgeon are large enough (>60 cm total length) that biological monitors are expected to be able to observe any individuals that may become entrapped by the cofferdam and stop potential entrapment before it occurs, or use seines to move individuals out of the area to be encircled by the cofferdam (following AMM-FISH-4, AMM-FISH-5). As discussed in Section 2.5.1.1, juveniles of each species do have a low chance of being entrapped in a cofferdam because they would be expected to be present in low abundance numbers within the action area during the in-water work windows and their smaller size would make them difficult to locate using visual surveys only. If juveniles are not moved out of the dewatering area via seining before becoming completely entrapped there is a low but not zero chance juveniles may be exposed to dewatering (see Section 2.5.1.5. on fish capture and relocation, below).

During active dewatering, entrainment of juveniles into the pump intakes will be prevented by using the screens specified by NMFS guidelines (NMFS 1997). As the pumping activities will all follow NMFS screening guidelines, injury to fish caused by impingement will be minimized. However, even if properly screened, a small number of juveniles remain at risk of being impinged upon the screen surface when intake velocity of the pump exceeds their swimming capabilities. Injury resulting from impingement may be minor and create no long-term harm to the fish, or result in injuries leading to mortality either immediately or at some time in the future, including predation or infections from wounds and abrasions associated with contact with the screen. As pumping activities may need to occur over a period of several years until construction

is complete, a small portion of fish exposed to the pumping activities are expected to experience injury or death from impingement.

Inside a cofferdam being dewatered, turbidity is expected to be elevated and trapped juveniles are likely to experience respiratory stress and potentially asphyxiate if not captured and relocated promptly (see Section 2.5.1.5. below). Similarly, it is expected that any water pumped out during dewatering will either be managed by collection into an infiltration basin or discharged behind an in-water turbidity curtain to control the impacts to downstream turbidity levels. Because of these CMs, and previously analyzed turbidity control BMPs, it is not expected that downstream turbidity will increase due to discharge water pumped from cofferdams. Turbidity may be temporarily elevated shortly after flows are restored to a dewatered area or channel, but in light of expected turbidity levels in the first rain flush of the season (expected to co-occur with rewetting the work area), the additional temporary elevation in turbidity associated with the proposed action is expected to be indistinguishable from background turbidity levels.

The portions of the channels dewatered will be temporarily unavailable for steelhead and green sturgeon use while the isolation barrier is intact and dewatered, primarily affecting the area available to them to forage. However, the relative amount of area removed from their access temporarily would be negligible when considering the size of Brisbane Lagoon. Because the Authority proposes to construct the artificial channels so that they meet NMFS fish passage criteria (NMFS 2011) to ensure they do not become passage barriers, changes to the movement patterns of fishes are not expected.

2.5.1.5 Fish capture, handling, and relocation associated with dewatering

As described above, there is also a low possibility that a small number of juvenile steelhead or juvenile green sturgeon may become entrapped or stranded during cofferdam installation and risk asphyxiation or experience mortality during dewatering. They may also become injured while entrapped and experience higher levels of physiological stress at sub-lethal levels. The Authority proposes to capture and relocate entrapped fish before dewatering begins to maximize their probability of survival and minimize the project's harm and injury to listed fishes from such activities. A fish relocation plan will be drafted and approved by NMFS before dewatering activities that may affect fish commence, and will include methods for minimizing stress and the risk of mortality from capture and handling of fish (see AMM-FISH-5 (Authority 2021i, c)).

Prior to any potential fish relocation or fish handling associated with dewatering, the Authority or its contractors will contact NMFS so that such activities can be coordinated, staff are aware and available to respond to the activities, and to help ensure minimal adverse effects to fish through appropriate capture and handling procedures. It is expected that the number of juveniles needing fish relocation and handling will be very low due to expected low abundance and limited amount of area enclosed by the cofferdam, and because dewatering and pumping should only occur at two locations (Crossing #9 Guadalupe Valley Creek/Brisbane Lagoon and Location #10 Visitacion Creek) once per construction season during which cofferdam establishment is required.

The Authority proposes that cofferdam establishment would only commence when channels are seasonally or tidally dry; however, some juveniles may become entrapped in any ponded water

within the construction zone. Throughout the period of in-water work in which cofferdams may become established, based on best available information regarding relative abundance, migration timing, and life history patterns, and with adoption of the proposed work windows, NMFS estimates that no more than 5 juvenile CCC steelhead and no more than 5 juvenile sDPS green sturgeon would become entrapped in a cofferdam and require capture, handling, and relocation to increase their chance for survival. Though individual juveniles will experience increased stress and possible injury, it is preferable to capture and relocate them into connected aquatic habitat compared to the eventual mortality these individuals would otherwise likely experience if they remained in an area that is to be dewatered. Stranded juvenile CCC steelhead and sDPS green sturgeon would likely experience increased stress levels, shock, and suffer mild injuries during capture and handling, even if seasoned fisheries biologists perform the fish relocation with appropriate equipment under ideal conditions. Some juveniles may be killed during capture, handling, or transport, while others may be disoriented at release, leaving them more susceptible to predation. Furthermore, fish are more likely to develop serious infections from small wounds inflicted during handling compared to unhandled fish. The expected rate of immediate mortality due to capture and handling is expected to be low (i.e., no more than 3%, on average, of the total number of juveniles relocated when electrofishing is used (Dalbey et al. 1996, McMichael et al. 2011)). It is also possible that some juveniles will avoid the capture methods and die while hiding due to asphyxiation in extremely elevated turbidity in the available water, desiccation, or receive fatal wounds in the dewatering/fish capture process (see Section 2.5.1.4., above). Proposed CMs AMM-FISH-4 and AMM-FISH-5, which focus on dewatering and fish relocation, were developed with technical assistance from NMFS staff and duplicated measures established in prior opinions dealing with Central Valley salmonids (Term and Condition 1i, (NMFS 2019a)).

2.5.1.6 Curing new concrete

The proposed action includes culverting Visitacion Creek at Location #10. The pouring of new concrete may negatively affect water quality by increasing the pH of water in contact with curing surfaces, though the amount the curing cement will increase pH in water decreases over time as the concrete cures. These pH changes can affect fish to varying degrees through direct damage to gills, eyes, and skin, and interfere with fishes' ability to dispose of metabolic wastes (ammonia) through their gills (Washington Department of Fish and Wildlife 2009). In addition, alkali may leak from freshly cast concrete for some time after curing if in contact with water, up to several days to months depending on the water in the water-cement ratio of the mix (CTC & Associates 2015).

Because the casting and curing of concrete will be done "in-the-dry," the potential that the curing concrete will adversely affect water quality and fish health is greatly reduced. New concrete is expected to mature and be practically inert within six months after casting, but it is possible that raised water heights caused by rain or king tides in the months following project completion may cause SFBDE water to be in contact with the concrete before curing is complete. The relatively larger amount of mixing volume expected when the concrete is in the last stages of maturing *and* is in contact with raised water levels is expected to dampen any potential changes in pH of stream water from contact down to immeasurable differences due to volumetric dilution, even if listed fishes are present while the cement is still precipitating alkali. Once the concrete is completely cured and chemically inert, potential pH changes are expected to cease. Therefore,

adverse effects to steelhead or green sturgeon from chemical changes from new concrete are not expected to occur.

2.5.1.7 Vibration and noise from HSR train operations

Once the California HSR system is completely constructed and ridership commences complete with regular schedules, trains running on the viaducts and tracks may disrupt normal fish behavior due to the noise and vibration that comes from high speed operation of the rolling stock and passenger cars. Japan's Shinkansen HSR is reported as running up to thirteen trains in each direction at peak hours with (Central Japan Railway Company 2019), sixteen cars in tow each (likely out of the major metropolitan hub of Tokyo, Japan). While it is currently unknown if the California HSR system will eventually run as many trains as the Shinkansen system per hour over CCC steelhead and sDPS green sturgeon waterways, it is expected that daily disturbance due to the train's schedule could occur often throughout the day and night once the system is in operation.

Quantification of the effects of HSR systems on aquatic organisms or fish is lacking; however, it is generally accepted that transportation noise pollutes aquatic and marine environments (i.e., ship traffic in waterways and automotive and rail traffic over bridges permeating into the aquatic environment (Popper and Hastings 2009, Martin and Popper 2016, Pavlock McAuliffe 2016, Hawkins et al. 2017, Rountree et al. 2020)). Additionally, HSR systems regularly cause disturbance to human residents that live in close proximity to tracks in operation (Yokoshima et al. 2017); therefore, disturbance to fish utilizing habitat under viaduct crossings is similarly expected. Studying fish responses to varying levels and types of transportation/disturbance sounds have produced unclear results (Federal Railroad Administration 2012). However, based on the speed, wind shear, and vibrations that will be associated with the HSR operations (Hunt and Hussein 2007), fish are expected to be startled as engines and passenger cars pass overhead throughout a 24-hour period. A study of ambient noise in large rivers with variously-sized bridges carrying both automotive and train (passenger or freight was not specified) overhead (Vracar and Mijic 2011) observed a maximum of 22 hertz with a mean level of 95 dB approximately 3-5 kilometers from the bridges, roads, and railways at the most comparably-sized river. Rountree et al. (2020) quantified that brook/creek habitats contained averages of 99.4 dB RMS (re: 1 μ PA RMS) while river habitats contained averages of 101.1 dB RMS (re: 1 μ PA RMS). These situations are comparable to future HSR operations as all of the overcrossings in the action area will host blended services with other railway operations, and some HSR overcrossings will be in close proximity to highway and other roadways that currently support vehicular traffic. The train underwater sound contributions in Roundtree et al. (2020) were noted as being relatively brief and bolstered by any use of the train horn. The distance to the study railroad bridge was also noted as being approximately 500 meters. Therefore, it is expected that the sound environment under and near HSR crossings will not exceed 100 dB RMS (re: 1 μ PA RMS) underwater beyond 500 meters from the crossing location in the affected waterbody. While the waterbody sizes in this study were different than the areas being analyzed in this opinion, and while the trains running overhead in the study would likely be louder than the HSR system and though the measurement was taken from quite a distance away from sources, these estimates do offer some insight into the expected maximum impact to the underwater sound environment from regular HSR operations, which are expected to be much quieter but must be considered in combination with existing underwater sound conditions.

There are some mechanisms the Authority can incorporate to dampen operational vibration and sounds that transmit down the columns into the river channel and water column, but it is currently undecided which if any dampening tactics will be used and to what degree they will be incorporated into the track design or rolling stock selection (Federal Railroad Administration 2012, Authority 2014, 2016). Listed fishes that are temporarily startled by vibrations or sound are expected to leave the immediate area, moving either upstream or downstream. This is expected to alter their migration, holding, and foraging patterns to a small degree, though to what degree is difficult to quantify. Unwarranted startle responses would also make juveniles susceptible to attack from piscivorous predators and increase their risk of mortality. Cessation of foraging behaviors due to train operation disruptions will likely slightly decrease their growth rates as energy acquisition is exchanged for energy expenditure. Adverse effects associated with noise and vibration from train operation are expected to persist in perpetuity, as long as the HSR system is in operation.

2.5.1.8 Permanent HSR structures overwater and associated shading or night lighting

All HSR alignment waterway crossings will contribute to artificial waterway shading. Some crossings also entail bridge deck widening of existing railway crossings, which would increase the amount of shading proportionally. The only new overcrossings are the Tunnel Avenue access road bridge and overpass (Crossing #9 Guadalupe Valley Creek/Brisbane Lagoon). The existing crossings' spans are regularly quite short as the waterways have already been channelized, often much less than 80 feet in length and 60 feet in width.

Overwater structures affect the amount of light that reaches the water column and the bottom of a streambed, which limits or prevents riparian and estuarine plant growth underneath and around the structure due to shading. Introduced shade has cascading effects on the benthic ecosystem immediately underneath the structure (Kahler et al. 2000). This changes the type and amount of prey available to foraging juvenile steelhead or green sturgeon that use these areas. Also, the shade created by artificial structures is drastic or sharp compared to that cast by overhanging vegetation (i.e., low and wide structures create stark high light and low light areas in the water column/substrate, versus the gradual and diffuse shading created by tree leaves). Predators are likely to hide in the shadowed areas to ambush prey, such as juvenile salmonids, coming in from bright light areas with greater success compared to predators not hiding in stark shadows (Helfman 1981, Lehman et al. 2019). In some cases, overwater structures can serve as novel roosting or nesting for piscivorous birds (PFMC 2014). However, at this time avian predators are not a notable source of mortality for juvenile steelhead in the recovery plan for the affected basin (NMFS 2016d). Therefore, the localized shading below the overhead crossings will slightly increase the risk of mortality from predation in ways that are expected to reduce the overall fitness and survivorship of juvenile steelhead and green sturgeon that must use the waterways over which structures are placed or maintained.

There is also a possibility that overwater HSR crossing structures may require permanent nighttime lighting for operational safety reasons. AMM-FISH-1 stipulates that temporary lighting for night construction on overwater structures will be designed so that illumination of the water is avoided, but this CM does not address operational effects. It is likely that both juvenile listed fishes and piscivorous predators will be attracted to night lighting over waterbodies in which they co-occur (Lehman et al. 2019). This will concentrate both predators

and juvenile steelhead in night lit areas. While green sturgeon juveniles may be less influenced by light levels in general, concentrating piscivorous predators around these structures and increasing the probability of encountering predators is expected to increase the mortality risk of juvenile steelhead and green sturgeon that use the affected area for foraging and rearing in perpetuity, for as long as water crossing structures use night lighting.

2.5.2. Consequences to critical habitat

2.5.2.1 Site preparation and vegetation removal

Site preparation is required and will likely occur early in the seasonal near-water work window periods (April 30 onward) and will include pre-construction surveys, sensitive habitat identification, installation of exclusionary fencing, and other similar BMPs intended to minimize impacts to natural habitats. Site preparation will also include earth moving, leveling, slope grading, excavation, road installation, and relocation or installation of HSR utilities. In the process of preparing the site for major construction, riparian vegetation and trees may be trimmed or removed for construction access at Crossing # 1 through Crossing #5. Of note, crossing locations #1 through #5 are freshwater riverine habitats which contain CCC steelhead freshwater migration corridor PBFs. The areas scheduled for vegetation removal are not considered green sturgeon critical habitat in this region, so adverse effects to green sturgeon PBFs from vegetation removal activities are not expected. The consequences to individual fish from general construction activities near waterways is discussed above in Section 2.5.1.1; this section will analyze the consequences of vegetation removal on the functionality of the critical habitat impacted by these activities.

The expected decreases in riparian vegetation will create physical changes in the habitat, which are expected to cumulatively result in degradation to the remaining migration and rearing habitat PBFs (Bjornn and Reiser 1991). Changes in vegetative cover can influence the macroinvertebrate prey assemblage, through alterations in shading, water temperatures, and nutrient inputs, to one less supportive of juvenile growth (Meehan et al. 1977). Removal of riverine vegetation will also reduce the natural cover that was previously available on site and reduce the general habitat complexity that would otherwise be beneficial to rearing steelhead's growth, survival, and eventual migration out of freshwater. Particularly, at major overcrossings #1 and #2 (Stevens Creek and San Francisquito Creek), riparian vegetation removals would decrease rearing and migration habitat PBFs complexity in stretches of streams that are already heavily impacted from anthropogenic modifications, channelization, and urbanization. Removing riparian trees also removes potential sources of LWM input over the long term, a legacy issue for CCC steelhead critical habitat in the action area. The Authority estimates that a total of 0.620 acres of riparian vegetation may be removed, including the loss of several trees (approximately eleven trees (Authority 2021i)).

The Authority proposes to replace all removed vegetation with native plants on-site to resemble the existing community, and to use 'soft' approaches to bank erosion where feasible, including vegetative plantings in bank stabilization efforts, or mitigate offsite for the same habitat type. Though the Authority has proposed to replant the disturbed areas with native riparian species to the extent practicable (plan forthcoming, anticipated at a higher ratio than what was removed, see CM-RIPN-1 BA Appendix 2-B (Authority 2021c)), there will be temporary reductions of

vegetative cover at all crossing construction locations discussed until the plantings establish and flourish, or a permanent loss of this habitat type in cases where HSR structures will permanently occupy habitat that before hosted native riparian vegetation and where previous urban development has limited the amount of area available for onsite replanting. The period of reduced riverine vegetation functionality will begin when site preparation commences and will persist for several years while construction is ongoing, until replanting occurs. The replanting will likely take at least one year to execute, and it will be several years to decades until the vegetation matures to the pre-disturbance state, depending on the age of the trees removed. During this lengthy interim, the riparian vegetation component of the freshwater migration corridor PBF for CCC steelhead will be degraded from its current baseline condition and the habitat's ability to support juvenile steelhead rearing is expected to be reduced due to these habitat changes. After the disturbed areas are fully restored with native plantings and 'soft' bank stabilization methods, there is potential for the critical habitat to be of greater complexity and functionality than its current baseline status in some of the more degraded areas.

2.5.2.2 Installing hard armoring, abutments, and bank/slope stabilization measures

Abutments will be placed at Crossing #9 Guadalupe Valley Creek/Brisbane Lagoon to support the Tunnel Avenue access road and overpass. As previously stated, "soft" approaches which incorporate vegetative plantings and large woody debris into the stabilization and revetment designs will be used to the extent possible. A combination of both tactics will likely be used at each site to maintain a more natural riparian corridor and maintain or increase anadromous habitat functionality, while ensuring bank and slope stability.

The consequences of installing hard armoring, abutments, etc. on individual fish is covered under the discussion of general construction effects, as described in Section 2.5.1.1. Once installed, hard structures remove the marginal shallow water habitat at the water/bank interface that provides refugia for juveniles due to its shallow water prism, reduce the total amount of natural area that could be used by species through physical occupation of the habitat, change the prey base through alteration of the benthic substrate type and local water dynamics, and often provide ambush habitat for non-native piscivorous fishes which are attracted to artificial hard surfaces with stark shading (Kahler et al. 2000, Tiffan et al. 2016). In addition, the act of bank stabilization is expected to prevent normal shoreline processes from occurring (Munsch et al. 2017). Instead, the placement of any hard structure is expected to perpetuate the channelization and homogenization of affected areas and reduce foraging habitat of both species into the future (Knudsen and Dilley 1987, Fischenich 2003, Gedan et al. 2010). Therefore, the habitat changes that follow abutment placement are expected to have a negative impact on CCC steelhead estuarine and sDPS green sturgeon foraging PBFs.

2.5.2.3 Permanent HSR structures overwater and associated shading or night lighting

Overwater structures and associated shading or night lighting is expected to cause a cascade of changes in the habitat that result in negative outcomes for the affected waterbody, similar to those discussed in Section 2.5.1.8. for consequences to individuals. Regarding the consequences to affected critical habitat, these changes are expected to result in negative changes to the available PBFs in ways that are expected to reduce their ability to support the steelhead and green sturgeon populations that rely on the waterways.

The benthic habitat around and under the Tunnel Avenue bridge and overpass is expected to provide suitable habitat for the benthic prey of both rearing steelhead and foraging green sturgeon (part of CCC steelhead estuarine areas PBFs and the sDPS green sturgeon estuarine habitats food resources PBF). The footings of the support columns for the Tunnel Avenue access road bridge and overpass (Crossing #9 Guadalupe Valley Creek/Brisbane Lagoon) will permanently and physically occupy estuarine habitat, and the column footings are likely to interact with the tidal flow from Brisbane Lagoon. These concrete piles will change the hydrodynamics in the area and affect sediment deposition rates upstream and downstream from the location (Oregon Water Resources Research Institute 1995, Dalrymple et al. 2012). Changing the sediment composition underneath and around the bridge is expected to change the prey composition available within the affected critical habitat accordingly, which will further degrade the available PBFs of CCC steelhead estuarine and sDPS green sturgeon estuarine foraging habitat.

The introduction of artificial structure shading and night lighting also increases risk of predation on juvenile fish, as noted in Section 2.5.1.8. As predation increases and local juvenile survivorship decreases, the value of the affected critical habitat to the DPSs is further reduced as less individual fish from these populations can effectively utilize the rearing and foraging PBFs. In summary, adverse effects to CCC steelhead estuarine and green sturgeon estuarine food resources critical habitat PBFs, especially to those necessary for juvenile fitness, are expected to occur due to the placement and continued use of permanent structure over waterbodies by causing shading or artificial nighttime illumination, which will slightly degrade the affected PBFs further in addition to their current degraded states, and this degradation will persist as long as the structures remain.

2.5.2.4 Installation of culverts

The Authority proposed to install a permanent culvert at Visitacion Creek at Location #10 as part of the Brisbane LMF design. The culverting of Visitacion Creek amounts to removal of most of the waterway upstream of the culvert (as the upstream habitat will be occupied by the Brisbane LMF) and permanent prevention of its potential use by either species in perpetuity. Modifications that confine and channelize streambeds like culverts also have the potential to restrict or prevent the movement of steelhead or sturgeon through the area. The Authority proposes to design the culvert so it will meet CDFG (2009) and NMFS (2011) fish passage requirements for the lower third of Visitacion Creek which will remain available to tidal flows and accessible to fish. Meeting fish passage criteria will prevent individual fish from being stranded upstream of its placement as water levels fluctuate with the tidal cycle, so changes to the functionality of migratory PBFs are not expected. This action will cause the same adverse effects as described above regarding the placement of hard armoring and abutments, and will reduce available CCC steelhead estuarine and green sturgeon estuarine food resources PBFs through occupation by an artificial hard structure as more shoreline is developed.

2.5.2.5 Impacts from HSR system operation over time

General HSR System Operation

Currently, the state of California's electricity grid would power the HSR system, and is expected to require less than 1% of the state's future projected energy demands (Authority 2016, Authority and FRA 2018, Authority 2019b). Because the power supplied by California's electricity grid is not necessarily from 100% renewable clean energy sources at this time, the Authority will instead obtain the quantity of power required for the HSR system by paying a clean-energy premium for the electricity consumed, with a goal of a net-zero rail system (Authority 2019b). Renewable energy sources such as sun, wind, geothermal, and bioenergy are cited as options. Over time, use of such renewable sources would be expected to decrease the amount of carbon released into the atmosphere; however, if hydropower is utilized, the perpetuation of greenhouse gas release from reservoirs could be considered an adverse effect of the HSR system (Deemer et al. 2016). Additionally, reliance on hydropower for electricity would likely be further linked to the decline of salmonids in California as dams continue to block salmonids from a majority of their spawning and holding habitats (Busby et al. 1996, NMFS 2013, 2014, 2016d, c, 2017a, 2018), as well as controlling and adversely altering the water flow and water temperature regimes downstream. Since hydropower is not cited as a possible renewable energy source for the HSR system, it is not expected that the creation of the electricity used to power the high speed trains will cause adverse effects to listed salmonids or their designated critical habitat beyond baseline conditions.

Operational Pollution and Stormwater

While the HSR system is a passenger train designed to run on electricity and will not carry any cargo composed of hazardous material (Authority and FRA 2018, Authority 2019b, 2021i), other sources of pollution are still expected to occur. While the exact vehicle type has not been selected, the HSR will use electronic propulsion power supplied by an overhead system on a steel-wheel-on-steel-rail track. Such systems are widely regarded as one of the least polluting transportation systems available, with the Japanese Shinkansen touting 1/8 to 1/12 the carbon emissions per passenger as an airplane for the same distance (Central Japan Railway Company 2019). However, all trains and machinery require lubricants that release PAHs, and the braking system will also release heavy metals and other compounds during breaking as the breaking pad materials are worn down and degraded by use (Brooks 2004, Bukowiecki et al. 2007, Burkhardt et al. 2008, Wilkomirski et al. 2011, Wilkomirski et al. 2012, Bobryk 2015, Levengood et al. 2015). Therefore, train operations are expected to contribute low-levels of heavy metals such as zinc, copper, lead, nickel, manganese, chromium, and iron to the environment adjacent to the tracks, and most studies indicate that the concentration of these metals and PAHs increases drastically at station platforms and at maintenance yards such as the Brisbane LMF (Bukowiecki et al. 2007, Wilkomirski et al. 2011, Wilkomirski et al. 2012). And because parking lots will be installed at the Brisbane LMF, in addition to typical railroad pollutants like PAHs and heavy metals, the project is also expected to contribute some amount of tire wear particles and 6-PPD quinone into the local ecosystems. 6-PPD quinone is known to be acutely toxic to coho salmon (Tian et al. 2021), and alter and reduce the freshwater prey base of juvenile salmonids (McIntyre et al. 2015). Adverse effects from this pollution would be similar to the outcomes described in Section 2.5.1.2. for construction-related pollution, only it would be more ubiquitous throughout

the system as small amounts would be received by the waterways throughout the entire action area and persist while operations continued.

The Authority proposes to capture all stormwater runoff from created impervious surfaces (Authority 2012, Authority and FRA 2018, Authority 2021i). The BA estimates that 117.5 acres of new impervious surface will be installed within the action area due to the proposed action, the largest amount being installed at one location will be at the Brisbane LMF (45 acres). In other sections, all stormwater runoff created by the HSR system, including the tracks, support structures, maintenance facilities, stations, passenger parking lots, and ROW access roads will be redirected as sheet flow into adjacent drainage systems or swales to infiltration basins designed as water quality control measures. No runoff from the proposed action will be directly discharged to any surface water body, including runoff from bridges, overpasses, underpasses, and aerial structures without prior treatment. The Authority is implementing low impact development (LID) designs and other stormwater BMPs to manage and treat stormwater and protect water quality as it leaves HSR station and passenger parking lot areas. Measures may include vegetated stream setbacks, vegetated buffer zones, tree planting and preservation, and/or vegetated swales (bioswales), in accordance with SWRCB's Phase II Small Municipal Separate Stormwater Permits. In addition, there are some studies that suggest that the green spaces created by railway ROW can be beneficial habitat for wildlife when not disturbed by regular railway operations (Lucas et al. 2017).

The exact stormwater control and treatment designs for this project section are still forthcoming. To date, the Authority has posted public stormwater outreach efforts on their website (Authority 2019d) and has incorporated LID stormwater control design plans into past station design and criteria documents (Authority 2012). It is anticipated the Authority will install significant treatment BMPs within the action area to control and treat a large portion of transportation pollution created by operation of the HSR system before discharge to critical habitat; however, it is nearly impossible to treat all stormwater pollutants before discharge at all times because there is always the possibility of a precipitation event occurring that produces more runoff volume than the stormwater treatment system is design to treat or contain. And, it is only through monitoring and regular maintenance of the installed stormwater treatment system that continued pollutant sequestration or removal can be known.

Therefore, the primary impact on critical habitat from stormwater is periodic increases in pollutant loads entering affected waters, despite a robust stormwater treatment approach. Some water quality contaminants are expected to be discharged into receiving waters due to treatment inefficiencies for certain pollutants and storm events which exceed facility design. This will cause a long-term, adverse effect to the critical habitat water quality PBFs for both species through the periodic addition of heavy metals, PAHs, tire wear particles, and other general transportation pollution created or introduced by the project.

HSR System Maintenance

As with any major transportation or infrastructure system that provides a service to the public, the Authority will perform regular structural, erosion, and disaster (flood, fire, and earthquake) safety checks to ensure the integrity of the tracks and support columns of the HSR system. Such protocol formations are in their infancy, and draft plans are not available to review; however, it is

assumed that some safety checks will be performed on these viaduct crossings and require personnel to be in close proximity to the river channels, and possibly require putting personnel or equipment in water. NMFS expects that the Authority will be in contact with staff (based on implementation of the EMMA environmental compliance system during operations) when draft safety check protocols are available so that a determination can be made with Authority staff at that time regarding whether such activities may affect listed species and critical habitat.

Similarly, it is expected that vegetation control near HSR tracks and column footings will be required in the future. Vegetation control plans and protocols have not been officially drafted or adopted (though the Authority proposes to generally follow Caltrans (2014) vegetation control measures), but these activities would likely include manual removals, such as trimming and “weed whacking”, and also some forms of herbicide application. It is also likely that by the time the HSR system requires vegetation control (Phase 1 operations to begin in action area in approximately 2030), the 2014 Caltrans vegetation control manual will be obsolete and replaced with an updated version with a revised list of approved near-water or aquatic application herbicides. If vegetation control is required in the riparian corridor, in floodplain habitat, or near waterways containing listed fish, the Authority would request ESA section 7 consultation with NMFS regarding the effects of such activities on listed species and critical habitat.

Catastrophic Accidents

A catastrophic derailment in the action area while the system is running is possible and a crash from a viaduct would certainly affect the immediate riparian environment around and below the accident, if a derailment were to occur while crossing a waterway. However, rigorous safety testing, which will occur before passenger trips commence, and many safety protocols will be followed during regular operations, so a derailment occurring at all is extremely unlikely. The comparative Japanese Shinkansen system has been in operation since 1964 and has no record of fatalities, injuries, or derailments, despite some lapses in inspection protocols and material integrity safety checks before an oil leak was discovered and resolved on December 11, 2017 (Sim 2017). However, other HSR systems have experienced crashes or derailments, such as the Santiago de Compostela rail disaster in 2013, the Wenzhou train collision in 2011, and the Eschede train disaster in Germany in 1998 (Wikipedia 2019). Compared to the total number of HSR systems in operation worldwide and the number of their lines and daily trip schedules, and their overall safety record, a derailment or catastrophic crash in the California HSR system is not expected to occur.

2.5.2.6 Compensatory mitigation

As part of their proposed action, the Authority has committed to offsetting unavoidable adverse effects to CCC steelhead and sDPS green sturgeon habitat that will be permanently occupied by HSR structures, permanently over-shaded by HSR structures, or otherwise temporarily modified in adverse ways by HSR actions through offsite compensatory mitigation. The Authority also proposes compensatory mitigation for the permanent removal of waterbodies modeled as accessible to steelhead or green sturgeon. Impacted areas such as tributaries, canals, and other waterbodies not part of critical habitat designations which may occasionally host individual steelhead or sturgeon, or drain to or otherwise influence waterbodies that are critical habitat, are considered part of the modeled habitat.

However, as established in Section 1.3 Proposed Action, many of the overcrossings of the proposed HSR alignment will utilize already existing in the landscape and the corridor is already highly developed for rail transportation. Many require little to no modification to enable HSR use and electrification; therefore, the total amount of compensatory mitigation incurred is low compared to the size of the proposed action and action area involved.

Based on the steelhead model developed by the Authority and designated critical habitat layers, 0.205 acres of permanent impacts and 0 acres of temporary impacts will occur to CCC steelhead designated critical habitat, with an additional 1.663 acres of permanent (1.147 acres, Table 4) and temporary (0.516 acres, Table 4) impacts to habitat that is modeled to also support CCC steelhead but not included in the critical habitat designation for the DPS.

Table 4. CCC steelhead habitat amounts estimated to be impacted by the project (acres rounded from provided data (Authority 2021i, j), CH = designated critical habitat, SHH = steelhead habitat).

Habitat Impact Type	Habitat Removal (acres)	Riparian Vegetation Affected (acres)	Total (acres)
Temporary Impacts to CH	0	0	0
Temporary Impacts to Modeled SHH	0.207	0.309	0.516
Permanent Impacts to CH	0.161	0.044	0.205
Permanent Impacts to Modeled SHH	0.880	0.267	1.147

Green sturgeon habitat in the SFBDE overlaps with estuarine habitat for CCC steelhead. Table 5 shows a reduced amount of green sturgeon habitat requiring offset. Most of the impact acreage for green sturgeon habitat is incurred at Crossing #9 Guadalupe Valley Creek/Brisbane Lagoon and Location #10 Visitacion Creek from placing new overwater structures and the removal of Visitacion Creek. Based on the habitat model developed by the Authority and designated critical habitat layers, 1.448 acres of green sturgeon critical habitat in total will be adversely affected (0.516 acres temporarily and 0.932 acres permanently, Table 5).

Table 5. sDPS green sturgeon habitat amounts estimated to be impacted by the project (acres rounded from provided data (Authority 2021i, j), CH = designated critical habitat, GSH = green sturgeon habitat).

Habitat Impact Type	Habitat Removal (acres)	Riparian Vegetation Affected (acres)	Total (acres)
Temporary Impacts to CH	0.207	0.309	0.516
Temporary Impacts to Modeled GSH	0	0	0
Permanent Impacts to CH	0.805	0.127	0.932
Permanent Impacts to Modeled GSH	0	0	0

CM-FISH-1 would provide compensatory mitigation that is commensurate with the type of habitat affected (rearing, migratory, or critical habitat) and the amount of habitat lost in the following ratios (Authority 2020a). Per CM-FISH-1, compensatory mitigation would be 2:1 (protected/restored:affected) for the loss of rearing and migratory aquatic and riparian habitat within critical habitat and 1:1 (protected/restored:affected) for all other modeled aquatic and riparian habitat. Unless agreed upon in coordination with NMFS, compensation would occur within the same DPS domain as the impact was incurred. Off-site mitigation would prioritize actions recommended in local or regional conservation plans where there is coordination and approval by NMFS.

The Authority estimates that the San Francisco to San Jose HSR Project Section will adversely affect approximately 1.868 acres of various anadromous fish habitat types in total (Authority 2021i, j). In estuarine areas that were modeled as both CCC steelhead and green sturgeon habitat, it is assumed that incurred impact acreages would be offset only once if the chosen mitigation option sufficiently provides dual estuarine benefits to both DPSs simultaneously. Due to the differing ratios of offset required by the habitat type and whether the habitat affected is critical habitat or not, the Authority proposes to provide 2.007 acres of aquatic and riparian habitat (likely to be offset by estuarine habitat types designed to benefit/be accessible to both of the affected species) and 1.085 acres of riparian habitat (likely for the benefit of CCC steelhead only). However, if less habitat acreage is impacted through complete avoidance through design/route decisions, or if on-site habitat restoration, rehabilitation, or augmentation is incorporated to a degree that maintains or enhances habitat functionality to pre-project condition or better, then the total amount of acres incurring mitigation need would be reduced.

When any of these compensatory mitigation options are undertaken and implemented in full, NMFS expects these actions to have temporary adverse effects and permanent beneficial effects to CCC steelhead and sDPS green sturgeon. As described in Section 1.3.6 **Error! Reference source not found.** of this opinion (Proposed Compensatory Mitigation), currently there are no NMFS-approved mitigation banks that offer steelhead, green sturgeon, or appropriate habitat

type credits that also include the action area of the project within their service areas, and there is currently no in-lieu fee program that could provide credits suitable to offset impacts either. Because of the lack of available mitigation options, the Authority expects to conduct permittee responsible restoration to offset unavoidable impacts to CCC steelhead and sDPS green sturgeon habitats from project impacts (Authority 2021i, c). However, the CMP has not been drafted and no sites have yet been proposed. As specific offset options have not been identified, there is not enough information on the compensatory mitigation component of the proposed action at this time to determine and analyze what temporary adverse effects are expected to occur as a consequence of that component. Nor is there enough information on the compensatory mitigation component of the proposed action at this time to determine and analyze the expected relevance of any beneficial effects of that component to the listed steelhead, green sturgeon, and critical habitat that would be adversely affected by other components of the proposed action. Nor is there enough information on the compensatory mitigation component of the proposed action at this time to determine and analyze the expected reliability and effectiveness of any beneficial effects of that component. Nor is there enough information on the compensatory mitigation component of the proposed action at this time to determine and analyze whether there would be any potential delay between the expected adverse effects of other components of the proposed action and the expected beneficial effects of the compensatory mitigation component. In the future, when a site(s) for compensatory mitigation is confirmed and additional information about the proposed compensatory mitigation is available, reinitiation of consultation may be warranted to analyze the effects of the compensatory mitigation portion of this proposed action, *or* the restoration component of the compensatory mitigation could be included under NOAA Restoration Center's programmatic approach for fisheries habitat restoration projects in California Coastal counties (NMFS 2017a) if a United States Army Corps of Engineers Clean Water Act section 404 permit is required, and ESA section 7 review would occur through that programmatic opinion process.

2.6. Cumulative Effects

“Cumulative effects” are those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02 and 402.17(a)). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Continued urbanization and human population growth will continue to put increasing pressure on the federally listed species that occur in the action area. Continued urban growth and human population density increases are likely to result in an increase in invasive species and sound, light, and nonpoint-source pollution in the local environment. The increased urban density is also likely to further affect hydrology, water quantity, and water quality experienced by the species. Development tends to lead to the rerouting, straightening, and hardening of creeks, streams, and rivers, which will continue to degrade wetland, stream, and estuarine habitats for steelhead and green sturgeon.

Some continuing non-Federal activities are reasonably certain to contribute to climate effects within the action area. However, it is difficult if not impossible to distinguish between the action area's future environmental conditions caused by global climate change that are properly part of the environmental baseline *vs.* cumulative effects. Therefore, all relevant future climate-related

environmental conditions in the action area are described in the environmental baseline (Section 2.4).

2.7. Integration and Synthesis

The Integration and Synthesis section is the final step in our assessment of the risk that the proposed action poses to species and critical habitat. In this section, we add the effects of the action (Section 2.5) to the environmental baseline (Section 2.4) and the cumulative effects (Section 2.6), taking into account the status of the species and critical habitat (Section 2.2), to formulate the agency's biological opinion as to whether the proposed action is likely to: (1) reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing its numbers, reproduction, or distribution; or (2) appreciably diminish the value of designated or proposed critical habitat as a whole for the conservation of the species.

2.7.1. Summary of Effects of the Proposed Action on Listed Species

Most adverse effects to CCC steelhead and sDPS green sturgeon individuals analyzed in this opinion will occur during the construction period of the proposed action, and are expected to be short-term disturbances; disruptions of normal behaviors, migration, and habitat use; temporary decreases in survivorship probabilities; and for very few individuals of each DPS, a short period in which some fish are expected to be injured or be killed during cofferdam dewatering, and fish capture and relocation. There are at least twelve major overcrossings across the landscape in the action area at which these behavioral effects will occur, and a period of one to three years during construction when the effects may occur at any one construction site. One continuing effect of operations of the HSR system will be the disturbance associated with running high speed trains over waterways containing listed anadromous fishes. Rail operations are expected to disrupt individual behaviors in perpetuity (foraging or migration) and will slightly increase the risk of predation if those individuals are juveniles when escapement cover is not readily available, resulting in reduced survival at HSR crossings, or disrupt foraging behavior which will result in a loss of energy intake and slightly decrease the fitness of affected individuals.

2.7.2. Summary of Effects of the Proposed Action on PBFs of Designated Critical Habitat

The implementation of the proposed action will unavoidably alter a small amount of CCC steelhead designated critical habitat. The riparian vegetation removal and railroad bridge widening at Crossing Location #1 Stevens Creek and Crossing #2 San Francisquito Creek are expected to remove proportional amounts of critical habitat through additional spatial occupation in the habitat, change the aquatic ecosystem structure below the structures due to shading, create additional ambush predator habitat, and degrade freshwater habitat functionality locally by further reducing riparian vegetation. These impacts will in turn reduce the fitness and survivorship of juvenile steelhead using rearing and migratory habitat PBFs at each site within the action area. Once the HSR system is operational, railway and roadway pollution sourced from HSR properties and impervious surfaces (e.g., parking lots) will be mostly controlled or prevented from entering waters containing critical habitat water quality PBFs through the incorporation of LID designs, green stormwater infrastructure, and effective stormwater treatment and control devices, including use of bioretention technology.

Several locations within the action area also contain SFBDE tidally-influenced waters, which is designated critical habitat for CCC steelhead (estuarine PBFs) and sDPS green sturgeon (estuarine habitats food resources PBF). The only direct disturbance to estuarine critical habitat will occur at Crossing #9 Guadalupe Valley Creek/Brisbane Lagoon where a new access road bridge and overpass is being installed across the creek mouth and at Crossing #10 Visitacion Creek that is being culverted and most of the portion upstream of the culverted area will be removed based on the location of the Brisbane LMF. Otherwise, all other interactions with tidally-influenced habitat occur as the proposed alignment crosses over or near them on existing train bridges with little to no modifications to the bridge deck, or construction occurs outside of designated critical habitat boundaries. Cofferdam adverse effects to habitat functionality (temporarily removes access to foraging area while cofferdam remains) is relatively negligible compared to the total area available for feeding; however, the adverse effects of bridge piles and shading in the landscape will be permanent and are expected to further reduce the habitat's ability to provide natural forage to listed species locally.

As described in Effects of the Action: Section 2.5.2.6. Compensatory Mitigation, there is not enough information on the compensatory mitigation component of the proposed action at this time to determine and analyze temporary adverse effects and permanent beneficial effects expected to occur as a consequence of that component. Therefore, we do not consider any effects expected to occur as a consequence of that component in our jeopardy and adverse modification conclusions in this opinion. In the future, when a site(s) for compensatory mitigation is confirmed and additional information about the proposed compensatory mitigation is available, reinitiation of consultation may be warranted to analyze the effects of the compensatory mitigation portion of this proposed action, *or* the restoration component of the compensatory mitigation could be included under NOAA Restoration Center's programmatic approach for fisheries habitat restoration projects in California Coastal counties (NMFS 2017a) if a United States Army Corps of Engineers Clean Water Act section 404 permit is required, and ESA section 7 review would occur through that programmatic opinion process.

2.7.3. Summary of Environmental Baseline

Both Stevens Creek and San Francisquito Creek CCC steelhead populations are considered essential to the recovery of the DPS and are top priority within the Coastal San Francisco Bay Diversity Strata. Current critical habitat conditions in these watersheds within the action area are considered poor for rearing because of channelization and removal of riparian vegetation, but good for migration purposes though there are passage limitations not far upstream due to existing dams on both waterways. Of note, CCC steelhead designated critical habitat within the action area has been degraded due to human modifications associated with water resource development for human use, urbanization, and transportation installations (particularly due to railways), and numerous passage impediments occur throughout the region. Because of its limited availability in the extensively developed region, all designated critical habitat, including all SFBDE waters, are considered to have high intrinsic value to the viability and recovery of both species.

A continuing pressure on steelhead freshwater habitat in the action area is the full development of local watersheds for human uses and continued reliance on this resource, which is heavily dependent on annual precipitation. Because of this, local water supplies are already limited for all other water uses and the area depends heavily on imported freshwater; increased stormwater

harvesting is planned for the future. The expectations of climate change in the action area are that precipitation, which already comes in ‘boom and bust’ events, will begin to fluctuate evermore so between extreme highs and lows, and that dry year types may become more frequent, in addition to becoming more severe; and that overall averages will be warmer, with the area becoming more chaparral-like with less fog cover (Ackerly et al. 2018). Better water quality control and adequate treatment of new sources of urban stormwater discharges throughout the action area are needed to ensure that the water quality of remaining aquatic habitats will be maintained at sufficient levels into the future to sustain listed salmonids and human populations through all water year types.

In the face of legacy habitat degradation, isolation, and contamination, there are numerous conservation efforts ongoing in the action area. More than a third of South San Francisco Bay tidal marshes have been isolated through dikes or levees for various human uses but many restoration and conservation projects are planning on, or have, reconnected some of these areas to be managed for the benefit of fish and wildlife species again.

2.7.4. Summary of Cumulative Effects

Further urban development in the communities around HSR stations is expected to increase in general as commuters and businesses capitalize on the convenience of being near a mode of transportation that provides fast access between the San Francisco and San Jose Area. And as the local human population increases, cumulative water quality impacts are also expected to increase, through increased urbanization effects, increased impervious surface cover, increased stormwater runoff and contaminant loads, increased discharges from wastewater treatment plants, and an increase in the demand for drinking water. This carries the potential of overdrawing local surface and groundwater supplies available for human use and not protecting sufficient amounts for CCC steelhead life history needs in surface waterbodies during dry and drought periods. Estuarine water quality is expected to decrease and contaminant introduction into the benthic food chain is expected to slightly increase with the associated increases in wastewater discharges.

2.7.5. Effects of the Proposed Action on the Survival and Recovery and on Designated Critical Habitat at the DPS scale

Both CCC steelhead and sDPS green sturgeon are listed as threatened under the ESA and the most recent 5-year status reviews for the DPSs concluded that the threatened status is still applicable (NMFS 2016a, 2021). They remain listed as threatened in large part because of widespread freshwater and estuarine habitat degradation and land use conversion for urban development and human use. The ubiquitous artificial modifications to, and destruction of, the freshwater and estuarine habitats upon which these species depend still persist and adverse effects are expected to increase as the human population continues to grow in the San Francisco-San Jose Area. Specifically, railroad and transportation bridges and infrastructures have been identified as a threat to the CCC steelhead DPS due to the habitat changes associated with the infrastructure and several railroad bridges and culverts impeded fish passage in the region (however, none of the bridges utilized in the proposed action area currently rated as fish passage impediments). Large scale restoration actions that improve the amount, quality, and access to freshwater and estuarine rearing/foraging habitats; remedy adult and juvenile steelhead passage

conditions at impeding structures; allocate surface water for fish and wildlife uses at sufficient quantities and qualities; and install large woody material in streams are necessary to recover these species as self-sufficient, viable, wild breeding populations.

As another railroad/transportation project, the HSR system has the potential to further negatively impact the survival and recovery potential of the CCC steelhead DPS in particular. However, because the project is largely utilizing existing railway bridge crossings with few deck/track modifications, the proposed action adds only a small amount of additional degradation to the existing environmental baseline and its current degraded condition. While the Stevens Creek and San Francisquito Creek populations are important to the recovery of the diversity strata, no injuries or mortality are expected at these interaction points, and the construction work window is expected to avoid adult exposure. At most, the consequences of construction are mostly attributed to temporary disturbances to a few individual juveniles per year for each DPS at two locations (#9 Guadalupe Valley Creek/Brisbane Lagoon and #10 Visitacion Creek), and at most a few individuals would experience injury or mortality in a worst-case scenario per year that construction is ongoing due to dewatering cofferdams. Therefore, the total numbers of fish anticipated to be adversely affected during construction of the proposed action is expected to be relatively small compared to the respective populations in each DPS, and have little measurable effect to the productivity potential of each DPS as a whole. Furthermore, since the construction phase of the project is temporary, once the HSR section is complete, most pathways of effects expected to result in injury or mortality of individuals will cease.

The potential for long-term adverse changes to the freshwater habitats of CCC steelhead is also relatively small, and limited to riparian vegetation removal. The impact to estuarine designated critical habitat for both CCC steelhead and green sturgeon is larger, with pile occupation and overshadowing effects of the Tunnel Avenue access road and overpass. When the size of the altered area is compared to the total amount of estuarine and nearshore foraging habitat available in Brisbane Lagoon, it is not expected to cause the total local benthic productivity levels to decrease. As described above, because the project is largely utilizing existing railway bridge crossings with few deck/track modifications, the proposed action adds only a small amount of additional degradation to the existing environmental baseline and its current degraded condition. The conservation measures proposed by the Authority acknowledge the utility of large woody material and vegetative riparian plantings in bank/slope stabilization measures where needed (though an installation location has not yet been identified) and to meet NMFS fish passage requirements when installing bridges and culverts in accessible habitat. Therefore, the proposed action is not expected to appreciably diminish the value of designated critical habitat as a whole for the conservation of the species.

Combining the minor adverse effects associated with this proposed action, the environmental baseline and the cumulative effects, and taking into account the status of the species and critical habitat affected by the project, the proposed action is not expected to appreciably reduce the likelihood of survival or recovery of the listed species, or appreciably diminish the value of designated critical habitat as a whole for the conservation of the species.

2.8. Conclusion

After reviewing and analyzing the current status of the listed species and critical habitat, the environmental baseline within the action area, the effects of the proposed action, the effects of other activities caused by the proposed action, and the cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of CCC steelhead or sDPS green sturgeon, nor destroy or adversely modify their designated critical habitat.

2.9. Incidental Take Statement

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined by regulation to include significant habitat modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering (50 CFR 222.102). "Harass" is further defined by interim guidance as to "create the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering." "Incidental take" is defined by regulation as takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant (50 CFR 402.02). Section 7(b)(4) and section 7(o)(2) provide that taking that is incidental to an otherwise lawful agency action is not considered to be prohibited taking under the ESA if that action is performed in compliance with the terms and conditions of this ITS.

2.9.1. Amount or Extent of Take

In the biological opinion, NMFS determined that incidental take is reasonably certain to occur as follows:

1. General construction activities described in Section 2.5.1.1 occurring in, near, or over waterways are expected to harass juvenile CCC steelhead and juvenile, subadult, and adult sDPS green sturgeon by causing them to alter their normal behaviors associated with migration, feeding, or sheltering due to disturbance. Because of the very low amount of adult abundance in these watersheds for each DPS overall, and reduced exposure probability during the proposed work windows for adult steelhead presence, it is expected that no more 2 subadult/adult green sturgeon would be harassed by general construction activities per year when construction is occurring. Green sturgeon juveniles may be exposed at any time in any tidally-influenced waterways. Similarly, juvenile CCC steelhead maybe exposed to harassment stemming from general construction activities at any time, though the risk of exposure is somewhat reduced due to the adoption of the proposed work windows. Therefore, it is expected that no more than 5 juvenile CCC steelhead and no more than 5 juvenile sDPS green sturgeon would be harassed by general construction activities per year construction is occurring.

2. In-water activities, such as the installation of cofferdams and turbidity control curtains, cofferdam dewatering, fish capture and relocation efforts, and in-water pile driving, that contact the stream banks, stream margin, and tidal channel bottom are expected to result in elevated turbidities (described in Sections 2.5.1.1, 2.5.1.3, 2.5.1.4, 2.5.1.5), which are expected to harm and harass juvenile CCC steelhead by causing them to alter their normal behaviors, alter their migration patterns, induce respiratory stress, and cause displacement.
3. Vibratory and impact pile driving in or near waterways (Section 2.5.1.3) is expected to harass, wound, or kill juvenile CCC steelhead and sDPS green sturgeon by introducing underwater pressure waves into the aquatic environment. While the calculated underwater pressure waves are not expected to cause instantaneous mortality to exposed individuals, sublethal internal injuries may lead to death following infection or temporary sensory impairments due to damage to sensory structures following sublethal underwater pressure wave exposure, and the underwater pressure waves will decrease the ability of juvenile fish to detect and avoid predators, thereby increasing their vulnerability to mortality by predation. The pressure waves created by pile driving activities are expected to persist only as long as these activities are ongoing and it is expected at least one underwater sound attenuation measure will be used.
 - a. The underwater pressure waves from vibratory and impact pile driving that are not expected to reach injurious or mortalities levels (≥ 150 dB_{RMS}), but which will harass fish by significantly disrupting normal fish behaviors, will occur up to 14 meters both upstream and downstream from the pile driving/tunneling location (Table 3).
 - b. The underwater pressure waves from impact pile driving are expected to exceed injurious levels (≥ 187 dB_{SEL} cumulative for fish greater than 2 grams bodyweight and ≥ 150 dB_{RMS}) and harm listed fish (from calculations in Section 2.5.1.3). Injury, potentially leading to death due to cumulative SEL exposure greater than or equal to 187 dB is expected out to a 3-meter radius from the driven pile (Table 3).
4. Cofferdam dewatering (Section 2.5.1.4) is expected to harass, wound, or kill juvenile CCC steelhead and sDPS green sturgeon by entrapping them, necessitating their capture, handling, and relocation (Section 2.5.1.5), which is likely to stress, shock, and injure them, resulting in immediate or delayed death, or susceptibility to predation. The number of juveniles entrapped by cofferdams, requiring capture and relocation is expected to be low, no more than 5 individuals from the CCC steelhead DPS and no more than 5 individuals from the sDPS of green sturgeon over the course of construction of the San Francisco to San Jose Project Section. It is also estimated that no more than 3% of the total number of juveniles entrapped (which is no more than one juvenile from the CCC steelhead DPS and one juvenile from the sDPS of green sturgeon) will result in mortality due to capturing, handling, and relocation by the Authority or its contractors each time a cofferdam is installed and dewatered. It is also possible that fish will evade capture and become impinged on the intake screen or be wounded in other ways during dewatering. The construction timeline estimates that active construction will be complete within 5 years (Authority 2021i, b).

5. Regular HSR operations (Section 2.5.1.7.) are expected to harass and cause behavioral changes and increased stress in individual CCC steelhead and sDPS green sturgeon as trains running overhead introduce sudden noise and vibrations into the underwater environment below. Disturbing fish will cause a net energy loss by unnecessarily expending energy through either interrupting resting or feeding, or delaying migration timing. Juveniles are expected to be startled by vibrations and noise created when high speed trains pass over waterways, causing them to flee when they otherwise may be resting or foraging, creating situations in which they are more likely to be predated upon in these areas over the long-term.
6. Site preparation, relocation of utilities, permanent waterbody removal, and vegetation removal in and near waterways in association with proposed activities (Sections 2.5.2.1, 2.5.2.2., 2.5.2.3., and 2.5.2.4.) are expected to harm adult and juvenile CCC steelhead and juvenile, subadult, and adult sDPS green sturgeon by reducing habitat quality (vegetation removal, temporary and permanent land disturbance and alteration, permanent natural waterbody removal, changes in natural shading), and these alterations are expected to reduce the fitness, growth and survival of listed anadromous fishes in the action area. Effects are expected to persist for several years until the aquatic habitats are restored and vegetative plantings mature to pre-disturbance functionality, or indefinitely, depending on the alteration.
7. Placement of permanent overwater structures and associated shading (Sections 2.5.1.8. and 2.5.2.3.) is expected to harm juvenile CCC steelhead and sDPS green sturgeon because the permanent structure occupation of habitat effectively reduces the amount of estuarine feeding habitat locally and the additional shading over the channels will change the local estuarine ecosystem composition/available prey base, and create ambush habitat for predators of juvenile steelhead, in perpetuity.
8. The creation of new impervious surface and the operation of HSR service and Brisbane LMF is expected to decrease the water quality PBFs of critical habitat for CCC steelhead and sDPS green sturgeon and harm CCC steelhead and sDPS green sturgeon by increasing the amount of surface area generating transportation pollution within the action area (Section 2.5.2.5). Despite incorporation of recommended stormwater treatment options, operational BMPS, and LID designs into the proposed action, it is expected that some storm events will produce runoff volumes greater than the stormwater treatment design storm volumes at times and allow for discharge of transportation pollution into the aquatic environments upon which these species depend, in perpetuity.

Ecological Surrogates

For incidental take avenues 2, 3, 5, 6, 7, and 8, NMFS cannot, using the best available information, quantify and track the amount or number of individuals that are expected to be incidentally taken because of the variability and uncertainty associated with the population sizes of the species, annual variation in the timing of migration, and variability regarding individual habitat use and importance within the action area. However, it is possible to express the extent of incidental take in terms of ecological surrogates for those elements of the proposed action that are expected to result in incidental take.

These ecological surrogates are measurable, and the Authority or its contractors can monitor them to determine whether the level of anticipated incidental take is exceeded over the course of project implementation. All incidental take, including ecological surrogates, are summarized in Table 6.

2.9.1.1 Incidental take associated with elevated in-water turbidity plumes

The most appropriate ecological surrogate for incidental take consisting of CCC steelhead disturbance and sub-lethal effects associated with elevated turbidity is the amount of increase in turbidity generated by in-water activities such as pile driving, channel bottom disturbance, and cofferdam establishment and dewatering (incidental take avenue #2). Increased turbidity is expected to cause harm and harass juvenile CCC steelhead through elevated stress levels and disruption of normal habitat use locally. These responses are linked to decreased growth, survivorship, and overall reduced fitness as described in Section 2.9.1.2 for underwater noise avoidance, up to respiratory distress and reduced gill function.

The ecological surrogate for turbidity increases will be based on juvenile salmonid sensitivity to raised turbidity levels. Juvenile salmonids have been found to prefer water between 57 and 77 NTUs (Sigler et al. 1984), despite potentially experiencing reduced growth rates (beginning at 25 NTUs), but would be expected to sustain physical injuries in higher turbidity areas (Bash et al. 2001). NTU ranges in undisturbed freshwater streams and estuaries, like those within the action area, are generally between 10 to 50 NTUs during non-flood conditions (Klein 2003, Ade et al. 2021). With expected maximum background turbidity levels up to 50 NTUs, project activity increases to turbidity should be controlled so that in-water readings do not exceed 77 NTUs and cause juvenile CCC steelhead to actively avoid the impacted area, within a reasonable distance from the work location. As the cofferdam installation, fish capture and relocation activities, dewatering, and pile driving are all occurring in tidally influenced waterbodies, it is expected that turbidity increases will be greater and have a greater spatial impact to adjacent water parcels compared to turbidity increases downstream of work locations in impacted freshwater streams.

Therefore, water 100 meters downstream of construction activities in tidally influenced areas would be 50 NTU (or less) above the turbidity levels observed naturally outside of this zone. In freshwater streams, in water 50 meters downstream of the construction activities, turbidity would measure 25 NTU (or less) above the ambient turbidity level in water measured immediately upstream of project activities. Exceeding these tiered turbidity thresholds will be considered as exceeding the expected incidental take levels for this effect.

2.9.1.2 Incidental take associated with underwater sound, pressure waves, and vibration from construction activities

The most appropriate ecological surrogate for incidental take consisting of harassment (avenue #3a) and injury (avenue #3b) as a result of vibratory and impact pile driving are the threshold sound levels and distances of underwater sounds produced by these activities, since underwater pressure waves illicit these responses and outcomes at certain threshold sound levels and distances.

Both vibratory pile driving and impact pile driving are expected to produce underwater pressure levels greater than or equal to 150 dB RMS out to 14 meters from the location of the activities when at least one attenuation measure is employed (Table 3). Though these elevated underwater sound levels are not expected to injure or kill fish directly, they are expected to cause disruption of normal habitat utilization and elicit temporary behavioral effects in juvenile CCC steelhead and adult and juvenile sDPS green sturgeon that may be in the area, leading to harassment as described in Section 2.5.1.3 pile driving analyses. Any behavioral alterations in juvenile fish are expected to decrease their fitness and ultimate survival by decreasing feeding opportunities that will decrease their growth, and by causing area avoidance, which will delay their downstream migration and increase their predation risk. Adult/subadult/juvenile green sturgeon fitness is expected to decrease as they avoid the area and miss feeding opportunities within the affected area. This surrogate will apply to incidental take avenue #3a and is defined by the boundary of the location of the disruptive activity out to 14 meters from the pile driving location (Table 3). All other types of temporary disturbance effects related to noise or vibrations created by equipment operation, construction noise, and human presence are expected to also be contained within this boundary of anticipated incidental take, during the proposed work windows. Meeting or exceeding 150 dB RMS underwater sound beyond 14 meters from the active construction or pile driving site will be considered exceeding expected incidental take levels for this effect.

Impact pile driving is expected to produce underwater pressure levels greater than or equal to 187 dB SEL cumulative out to 3 meters from the driven pile when at least one attenuation measure is employed (Table 3) and cause sublethal injuries potentially leading to death within this boundary, in addition to causing stress, disturbance, behavioral changes, and migration delays. In addition, the distance that instantaneous mortality due to underwater pressures greater than or equal to the 206 dB peak threshold are not expected to occur (peak (dB) $\geq 206 = 0$ meters). Therefore, meeting or exceeding 187 dB SEL cumulative beyond 3 meters from the driven pile, or meeting or exceeding 206 dB peak at any distance, will be considered exceeding expected incidental take levels from this effect.

2.9.1.3 Incidental take associated with vibration and noise from regular HSR train operations

The most appropriate ecological surrogate for incidental take associated with repetitive fish disturbance from HSR passenger trains running overhead during operations (avenue #5) is the amount of additional underwater sound and vibration to the underwater sound environment from the proposed action above current baseline noise levels experienced by fish in the action area. Quantifications of the underwater sound signature emanating from high speed train operation specifically are not directly available in scientific literature, but estimates are available of overall underwater sound environments currently affected by anthropogenic noise over and near monitored waterways near passenger car railways. Roundtree et al. (2020) quantified that brook/creek habitats contained averages of 99.4 dB RMS (re: 1 μ PA RMS) while river habitats contained averages of 101.1 dB RMS (re: 1 μ PA RMS). These situations are comparable to future HSR operations as all of the overcrossings in the action area will host blended services with other railway operations, and some HSR overcrossings will be in close proximity to highway and other roadways that currently support vehicular traffic. The train underwater sound contributions in Roundtree et al. (2020) were noted as being relatively brief and bolstered by any use of the train horn. The distance to the study railroad bridge was noted as being approximately 500

meters. Therefore, it is expected that the sound environment under and near HSR crossings will not exceed 100 dB RMS (re: 1 μ PA RMS) underwater beyond 500 meters from the crossing location in the affected waterbody. This is similar to the disturbance limit established for vibratory pile driving, the main difference being that this disturbance is expected to occur regularly in perpetuity, affecting all future generations of steelhead and green sturgeon in the action area. Causing the underwater sound environment to regularly exceed 100 dB RMS (re: 1 μ PA RMS) beyond 500 meters from the mid-line of the overcrossing bridge/culvert/viaduct structure will be considered exceeding expected incidental take levels from this effect.

2.9.1.4 Incidental take associated with habitat occupation by HSR permanent overwater structures and artificial materials, shading, waterway and vegetation removal, and other habitat alterations

The most appropriate ecological surrogate for harm to CCC steelhead and sDPS green sturgeon through further degradation of the functionality of their habitats as associated with site preparation, utility placement, vegetation removal, permanent waterbody removal (avenue #6); and permanent structure and otherwise occupation by artificial material and associated shading (avenue #7) is the total amount of area adversely affected. The artificial hard structures and materials will occupy benthic substrates that would have otherwise supported benthic prey of juvenile steelhead and green sturgeon in estuarine areas, which will reduce the overall forage habitat available and will negatively affect the potential local productivity and its ability to bolster fish growth rates and fitness. The hard structures placed in channel beds will introduce new water velocities proportional to the amount of structure placed, and reduce the possibility of natural processes from otherwise occurring in the area, like aquatic vegetation establishment or normal sedimentation movement. Any shading from overwater structures like bridges is related and proportional to the amount the artificial structures that will cover the wetted channel/riparian corridor, and will change the local ecosystem structure below and increase the amount of water column ambush predator habitat, negatively affecting juvenile survivorship. While habitat functionality will not be lost completely in most cases, except for the permanent removal of natural waterbodies, the habitat alterations are expected to result in functional decreases that will be maintained in perpetuity; therefore, the adverse effects associated with these structures will also remain as long as the overwater structure and hard surfaces remain in the landscape.

Based on the acres estimated by the Authority, NMFS estimates that a total of approximately 0.205 acres of CCC steelhead designated critical habitat will be permanently adversely affected by the project section but that none will be temporarily affected by the proposed action. We also estimate that approximately 0.932 acres of sDPS green sturgeon designated critical habitat will be permanently and 0.512 acres will temporarily be affected by the proposed action. The affected amounts are relatively small because much of the alignment relies on existing bridges whose permanent adverse effects are already part of the environmental baseline of the area. While oblique shading would cause a greater amount of area to be affected under the overwater structures caused by differing sunlight angles throughout the day, these amounts are not included in these totals, because it is not practical to calculate them relative to meaningful biotic responses and because the area directly under the structure will experience the greatest reduction in surface lighting. Exceeding this acreage total for direct alterations to designated critical habitat stated above as a surrogate threshold for incidental take described in #6 and #7 above will be considered as exceeding the expected incidental take levels from these effects. If NMFS later

determines that onsite restoration, plantings, installed habitat augmentations, ‘soft’ bank armoring, or other habitat improvements undertaken, funded, or implemented by or on the behalf of the Authority are expected to adequately restore habitat functionality to prior levels or better, the improved/rehabilitated acreages will not be counted in the amount totaled towards the ‘permanently adversely affected’ CCC steelhead habitat limits above. These ecological surrogates are expected to function as an effective reinitiation trigger, because these surrogates would limit the amount of area of habitat occupation or other permanent adverse habitat alterations and associated incidental take that would be expected to occur from site preparation, utility placement, vegetation removal, permanent waterbody removal (avenue #6); and permanent structure and otherwise occupation by artificial material and associated shading (avenue #7).

2.9.1.5 Incidental take associated with post-construction operational stormwater pollution

The most appropriate ecological surrogate for harm to CCC steelhead and sDPS green sturgeon through periodic degradation of the water quality PBFs associated with stormwater generation and discharge during the operational phase of the HSR in this section is the amount of pollution generating surface installed as part of the proposed action (avenue #8) because the amount of transportation pollution that will be generated is proportional to the total surface area that will be a source of pollution. This is especially true for the operation of the Brisbane LMF, which will require installation of impervious surface in an area that is currently mostly pervious, uncovered ground and because the Brisbane LMF is expected to be the greatest new source of train-associated pollution (rolling stock off ramps, stockyard, and maintenance areas) and vehicular pollution, including 6-PPD quinone in tire wear particles (staff parking lot) above what currently enters the habitat during stormwater runoff in the action area. The Authority has proposed to implement stormwater treatment BMPs to contain the transportation pollution generated by the new impervious surfaces before discharge for at least average sized storms for the region but some percentage of storm volumes will exceed the design criteria periodically and lead to runoff entering waterways untreated. These impacts are likely to impair rearing and foraging by affecting the water quality PBF, but quantifying the amount of incidental take resulting from the pollution is not practicable, even if the exact amount of increase in stormwater pollution was known.

Based on the impervious surface acres estimated by the Authority, NMFS estimates that a total of 117.5 acres of new impervious surface will be installed within the described action area, and 45 of those acres will be new impervious surface in association with the Brisbane LMF. Exceeding these acreages of new impervious surface stated above as a surrogate threshold for incidental take described in avenue #8 will be considered exceeding the expected incidental take levels for this effect. If NMFS later determines through technical assistance that use of permeable pavements, LID designs, urban greening, or other stormwater BMPs to be implemented by the Authority are expected to adequately reduce or treat the generated stormwater pollution to levels that are not known to cause harm to CCC steelhead or sDPS green sturgeon critical habitat, said new acres will not be counted in the amount totaled towards ‘new impervious surface’ limits. This ecological surrogate is expected to function as an effective reinitiation trigger, because this surrogate would limit the amount of new impervious surfaces and associated incidental take that would be expected to occur from operational stormwater pollution (avenue #8).

Table 6. Summary of incidental take, including ecological surrogates.

Incidental Take Avenue (#)	Form of Incidental Take	Amount or Extent, including Ecological Surrogate Limits	Duration
#1 General construction activities	Harassment	5 juvenile CCC steelhead 2 adult/subadult sDPS green sturgeon 5 juvenile sDPS green sturgeon	Per year construction is ongoing
#2 Elevated turbidity	Harassment Harm (through short-term reductions in survival and fitness)	Compared to local unaffected/upstream measurements: In-water turbidity elevated up to 50 NTUs within 100 meters from construction in estuarine areas; In-stream turbidity elevated up to 25 NTUs within 50 meters downstream from construction in freshwater streams	While construction is ongoing
#3a Vibratory pile driving; #3b Impact pile driving	Harassment Injure	Underwater noise/pressure up to: ● 150 dB RMS within 14 meters from driven pile or tunneling location ● 187 dB SEL cumulative within 3 meters from driven pile	While pile driving is ongoing (estimate 7 working days)
#4 Cofferdam dewatering and fish capture/relocation	Capture Injure Kill	5 juvenile CCC steelhead 5 juvenile sDPS green sturgeon Up to 3% mortality at immediate release or one individual per DPS per construction year	Over the course of construction of the section, expected up to 5 years
#5 HSR operation noise/vibration	Harassment	Underwater noise up to 100 dB _{RMS} (re: 1μPA RMS) within 500 meters from all major crossing locations due to regular HSR operations	Permanent intermittent
#6 General habitat alteration/vegetation removal/waterbody removal; #7 Permanent structures and shading	Harm (through reduced survival and fitness)	Up to 0.205 acres of permanent impacts to CCC steelhead designated critical habitat Up to 0.932 acres of permanent impacts to sDPS green sturgeon designated critical habitat Up to 0.512 acres of temporary impacts to sDPS green sturgeon designated critical habitat	Maximum amount of permanently affected habitat section implementation

Incidental Take Avenue (#)	Form of Incidental Take	Amount or Extent, including Ecological Surrogate Limits	Duration
#8 Post-construction operational stormwater	Harm (through periodic degradation of critical habitat water quality PBF)	Up to 117.5 acres of new impervious surface Up to 45 acres of new impervious surface for Brisbane LMF	Maximum amount of new impervious surface placed

2.9.2. Effect of the Take

In the biological opinion, NMFS determined that the amount or extent of anticipated take, coupled with other effects of the proposed action, is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

2.9.3. Reasonable and Prudent Measures

“Reasonable and prudent measures” are measures that are necessary or appropriate to minimize the impact of the amount or extent of incidental take (50 CFR 402.02).

1. Measures shall be taken by the Authority and its contractors to minimize the extent of disturbance, harassment, injury, and mortality to CCC steelhead and sDPS green sturgeon caused by construction activities and HSR operation in the action area related to the consequences of the proposed action as discussed in this opinion.
2. Measures shall be taken by the Authority and its contractors to minimize the extent of harm as a result of degradation and alteration to the designated critical habitats of CCC steelhead and sDPS green sturgeon, and other habitats which support these species, in the action area related to the consequences of the proposed action as discussed in this opinion.
3. The Authority or its contractors shall prepare and provide NMFS with updates, reports, and plans pertinent to monitoring and documenting the impacts to and amount of incidental take of listed species under NMFS jurisdiction in the action area.

2.9.4. Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the Federal action agency must comply (or must ensure that any applicant complies) with the following terms and conditions. The Authority or any applicant has a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this ITS (50 CFR 402.14). If the entity to whom a term and condition is directed does not comply with the following terms and conditions, protective coverage for the proposed action would likely lapse.

1. The following terms and conditions implement reasonable and prudent measure 1:
 - a. The Authority and its contractors shall adaptively manage all CMs, AMMs, and BMPs with technical assistance from NMFS staff as they pertain to protecting listed species under NMFS jurisdiction to the extent those CMs, AMMs, and BMPs are applicable during the life of the project to ensure their effectiveness.
 - b. The Authority and its contractors shall work in coordination with NMFS throughout HSR project active construction phases by holding meetings between NMFS, USFWS, CDFW, Authority, and design-build contractor staff at least once a year that construction is ongoing so that impacts on and interactions with listed fishes can be reduced or avoided to the greatest extent possible.
 - c. The Authority and its contractors shall work in coordination with NMFS before and during active HSR operations and maintenance activities to develop specific BMPs and standard maintenance protocols so that impacts on, and interactions with, listed fishes can be reduced or avoided to the greatest extent possible.
 - i. The Authority shall request NMFS review on draft plans for vegetation removal activities and herbicide use as regular maintenance near waterways containing listed anadromous fishes prior to undertaking said activities. NMFS comments shall be addressed in vegetation removal and maintenance plans.
 - ii. The Authority shall request NMFS review on drafts of HSR safety check protocols prior to establishing the protocols if implementation of the protocols may affect listed fishes or their habitats.
 - d. In the course of monitoring the construction portion of the proposed action, the Authority or its contractors shall contact and coordinate with NMFS within 24 hours after direct observation that exceedance of the amount or extent of incidental take of a listed fish or exceedance of its ecological surrogate has occurred (Table 6), or is suspected of being exceeded, so that both agencies can discuss how or whether incidental take levels can return back below applicable levels. Construction shall cease until coordination takes place and an adaptive management plan is adopted.
 - e. The Authority shall ensure its contractors comply with the terms and conditions in this opinion by including them in future contracts through specific requirements that address:

- i. Adherence to the NMFS terms and conditions identified in this opinion as part of the award packages as necessary to reduce and limit the amount of incidental take of listed anadromous fishes;
 - ii. Explicit assignment of the responsibilities of implementation of the environmental CMs/AMMs/BMPs proposed for this action and related to NMFS trust resources as part of the award packages; and
 - iii. Explicit assignment of responsibilities of the monitoring of NMFS resources, associated ecological surrogates, and the implementation and effectiveness of the CMs/AMMs/BMPs associated with NMFS resources as stated in the terms and conditions below as part of project award packages.
- f. Prior to deviations from the proposed work windows or daily work windows, the Authority shall obtain technical assistance approval from NMFS staff before the change is adopted into the construction schedule.
- g. During construction activities, but especially pertaining to impact and vibratory pile driving periods, the Authority and its contractors shall implement the following measures:
 - i. If any steelhead or sturgeon is observed injured or killed within the action area in relation to project activities, the Authority and its contractors shall cease construction actions and contact NMFS staff immediately to assign species identity.
 - ii. If dead, the fish shall be recovered and placed on ice or frozen until transfer to NMFS can occur. If injured, the fish shall be gently handled only to take a photograph to enable later species assignment. Then it shall be immediately released back into the waterbody it was taken in, preferably in a shaded area with overhanging or in-water vegetation. However, the injured individual shall not be pursued if it proceeds to exit the immediate area under its own volition before being photographed.
 - iii. Construction activities shall not resume until NMFS can evaluate the situation and determine if the take could have been avoided.
- h. During in-water pile driving for installation/removal of cofferdams and permanent structures, the Authority and its contractors shall implement the following measures:
 - i. Piles and sheet piles shall be driven as far as possible with vibratory hammering before using an impact hammer.
 - ii. The underwater sound environment shall be monitored whenever in-water impact pile driving is employed to ensure ecological surrogates are not exceeded.

- iii. At least one underwater sound control measure shall be employed whenever in-water impact pile driving is used, such as cushion blocks, bubble curtains, de-watered cofferdams, or de-watered caissons around the pile being driven.
- iv. Piles and cofferdams shall be inspected daily for accumulated debris and debris shall be removed. If the debris is natural large woody material, the Authority shall return the large woody material back to the waterway downstream of their structure or make the material available for restoration activities, preferably for fish habitat onsite.
- i. The Authority shall ensure that a qualified biologist conducts water quality monitoring upstream and downstream of the location of in-water construction activities to ensure turbidity plumes created by construction do not exceed 25 NTUs above natural upstream measurements within 50 meters from the location of in-water activities in freshwater stream environments, or 50 NTUs above the turbidity levels observed naturally outside of this zone within 100 meters from construction in estuarine environments. If a turbidity reading exceeds these thresholds due to construction, construction shall cease and turbidity/sedimentation control AMMs/BMPs shall be adjusted until turbidity readings downstream cease exceeding the established thresholds.
- j. During the in-water work windows, if cofferdams require dewatering, the Authority shall ensure that the enclosed area is checked for steelhead, according to the recommendations of the assigned, on-site fish biologist. In addition, the Authority shall ensure that the following measures are implemented:
 - i. A final dewatering and fish capture/relocation plan shall be submitted to NMFS for review no later than 30 days prior to implementation.
 - ii. NMFS staff shall be notified of any planned fish relocation activities at least two business days before fish capture and handling activities begin, so that staff can advise these efforts or make a field visit to observe, if deemed necessary.
 - iii. Juvenile steelhead entrapped shall be captured using nets (seines) or electrofishing of enclosed areas, water temperatures permitting (less than 65°F). Fishing equipment used shall be in good condition and decontaminated if used outside of the watershed prior to the fish salvage event.
 - iv. Persons performing salmonid captures shall be experienced juvenile salmonid handlers and be familiar with the fishing equipment in use.
 - v. If electrofishing is selected to be used in fish capture, the operator of the equipment shall have at least 100 hours of practical experience using such equipment in the field.
 - vi. Clean relocation equipment and containers shall be available and ready to receive fish on site during all fishing/fish salvage activities, preferably under shade.

- vii. Captured *O. mykiss* shall be counted and assessed visually for immediate health condition and tentatively assigned to steelhead or resident life history group.
- viii. If a steelhead dies, see retaining and reporting a listed fish mortality procedures above (Term and Condition 1g).
- ix. The water quality of the transport water shall be monitored to ensure sufficient oxygen and temperature levels are maintained. Transport water shall be within 5°F of the stream water to minimize shock and transport stress, and less than 64°F overall.
- x. Captured juvenile steelhead shall be held in transport containers for no more than 30 minutes before release. Release locations shall be nearby and the same water body from which they were removed, and the selected release area shall have complex shaded habitat if available, so juveniles may rest or hide after release.
- xi. A report on fish relocation efforts and results shall be submitted to NMFS within 30 days of conclusion of the activities, indicating the number of salmonids that were handled, the number injured or killed, the transport water quality readings, total time in transport, and the location they were released into.
- k. The Authority and its contractors shall incorporate into and adhere to measures in a SPCCP and SWPPP for each construction site discussed in this opinion to minimize the probability of introducing construction pollution into waterways and to reduce the amount discharged should an accidental or uncontrolled discharge occur. Such measures shall include:
 - i. Construction stormwater and erosion AMMs and BMPs shall be established prior to the start of construction and earthwork, and be maintained and monitored regularly to ensure effectiveness.
 - ii. Accidental spill containment and clean-up materials shall be present at all work locations and be accessible to construction crews at all times, to ensure rapid response to events. Materials and available amounts shall be adequate for the machinery and chemicals expected onsite.
 - iii. All equipment maintenance and fueling shall occur in paved areas whenever possible, and occur at least 200 feet away from the wetted channel, using full spill or leak containment systems.
 - iv. Equipment shall be checked for leaks and maintained regularly to ensure proper function before entering water channels or traveling over water channels. Equipment to be used stationary over water for long periods shall have drip pans or absorbent pads placed underneath to catch any and all leaks.
 - v. Should an accidental spill or discharge into riparian or estuarine habitat occur, NMFS shall be contacted within 24 hours with information regarding the event, including type of spill or breach, event duration, estimates on the amount and

concentration of materials discharged, Authority/contractor immediate response, and the Authority's and their contractors proposed long-term resolution to avoid such events. Environmental samples shall be taken and documentation made to track the efficacy of containment and clean-up efforts.

2. The following terms and conditions implement reasonable and prudent measure 2:
 - a. The Authority and its design-build team shall work with NMFS staff to ensure viaduct and crossing footings placed within the OHWM will have minimal hydraulic effects and not significantly alter the hydrology of critical habitat in ways that may impede the migration of CCC steelhead or sDPS green sturgeon or cause changes in geomorphic processes through holding working group meetings when 75% and 90% project designs are available for the sections interacting with NMFS trust resources.
 - b. The Authority and its design-build team shall seek technical assistance from NMFS during the design phase (before construction) of crossings that involve alterations to stream bed bottoms such as in association with culverts or box culverts to be placed in designated CCC steelhead or sDPS green sturgeon critical habitat to ensure the selected designs sufficiently meet fish passage criteria appropriate to the species affected (NMFS 2001, CDFG 2010, NMFS 2019b) and will not impede fish passage.
 - c. The Authority and its design-build team shall provide final crossing designs of each major overcrossing to NMFS at least one year prior to construction mobilization and site preparation start dates for consultation and coordination purposes to determine whether new information or project design changes warrant consultation re-initiation or in-depth technical assistance.
 - i. If consultation reinitiation or opinion changes are not required, the Authority and its construction contractors shall again contact NMFS at least two months ahead of construction mobilization to discuss adaptively managing or avoiding interactions with special status anadromous fishes and the habitats they use in the upcoming construction season.
 - d. The Authority shall ensure that decreases to the riparian vegetation available locally are minimized through implementation of the following measures.
 - i. Riparian vegetation removal shall be limited to the extent practicable for structure placement and construction access, and both trimming and removal shall be limited to the absolute minimum amount required for construction.
 - ii. Riparian vegetation not planned for removal shall be clearly marked and areas of special biological significance that contain native, over-hanging riverine trees, floodplain habitat, or other habitat features that offer in-water heterogeneity such as large woody debris shall be fenced off or clearly marked before removal activities begin to ensure those resources are avoided and preserved.
 - iii. Remaining riparian trees shall be protected from damage during construction activities and during riprap placement to ensure their continuing survival as part

of the riverine habitat. Protective measures may include wrapping their trunks with burlap and/or creating a scaffold buffer of scrap timber around the trunks, in both cases to buffer against damage. A qualified biologist shall confirm proper application of these protective measures and tree survival through the construction and restoration process.

- e. The Authority shall ensure that trees to be removed for the project are surveyed for species and number. The Authority or its contractors shall replant native species, onsite to the maximum extent practical, at minimum a 3:1 ratio in-kind for the number of individual trees removed once construction is complete. Plantings shall be monitored, cared for, and watered as necessary for at least three years after planting to ensure survival.
- f. The Authority shall ensure that native trees and large woody material removed for the project during site preparation are either placed back into the waterway to provide cover and habitat for listed salmonids, secured in an affected waterway as fish habitat augmentation near major overcrossings, or incorporated into bank stabilization and other 'soft' armoring designs for the project (FEMA 2009).
- g. The Authority shall place and secure in-stream woody material refugia within 500 meters of overcrossing and viaduct footings in affected streams to minimize the rate of successful predation on juveniles expected from artificial structures attracting more piscivorous predators to the area in combination with the regular disturbance of HSR trains running over the river channel on the viaducts and bridges. The Authority shall contact NMFS for technical assistance on the placement and amount needed to provide optimal refuge for juveniles to hide in and avoid predation.
 - i. The Authority shall estimate the distance to which 100 dB (re: 1 μ PA) occurs in the underwater environment due to the normal operation of high speed trains running over waterways using empirical underwater sound monitoring taken once track sections are complete and the HSR system is operational, to better inform placement of fish habitat augmentation structures relative to HSR structures in and around streams.
- h. The Authority shall submit preliminary designs of temporary and permanent night lighting of overwater structures to NMFS for approval via technical assistance prior to their implementation.
- i. The Authority shall ensure that temporary construction materials and BMPs consist of natural biodegradable materials and the use of plastic (such as monofilament and Visqueen) is minimized to the extent practicable. All materials intended for temporary use onsite shall be removed within 60 days post construction/project completion or at least three days before anticipated rainfall to reduce pollution and trash from entering the waterways.

- j. The Authority shall ensure that temporary construction areas utilized for staging, storage, parking, and stockpiling are outside of the water channels, floodplains, and riparian areas whenever practicable.
- k. The Authority shall ensure that the amount of new impervious surfaces placed or created in the action area by the proposed project is minimized, and the use of permeable pavements or surfaces in lieu of pavement or gravel is considered whenever feasible.
- l. The Authority shall ensure that no environmental designs or project features include the incorporation or use of new or recycled tire particles or materials, especially not in stormwater infrastructure, bank stabilization, or aquatic habitat restoration designs.
- m. The Authority shall ensure that disturbed areas that were graded are re-contoured and stabilized at the end of the construction year to ensure erosion and sediment mobilization into steelhead waterways will be avoided. Once construction is complete, all disturbed areas shall be restored to pre-project condition or better, in the context of functioning riparian corridors, to the extent practicable.
- n. The Authority shall ensure that the placement of artificial structures in the riparian corridor and on the river banks is limited to the extent practicable, both above and below the OHWM, by implementation of the following measures.
 - i. The placement of riprap on the river bank shall be limited to the amount described in the submitted project BA or less. “Soft” or green approaches to bank stabilization shall be utilized to the extent practicable, hard bank protection methods shall be avoided whenever feasible, and all bank stabilization tactics shall include the placement of large woody material.
 - ii. Wood treated with creosote or copper-based chemicals shall be avoided for use in bank stabilization efforts.
 - iii. Whenever revetment/riprap must be used, quarry stone, cobblestone, or their equivalents shall be used and complemented with native riparian plantings and other natural stabilization alternatives with the goal of maintaining a natural riparian corridor (FEMA 2009).
 - iv. Temporarily disturbed areas shall be revegetated with native plants that resemble or improve the existing native vegetation diversity based on historical, locally appropriate assemblages.
 - v. When revetment/riprap is placed, voids created by the boulders shall be filled by smaller diameter rocks/gravel when below the OHWM to avoid supporting piscivorous predator ambush habitat.
- o. The Authority shall ensure that the use of pesticides and herbicides is avoided near wetted channels, floodplains, and uplands during weed control activities, and amounts used are minimized, to the extent practicable.

- p. The Authority shall ensure that temporary sheet piles are completely removed from streams once construction is complete.
 - i. Sediment suspension created during the removal of temporary sheet piles and cofferdams shall be controlled by encircling the in-water work area with a silt curtain, pulling the piles out slowly, and filling any streambed holes left by the piles with clean, native sediment, or appropriately-sized spawning gravel following pile removal.
- q. The effectiveness of stormwater facilities to treat and manage runoff relies on monitoring and maintenance to ensure facilities are performing as intended. The Authority and its contractors shall develop a Post-Construction Stormwater Management Plan for the project alignment which identifies:
 - i. The amounts of impervious surfaces placed by the program and where the amount was reduced through use of LID design components (e.g., a map delineating project and non-project impervious surfaces, use or retention of permeable surface within project footprint, etc., in acres);
 - ii. All stormwater basins that receive stormwater from impervious surface in the project footprint installed by the project and areas of impervious surface contiguous to the project that also drain into project impervious surfaces and stormwater facilities;
 - iii. A description of stormwater treatment and management facilities in each basin;
 - iv. The effectiveness and capacity of the stormwater facilities, based on expected runoff volumes (design storm, BMP geometry, and residence time);
 - v. The post-treatment pre-discharge water quality monitoring program sample techniques, frequency, and constituents to be measured;
 - vi. Identification of the staff member responsible for stormwater monitoring and maintenance, and their contact information;
 - vii. The maintenance, repair, and replacement program for each facility, with descriptions of the routine maintenance schedule and activities; and
 - viii. The conditions which trigger maintenance, inspection, or sampling outside of those routinely scheduled.
- 3. The following terms and conditions implement reasonable and prudent measure 3:
 - a. The Authority and its contractors shall coordinate with NMFS, whenever NMFS requests, to allow staff safe and reliable access through HSR ROW and construction sites when site visits, in-stream monitoring, or fish relocation activities are required or necessary.

- i. The Authority shall designate an on-site point of contact who can facilitate access and ensure safety through HSR construction sites and ROW, and update NMFS of their contact information regularly.
- b. The Authority shall submit operational stormwater monitoring reports to NMFS annually for at least the first five years after the HSR system is built and being tested, when station and LMF construction is complete, and as ridership/passenger use is increasing (operational phases), to ensure stormwater conveyance and treatment designs adequately contain generated stormwater volumes and pollutant concentrations.
- c. The Authority shall prepare and submit a plan to monitor the amount or extent of incidental take as a result of the proposed action (in relation to proposed AMM-GEN-35), including ecological surrogates as described in Section 2.9.1. of this opinion, for NMFS review at least one year before project construction is scheduled to begin. The Authority shall address NMFS comments on the plan and finalize the monitoring plan before construction begins. After construction commences, the Authority shall submit an annual report to NMFS with the results of said monitoring described in the plan.
- d. The Authority shall submit annual updates and reports proposed as part of the action (listed fish observations and interactions, outcomes of fish capture and relocation efforts, general construction biological monitoring reports, and annual construction progress updates) and those required by these terms and conditions by December 31st of each year of construction.
- e. Monitoring reports shall include record of adherence to project schedules, project milestone completion dates, and details regarding CM, AMM, and BMP implementation and effectiveness, as well as any observed incidental take, incidents such as unplanned equipment failures or accidental spills that occur within the OHWM of work areas, or encounters and observations of individuals of listed or protected species relating to NMFS resources or their ecological surrogates.
- f. Updates and reports required by these terms and conditions shall be sent to:

California Central Valley Office – c/o Cathy Marcinkevage
National Marine Fisheries Service
650 Capitol Mall, Suite 5-100
Sacramento, CA 95814
Monica.Gutierrez@noaa.gov

California Coastal Office – c/o Gary Stern
National Marine Fisheries Service
777 Sonoma Avenue, Room 212
Santa Rosa, CA 95404
Gary.Stern@noaa.gov

2.10. Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of threatened and endangered species. Specifically, conservation recommendations are suggestions regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information (50 CFR 402.02).

- The Authority and its contractors should incorporate LID/green infrastructure designs and features into HSR ROW and access roads, stations, maintenance facilities, utilities, and parking areas to the maximum extent, including tree plantings, vegetated roofs, stormwater planters, infiltration or lined rain gardens, bioswales, vegetated strips, bioretention devices, and the enhancement of onsite hydrologic features that maximize the amount of water evapotransport and groundwater infiltration to in turn minimize watershed degradation impacts to CCC steelhead and sDPS green sturgeon designated critical habitat water quality and habitat function. Doing so would aid in the restoration of the functionality of existing critical habitat water quality and water quantity PBFs in general, and improve the resiliency and probability of recovery of CCC steelhead and sDPS green sturgeon in the region.
- The Authority and its contractors should notify NMFS if any steelhead or salmonid juveniles are observed to be naturally isolated in disconnected or ponded water within their ROW and the Authority or its contractors anticipate the fish being in danger of dying from receding water levels so that appropriate wildlife and fishery agencies may coordinate a fish relocation effort. The Authority and its contractors should enable and facilitate site and area access through the ROW/construction zone until the fish salvage efforts conclude. Any steelhead juveniles handled, injured, or killed by other organizations in this manner will not be tallied toward the incidental take associated with the Authority's incidental take for the proposed action; instead any incidental take associated with the relocation effort would be covered by any permit or other exceptions to take prohibitions held by or applicable to the fish and wildlife agency sponsoring the relocation effort. Doing so will improve the probability the individuals are relocated if necessary and will survive to adulthood and improve the cohort productivity of the CCC steelhead populations involved.
- The Authority and its contractors should continue to work cooperatively with other State and Federal agencies, private landowners, governments, and local land management groups to identify opportunities for cooperative analysis, monitoring, and funding to otherwise support steelhead and watershed restoration projects and recovery action projects in the action area. For example, consider taking part as either lead action agency or funding projects which will remedy existing fish passage barriers for CCC steelhead populations of tributaries of South San Francisco Bay. NMFS recommends the Authority use existing fish passage evaluation reports (e.g., Inventory of Barriers to Fish Passage in California's Coastal Watersheds (The Coastal Conservancy 2004) or the Multispecies Recovery Plan (NMFS 2016c)) to identify waterway crossings that currently impede salmonid access to EFH in the region. Replace any barriers to fish passage that are part of the existing train infrastructure the HSR is relying on or will modify in preparation for

operations. Use weirs, grade control structures, and low flow channels to provide the proper depth and velocity for fish in new or replacement infrastructure. Provide an update on which sites have been remediated and which will remain a barrier, which would be important information for future restoration and recovery actions. Doing so would aid restoration of the functionality of existing critical habitats in general, and improve the resiliency and probability of recovery of CCC steelhead in the region.

- The Authority should use biodegradable oil in equipment and onsite vehicles. Doing so will reduce the amount of construction equipment contamination resultant from the project, and available critical habitat quality will be better maintained, in support of CCC steelhead and sDPS green sturgeon.
- The Authority should submit a final CMP to NMFS prior to implementation of the proposed action. The final CMP should demonstrate that the compensatory mitigation plan for unavoidable impacts to steelhead and green sturgeon habitat adequately meets the Authority’s conservation goals and ratio targets proposed in CM-FISH-1. The final CMP should include:
 - Updated and accurate acreage estimates of types of steelhead/green sturgeon habitat (designated critical habitat or other habitat, by DPS) to be temporarily and permanently impacted by the project (examples of project components that are of concern in this context: permanent structures and bank/slope stabilization measures).
 - Updated and accurate acreage estimates of planned on-site restoration, including riparian replantings, incorporation of large woody material, enhancement of fish habitat, and where “soft” bank/slope stabilization designs were selected for use over hard revetment or riprap.
 - Identification of the property or properties selected to provide compensatory offsets for unavoidable impacts to CCC steelhead habitats, and identification of the conservation partners and agencies that will be responsible for holding and maintaining the conservation easements or fee-title to the identified parcels in perpetuity.
 - Consider supporting NMFS-identified recovery actions or information needs for the DPSs instead of, or in addition to, impact-offset acre based compensatory mitigation. For example, sDPS green sturgeon Monitoring Priority 3 (NMFS 2018) identifies the need to monitor trends in annual production and habitat use of juvenile sDPS green sturgeon in the SFBDE. Funding or otherwise facilitating investigations that address this monitoring priority, and widely sharing the results, may have more recovery benefit to the population than a mitigation bank acreage purchase.

2.11. Reinitiation of Consultation

This concludes formal consultation for the California HSR San Francisco to San Jose Project Section.

Under 50 CFR 402.16(a): “Reinitiation of consultation is required and shall be requested by the Federal agency or by the Service where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and: (1) If the amount or extent of taking specified in the incidental take statement is exceeded; (2) If new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion or written concurrence; or (4) If a new species is listed or critical habitat designated that may be affected by the identified action.”

An example of when reinitiation of consultation will likely be warranted under 50 CFR 402.16 is if the Authority or its contractors do not adhere to the work windows or daily work hours as proposed or when stormwater treatment designs do not perform adequately to avoid or minimize harm to listed species as considered in this opinion. In addition, when a site(s) for compensatory mitigation is confirmed and additional information about the proposed compensatory mitigation is available, reinitiation of consultation may be warranted to analyze the effects of the compensatory mitigation portion of this proposed action, *or* the restoration component of the compensatory mitigation could be included under NOAA Restoration Center’s programmatic approach for fisheries habitat restoration projects in California Coastal counties (NMFS 2017a) if a United States Army Corps of Engineers Clean Water Act section 404 permit is required, and ESA section 7 review would occur through that programmatic opinion process.

3. MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT ESSENTIAL FISH HABITAT RESPONSE

Section 305(b) of the MSA directs Federal agencies to consult with NMFS on all actions or proposed actions that may adversely affect EFH. Under the MSA, this consultation is intended to promote the conservation of EFH as necessary to support sustainable fisheries and the managed species' contribution to a healthy ecosystem. For the purposes of the MSA, EFH means "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity", and includes the physical, biological, and chemical properties that are used by fish (50 CFR 600.10). Adverse effect means any impact that reduces quality or quantity of EFH, and may include direct or indirect physical, chemical, or biological alteration of the waters or substrate and loss of (or injury to) benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects on EFH may result from actions occurring within EFH or outside of it and may include site-specific or EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) of the MSA also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH. Such recommendations may include measures to avoid, minimize, mitigate, or otherwise offset the adverse effects of the action on EFH (CFR 600.905(b)).

This analysis is based, in part, on the EFH assessment provided by the Authority and descriptions of EFH for Pacific Coast groundfish (Pacific Fishery Management Council (PFMC) 2005), coastal pelagic species (CPS; PFMC (1998)), and Pacific Coast salmon (PFMC 2014); contained in the fishery management plans developed by the PFMC and approved by the Secretary of Commerce.

3.1. Essential Fish Habitat Affected by the Project

Effects of the proposed project will impact EFH for Pacific Coast Salmon (for Chinook and coho salmon; PFMC (2014)), Pacific Coast groundfish (PFMC 2019b, 2020), and CPS (PFMC 1998, 2019a) within the action area.

The EFH identified within the action area is identified in the Pacific Coast salmon fishery management plan (PFMC 2014) for both marine and freshwater components. Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other water bodies currently or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC), and longstanding, naturally-impassable barriers (i.e., natural waterfalls in existence for several hundred years). In the estuarine and marine areas, Pacific Coast Salmon EFH extends from the nearshore and tidal submerged environments within state territorial waters out to the full extent of the exclusive economic zone (370.4 km) offshore of Washington, Oregon, and California north of Point Conception. Habitat Areas of Particular Concern (HAPCs) for salmon that will be impacted are: complex channel and floodplain habitat (approximately from Crossing #1 Stevens Creek through Crossing #5 Mills Creek) and estuaries (approximately from Location #6 Millbrae Station through Location #12 China Basin/Mission Bay Channel).

The Pacific Coast Groundfish FMP manages 90-plus species over a large and ecologically diverse area. Groundfish species are comprised of flatfish, rockfish, roundfish (e.g., lingcod, Pacific cod, cabezon), and elasmobranchs (sharks and skates). The overall extent of groundfish EFH is identified as all waters and substrate within depths less than or equal to 3,500 m (1,914 fathoms) to mean higher high water level or the upriver extent of saltwater intrusion, defined as upstream and landward to where ocean-derived salts measure less than 0.5 parts per thousand during the period of average annual low flow, seamounts in depths greater than 3,500 meters, and areas designated as habitat areas of particular concern not already identified by the preceding criteria. The Pacific Coast Groundfish and CPS EFH in the action area are the tidal waters of the SFBDE (approximately Location #6 Millbrae Station through Location #12 China Basin/Mission Bay Channel). The HAPC for groundfish in the action area is: estuaries.

The fishery management plan for Pacific Coast CPS includes five species: northern anchovy, Pacific sardine, Pacific (chub) mackerel, jack mackerel, and market squid. EFH for these fish is defined both by geographic boundaries and sea-surface temperature ranges (PFMC 1998). Pelagic fish live in the water column as opposed to living near the sea floor. They can generally be found anywhere from the surface to 1,000 meters (547 fathoms) deep. EFH for CPS is based on a thermal range bordered by the geographic area where CPS occur at any life stage, where CPS have occurred historically during periods of similar environmental conditions, or where environmental conditions do not preclude colonization by CPS. The identification of EFH for CPS takes into account that the geographic range of CPS varies widely over time in response to the temperature of the upper mixed layer of the ocean. The east-west geographic boundary of EFH for CPS is defined to be all marine and estuarine waters from the shoreline along the coasts of California, Oregon, and Washington offshore to 200 nautical miles and above the thermocline where sea surface temperatures range between 50°F to 79°F. The southern boundary is the United States-Mexico maritime boundary. The northern boundary is more dynamic and is defined as the position of the 10°C isotherm, which varies seasonally and annually (PFMC 2019b).

3.2. Adverse Effects on Essential Fish Habitat

The potential adverse effects of the proposed action on EFH have been described in the preceding biological opinion. Those described for CCC steelhead habitat effects generally apply to Pacific Coast Salmon freshwater EFH and sDPS green sturgeon habitat effects generally apply to Pacific Coast Salmon estuarine EFH, Pacific Coast Groundfish EFH, and CPS EFH. There are many instances where the action area buffer overlaps with EFH; direct project effects from activities or alterations are not expected.

For Pacific Coast Salmon freshwater EFH, adverse effects include:

1. Reduction or removal of riparian vegetation will reduce the habitat complexity of freshwater complex channel habitat (HAPC), both in the short and long-term.
2. Continued or increased channelization by additional armoring of complex channels (HAPC).

3. Sedimentation and turbidity, and exposure to hazardous materials and contaminants, from temporary minor disturbances to the stream beds and banks, or from dewatering.
4. Potential water quality degradation through nonpoint transportation stormwater discharges.
5. Creation or expansion of predator cover and visual barriers.
6. Temporary effects of underwater sound propagation from vibratory and impact pile driving.
7. Additional conversion/removal of natural areas for transportation needs.

For Pacific Coast Salmon estuarine EFH, Pacific Coast Groundfish EFH, and CPS EFH:

1. Additional conversion/removal of estuarine areas for transportation needs (estuaries HAPC).
2. Sedimentation and turbidity, and exposure to hazardous materials and contaminants, from temporary minor disturbances to tidal mudflats and channel bottoms (estuaries HAPC).
3. Dewatering that results in a temporary loss of habitat.
4. Temporary changes to substrate that remove/alter/disturb benthic macroinvertebrate organisms within the project area; thus disrupting the prey base for EFH species (estuaries HAPC).

3.3. Essential Fish Habitat Conservation Recommendations

NMFS determined that the following conservation recommendations are necessary to avoid, minimize, mitigate, or otherwise offset the impact of the proposed action on EFH. Many of the EFH concerns presented above are expected to be addressed through the ESA consultation RPMs 1-3 (section 2.9.3). In addition to the RPMs, NMFS determined that the following conservation recommendations are also necessary to avoid, minimize, mitigate, or otherwise offset the impact of the proposed action on EFH.

For Pacific Coast Salmon freshwater EFH:

1. Minimize or offset decreases to riparian vegetation and corridors (freshwater complex channel habitat HAPC): Protect existing riparian buffer zones or establish new zones on all permanent and ephemeral streams that include or influence Pacific Coast Salmon EFH. Re-vegetate sites to resemble the natural ecosystem community and maintain buffers that support shading, LWD and leaf litter input, sediment and nutrient control, and bank stabilization function. To address long-term reductions in riparian vegetation in areas where channels are under the jurisdiction of the United States Army Corps of Engineers or any other flood management agency, apply for a vegetation variance which will allow for the Authority or its contractors to re-plant the area with native species as described, or at least in the lower one-third of the waterside of the managed channel.

2. Maintain or increase channel complexity (complex channels HAPC): Enhance in-stream fish habitat by providing root wads and deflector logs below the stabilized bank, and by planting shaded riverine aquatic cover vegetation (in conjunction with EFH conservation recommendation #1, above, regarding seeking a vegetation variance where needed), as part of bank revitalization in conjunction with support footings so that the likelihood of scour caused by structure placement is reduced. The Authority should work with NMFS staff to ensure LWM installations are placed in arrangements and in sufficient numbers so that maximal benefits and use of salmon juveniles are likely and expected (Dollof and Melvin 2003).
3. Avoid creation of predator cover or provide refuge: Install in-river LWM around or adjacent to the HSR crossing and footings so that juvenile Chinook and coho salmon may have access to cover and predator escapement nearby areas under constant train operation as described above.
4. Avoid creating barriers to fish passage when installing new infrastructure or when modifying existing structures for HSR service, using passage metrics designed for Chinook salmon passage (CDFG 2009, NMFS 2011). Provide an update on which project designs, if any, have been changed after considering salmonid passage needs.
5. Address the increase in impervious surface cover and general urbanization of natural habitat in the action area: NMFS recommends the Authority examine its ROW, parking lots, Brisbane LMF, and access road designs of the project area to maintain the maximum amount of natural hydrologic connectivity and to maintain remaining floodplain habitat connectivity whenever possible. Minimize the placement of new impervious surface as much as possible and remove impervious surfaces as feasible (e.g., unused parking lots). New designs could also include incorporation of stormwater treatment/LID tactics to treat project-associated stormwater before discharge and use of permeable pavements to the maximum extent possible.
6. Address potential decreases in water quality due to nonpoint stormwater discharge: A program should be established to address non-point and stormwater pollution from the proposed action. Install and monitor vegetated buffers along stormwater drains to streams, compost based bioretention filters, or bioswales in upland areas with the goals of trapping sediment, removing nutrients, tire wear particles, and metals, and moderating water temperatures, as feasible. Allow zero net increase in annual loading of stormwater pollutants into EFH. If allowing zero net increase is not possible, take efforts beyond HSR properties to help the local communities, in conjunction with local watershed conservation or restoration groups, perhaps through permitting guidance, knowledge exchanges, or funding community projects as a mitigation offset option.
7. Minimize or eliminate potential effects of bank armoring/stabilization: Utilize alternatives to traditional riprap and hard armoring where streambank stabilization is needed, such as designing compacted fill lifts and vegetation plantings to stabilize banks while also enhancing Pacific Coast Salmon EFH. This could involve placing granular soil under compost socks above the OHWM. The compacted fill lifts would consist of compost socks, would have a minimum durability of one year and would be composed of biodegradable jute,

sisal, burlap, or coir fiber fabric. A 12-inch diameter compost sock would be installed on the face of each lift and then the compost sock and soil at each lift would be wrapped with biodegradable material. The process would be repeated until the top of the site is reached. Once the compost socks and soil wraps have been placed, two 6-foot live willow branch cuttings would be placed per linear foot in each of the lifts and a 2-inch layer of topsoil would be placed over the cuttings. Hard bank protection should be a last resort and the following options should be explored beforehand for efficacy (tree revetments, stream flow deflectors, and vegetative riprap (FEMA 2009)). Exchanging riprap placement or channelization practices for these recommendations helps restore the disturbed ground, decreases the chance of future erosion events, and moves the riverbank back to a more natural state while still providing the stabilization needed for the continuous operations of the HSR system.

For Pacific Coast Salmon estuarine EFH, Pacific Coast Groundfish EFH, and CPS EFH:

1. Minimize loss or alteration of habitat (estuaries HAPC): Maintain and restore functioning estuarine conditions. The removal, diking, or draining of tidal marshlands and estuaries should not be undertaken unless a satisfactory compensatory mitigation plan is in effect and monitored. Work with watershed or estuary conservation groups to focus resources on conservation and restoration of estuarine habitats on public or private lands. Ensure alignment crossings allow for free movement of organisms, sediment, and water. Use vegetation methods or “soft” approaches (beach nourishment, vegetative plantings, placement of large woody debris) for bank stabilization if necessary, instead of “hard” modifications, or use manmade structures in combination with ecosystem-based methods (e.g., oyster domes) to promote both shoreline protection and ecological benefits (Gedan et al. 2010)). Decrease shading impacts by using light transmitting material on overwater structures, such as grated decking when feasible. Filling of any estuarine or tidally influenced waterway should be curtailed as much as reasonably possible, and avoid filling native eelgrass beds. Protect or restore vegetated buffer zones with the natural ecosystem community around estuarine areas. Design bridge abutments or modifications to minimize disturbance to EFH; place abutments outside of current and predicted floodplain areas.
2. Address potential siltation and contamination (estuaries HAPC): A program should be established to address non-point and stormwater pollution from the proposed action. Discharge outfalls should be treated to avoid further contamination of the receiving waters and be located only in areas that have good mixing characteristics. Install bioretention or biofiltration features along all types of transportation drainage systems. Allow zero net increase in annual loading of stormwater pollutants into EFH. Use natural untreated materials to avoid releasing additional contaminants. Remove piles with a vibratory hammer only and remove slowly so sediment can slough off near the mudline; place clean sand around base of pile to contain some of the sediment.

Fully implementing these nine EFH conservation recommendations and RPMs 1-3 (section 2.9.3 of the Opinion) would protect, by avoiding or minimizing the adverse effects described in section 3.2 above, for Pacific Coast salmon, Pacific Coast groundfish, and CPS EFH and associated HAPCs.

3.4. Statutory Response Requirements

As required by section 305(b)(4)(B) of the MSA, the Authority must provide a detailed response in writing to NMFS within 30 days after receiving an EFH Conservation Recommendation. Such a response must be provided at least 10 days prior to final approval of the action if the response is inconsistent with any of NMFS's EFH Conservation Recommendations unless NMFS and the Federal agency have agreed to use alternative time frames for the Federal agency response. The response must include a description of the measures proposed by the agency for avoiding, minimizing, mitigating, or otherwise offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the Conservation Recommendations, the Federal agency must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS over the anticipated effects of the action and the measures needed to avoid, minimize, mitigate, or offset such effects (50 CFR 600.920(k)(1)).

In response to increased oversight of overall EFH program effectiveness by the Office of Management and Budget, NMFS established a quarterly reporting requirement to determine how many conservation recommendations are provided as part of each EFH consultation and how many are adopted by the action agency. Therefore, we ask that in your statutory reply to the EFH portion of this consultation, you clearly identify the number of conservation recommendations accepted.

3.5. Supplemental Consultation

The Authority must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH Conservation Recommendations (50 CFR 600.920(l)).

4. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

The Data Quality Act (DQA) specifies three components contributing to the quality of a document. They are utility, integrity, and objectivity. This section of the opinion addresses these DQA components, documents compliance with the DQA, and certifies that this opinion has undergone pre-dissemination review.

4.1. Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended users of this opinion are the California High Speed Rail Authority. Other interested users could include the United States Army Corps of Engineers, USFWS, California Department of Fish and Wildlife, EPA, citizens of California, and others interested in the conservation of the affected DPSs. Individual copies of this opinion were provided to the Authority. The document will be available within two weeks at the [NOAA Library Institutional Repository](#). The format and naming adheres to conventional standards for style.

4.2. Integrity

This consultation was completed on a computer system managed by NMFS in accordance with relevant information technology security policies and standards set out in Appendix III, 'Security of Automated Information Resources,' Office of Management and Budget Circular A-130; the Computer Security Act; and the Government Information Security Reform Act.

4.3. Objectivity

Information Product Category: Natural Resource Plan

Standards: This consultation and supporting documents are clear, concise, complete, and unbiased; and were developed using commonly accepted scientific research methods. They adhere to published standards including the NMFS ESA Consultation Handbook, ESA regulations, 50 CFR 402.01 et seq., and the MSA implementing regulations regarding EFH, 50 CFR 600.

Best Available Information: This consultation and supporting documents use the best available information, as referenced in the References section. The analyses in this opinion and EFH consultation, contain more background on information sources and quality.

Referencing: All supporting materials, information, data and analyses are properly referenced, consistent with standard scientific referencing style.

Review Process: This consultation was drafted by NMFS staff with training in ESA and MSA implementation, and reviewed in accordance with West Coast Region ESA quality control and assurance processes.

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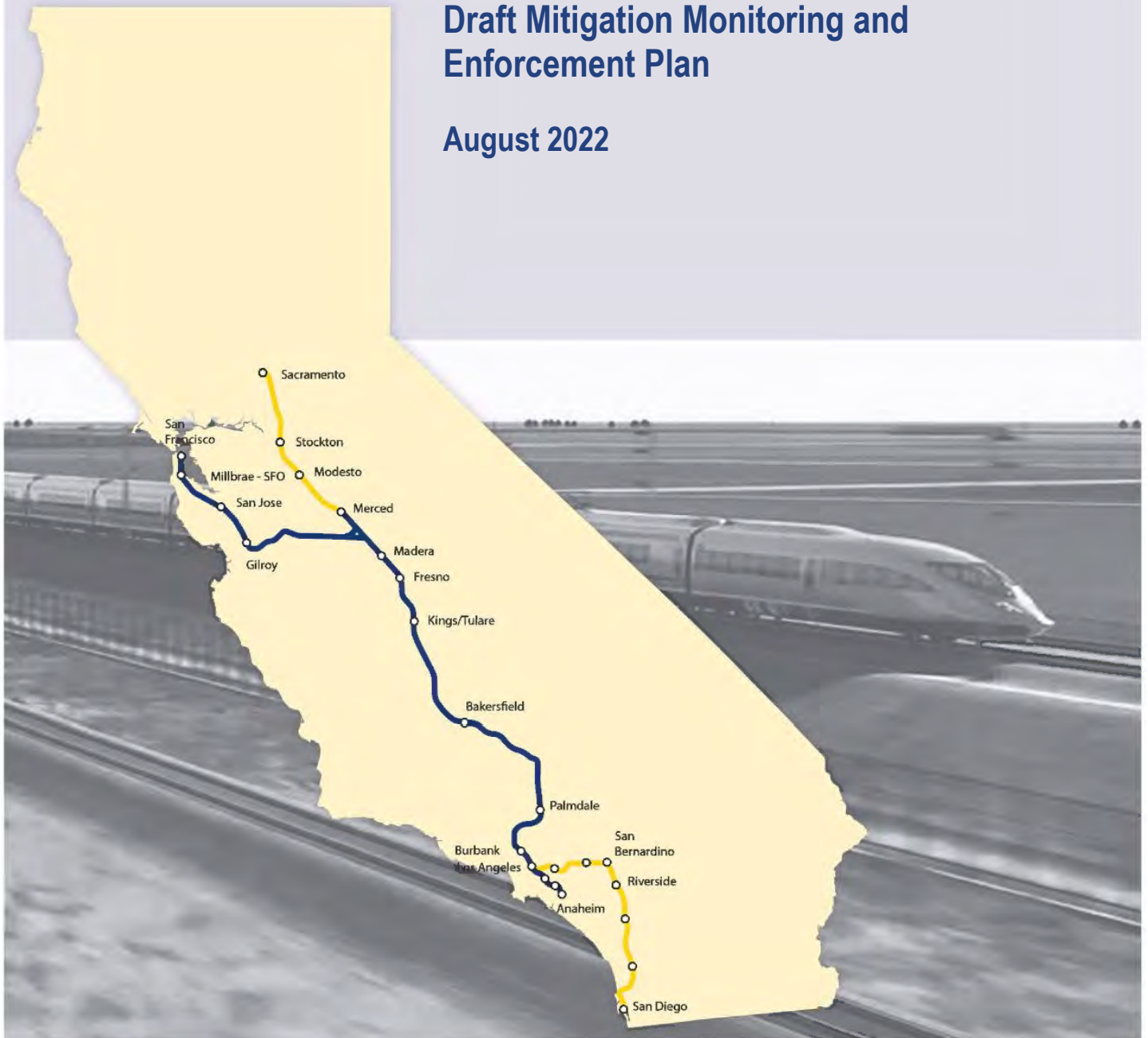
APPENDIX D: DRAFT MITIGATION MONITORING AND ENFORCEMENT PLAN

California High-Speed Rail Authority

San Francisco to San Jose Project Section

Draft Mitigation Monitoring and Enforcement Plan

August 2022



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.

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**California High-Speed Rail Project
San Francisco to San Jose Project Section**



**DRAFT MITIGATION MONITORING AND
ENFORCEMENT PLAN**

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1 INTRODUCTION

In June 2022, the California High-Speed Rail Authority (Authority), as the state lead agency and as the federal lead agency pursuant to the National Environmental Policy Act (NEPA) Assignment Memorandum of Understanding (MOU) (July 23, 2019), issued a Final Environmental Impact Report (EIR)/Environmental Impact Statement (EIS) for the San Francisco to San Jose Project Section (Project Section, or project) of the California High-Speed Rail (HSR) System (Authority 2022). The Final EIR/EIS satisfies the requirements of the California Environmental Quality Act (CEQA) and NEPA and is the basis for the Authority's decision. In its decision, the Authority selected the Preferred Alternative (Alternative A with modified Caltrain stations for HSR at the 4th and King Street and Millbrae Stations, the East Brisbane light maintenance facility, and associated project elements) for the portion of the Project Section between the 4th and King Street Station in San Francisco and Scott Boulevard in Santa Clara. This Mitigation Monitoring and Enforcement Plan (MMEP)¹ has been prepared for the Preferred Alternative. The portion of the Project Section from Scott Boulevard in Santa Clara to West Alma Avenue in San Jose (including the San Jose Diridon Station) was approved by the Authority Board of Directors as part of the San Jose to Merced Project Section in April 2022. Refer to the MMEP for the San Jose to Merced Project Section for the mitigation measures and impact avoidance and minimization features (IAMF) relevant to the HSR alignment between Scott Boulevard in Santa Clara and West Alma Avenue in San Jose.

Table 1 describes mitigation measures from the San Francisco to San Jose Project Section Final EIR/EIS that will mitigate the adverse impacts of the Preferred Alternative. These measures were developed by the Authority in consultation with appropriate agencies, as well as with input from the public, to meet the requirements of CEQA and NEPA. The mitigation measures in Table 1 are conditions of approval that the Authority is required to comply with as it implements the Preferred Alternative.

The Preferred Alternative incorporates IAMFs including best management practices (BMPs), which are described in detail in the Final EIR/EIS Volume 2, Technical Appendices, Appendix 2-E, Project Impact Avoidance and Minimization Features, and in the technical reports that support the Final EIR/EIS. As a result of applying these IAMFs, the Preferred Alternative will avoid potential adverse environmental impacts in several resource areas including electromagnetic fields and electromagnetic interference; public utilities and energy; geology, soils, seismicity, and paleontological resources; socioeconomics and communities; parks, recreation, and open space; and aesthetics and visual quality. In addition, the regulatory requirements, including permitting and coordination with regulatory agencies, for many project-related activities provide additional assurance that potential adverse environmental impacts would not occur. Two cooperating agencies are part of the NEPA review process: the U.S. Army Corps of Engineers (USACE) and Surface Transportation Board. As part of the CEQA process, the responsible agencies include the California Department of Fish and Wildlife (CDFW), California Department of Transportation (Caltrans), California Public Utilities Commission, San Francisco Bay Conservation and Development Commission (BCDC), San Francisco Bay Regional Water Quality Control Board, Bay Area Air Quality Management District, Bay Area Rapid Transit District (BART), Peninsula Corridor Joint Powers Board (PCJPB) (Caltrain), and California State Lands Commission. Like the mitigation measures listed in Table 1, the project IAMFs and compliance with regulatory requirements are a condition of project approval and must be implemented by the Authority during design, construction, and operation of the project. The IAMFs that are part of the Preferred Alternative are described in Volume 2, Appendix 2-E of the Final EIR/EIS and listed in Table 2 of this document.

Key legal requirements the Preferred Alternative is subject to are described for the following resource areas in more detail in the corresponding sections of Chapter 3, Affected Environment,

¹ The MMEP is consistent with CEQA requirements for mitigation monitoring as set forth in Section 15097 and 15091, subdivision (d) of the CEQA Guidelines (14 California Code of Regulations, Division 6, Chapter 3). Where mitigation is for NEPA purposes only or CEQA purposes only, it is identified accordingly.

Environmental Consequences, and Mitigation Measures, of Volume 1, Report, of the Final EIR/EIS:

- Transportation—Section 3.2.2
- Air Quality and Greenhouse Gases—Section 3.3.2
- Noise and Vibration—Section 3.4.2
- Electromagnetic Fields and Electromagnetic Interference—Section 3.5.2
- Public Utilities and Energy—Section 3.6.2
- Biological and Aquatic Resources—Section 3.7.2
- Hydrology and Water Resources—Section 3.8.2
- Geology, Soils, Seismicity, and Paleontological Resources—Section 3.9.2
- Hazardous Materials and Wastes—Section 3.10.2
- Safety and Security—Section 3.11.2
- Socioeconomics and Communities—Section 3.12.2
- Station Planning, Land Use, and Development—Section 3.13.2
- Parks, Recreation, and Open Space—Section 3.14.2
- Aesthetics and Visual Quality—Section 3.15.2
- Cultural Resources—Section 3.16.2
- Regional Growth—Section 3.17.2
- Cumulative Impacts—Section 3.18.2

The MMEP adheres to the Council on Environmental Quality's (CEQ) regulations (40 Code of Federal Regulations [C.F.R.] Part 1505)² and Federal Railroad Administration *Procedures for Considering Environmental Impacts* (64 *Federal Register* [Fed. Reg.] 28545, May 26, 1999) and was prepared based on the CEQ finalized guidance entitled *Appropriate Use of Mitigation and Monitoring and Clarifying the Appropriate Use of Mitigated Findings of No Significant Impact* (CEQ January 14, 2011). The CEQ guidance assists NEPA lead agencies to develop mitigation programs that provide effective documentation, implementation, and monitoring of mitigation commitments.

² The CEQ issued new regulations on July 14, 2020, effective September 14, 2020, updating the NEPA implementing procedures at 40 C.F.R. Parts 1500–1508. However, this project initiated the NEPA process before the effective date and is not subject to the new regulations, relying on the 1978 regulations as they existed prior to September 14, 2020. All subsequent citations to CEQ regulations in this environmental document refer to the 1978 regulations, pursuant to 40 C.F.R. Section 1506.13 (2020) and the preamble at 85 Fed. Reg. 43340.

2 MITIGATION MONITORING AND ENFORCEMENT PLAN

The environmental effects of the Preferred Alternative would result in impacts considered significant under CEQA and in effects considered adverse under NEPA. Mitigation measures that will reduce or eliminate potential adverse environmental impacts are described in Chapter 3 of the Final EIR/EIS. The specific provisions contained in this MMEP are presented in a table and include mitigation measures identified in the Final EIR/EIS, organized by environmental issue and topical areas addressed in the Final EIR/EIS. In collaboration with the appropriate agencies, the Authority may refine the means by which it will implement a mitigation measure, as long as the alternative means will be equally or more effective. This MMEP describes implementation and monitoring procedural guidance, responsibilities, and timing for each mitigation measure identified in the Final EIR/EIS. Components include:

- **Impact Number and Impact Text:** Provides the impact number and description of the impact requiring mitigation as identified in the Final EIR/EIS.
- **Mitigation Measures:** Provides the number, title, and text of the mitigation measures as identified in the Final EIR/EIS.
- **Phase:** Provides the phase during which the mitigation measure will be implemented (pre-construction, during construction, post-construction, or during operation).
- **Implementation Action/Text/Mechanism:** Identifies the actions required to implement the measures, including any required agreements and conditions.
- **Reporting Schedule:** Identifies the stage of the project and the frequency that reporting is to occur, if reporting is required.
- **Implementing Party/Reporting Party:** Except as noted, identifies the entity that will be responsible for directly implementing the mitigation measures, monitoring, and reporting. Implementation can be the responsibility of the Authority or its contractor. Monitoring will generally be the responsibility of the contractor, with oversight provided by the Authority during construction. Long-term mitigation monitoring responsibilities will be the responsibility of the Authority.

Roles and Responsibilities

As the lead agency and proponent of this project, the Authority will implement the mitigation measures through its own actions, those of its contractor, and actions taken in cooperation with other agencies and entities. The Authority is ultimately accountable for the overall administration of the MMEP and for assisting relevant individuals and parties in their oversight and reporting responsibilities. The responsibilities of mitigation implementation, monitoring, and reporting extend to several entities as discussed above; however, the Authority will bear the primary responsibility for verifying that the mitigation measures are implemented. The Authority defines the mitigation measures required for the project. When project work is undertaken by the Authority's contractor, the contractor will implement the mitigation measures that are pertinent to its scope of work. The contractor will monitor construction activities to ensure that the mitigation measures are being properly implemented and accurately report their activity and results to the Authority. The Authority will periodically check the contractor's activity, reports, and effectiveness of mitigation activities.

- **Authority:** While the Authority retains responsibility for the implementation of and reporting on mitigation measures and IAMFs as specified in this MMEP, activities may be carried out by an Authority representative or an Authority-approved contractor. Authority responsibilities may also include certain measures outside of the scope of the contractor such as future studies or operations-phase implementation. In addition, oversight of implementation and reporting may be provided by the Authority's contractor or representatives as lead agency representatives to facilitate regulatory oversight agency coordination and compliance during implementation and reporting.

- **Contractor:** The contractor(s) (or the environmental team provided by the contractor) will be responsible for implementing or monitoring mitigation measures and IAMFs as specified in this MMEP.
- **Mitigation Manager:** The contractor's representative responsible for overseeing its environmental team's implementation and reporting of environmental commitments will be responsible for reporting the status of each mitigation measure to the Authority in accordance with this MMEP.
- **Biological Monitor(s):** The contractor-provided biological monitor(s) will be approved by and report directly to the contractor's biologist. The biological monitor(s) will be present on-site within a reasonable monitoring distance during all ground-disturbing activities that have the potential to affect biological resources as directed by the project biologist and will be the principal agent(s) in the direct implementation of the MMEP and compliance assurance.
- **Cultural Resources Compliance Manager/Principal Investigator:** This position must be an archaeologist who meets relevant Secretary of the Interior's qualifications for an archaeologist. The cultural resources compliance manager/principal investigator is responsible for implementing mitigation measures in compliance with the terms and conditions outlined in the MMEP and treatment plans and coordinating the status of archaeological mitigation with the Authority in accordance with this MMEP, the Authority's Section 106 Programmatic Agreement, and the San Francisco to San Jose Project Section Memorandum of Agreement.
- **Cultural Resources Monitor(s):** The contractor-provided cultural resources monitor(s) will be approved by and report directly to the cultural resources compliance manager/principal investigator. This/these monitor(s) will be present on-site within a reasonable monitoring distance during ground-disturbing activities in areas indicated as culturally sensitive and will be the principal agent(s) in the direct implementation of the MMEP and compliance assurance as directed by the cultural resources compliance manager/principal investigator.
- **Paleontological Resources Specialist:** The contractor-provided paleontological resources specialist is responsible for implementing mitigation measures in compliance with the terms and conditions outlined in the MMEP, including preparation of the paleontological resources management plan and approval and direction of the paleontological resource monitor(s).
- **Paleontological Resources Monitor(s):** The contractor-provided paleontological resources monitor(s) will be approved by and report directly to the paleontological resources specialist. The paleontological resources monitor(s) will be present on-site within a reasonable monitoring distance during ground-disturbing activities in areas indicated as resource sensitive and will be the principal agent(s) in the direct implementation of the MMEP and compliance assurance as directed by the paleontological resources specialist.

3 ENVIRONMENTAL MITIGATION MANAGEMENT AND ASSESSMENT SYSTEM

The Authority will implement an Environmental Mitigation Management and Assessment (EMMA) system consisting of strategic planning, policies, and procedures, organizational structure, staffing and responsibilities, milestones, schedule, and resources devoted to achieving the Authority's environmental commitments. The EMMA will also include a component that tracks the implementation of mitigation measures (as well as environmental commitments, BMPs, and IAMFs) and can produce reports on compliance. The Authority staff will receive periodic reports on compliance and may request additional reports as necessary to ensure that the MMEP is fully implemented. This system will rely on data provided by the contractor, its consultants, and others to produce status reports regarding construction status, permitting activities, monitoring, inspections, and other compliance activities.

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Table 1 San Francisco to San Jose Project Section: Mitigation Monitoring and Enforcement Plan

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementing Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
Transportation										
TR-MM#1a	Scott Street/San Mateo Avenue, North Lane/California Drive, North Lane/Carolan Avenue, Peninsula Avenue/Arundel Road, Brewster Avenue/Perry Street, Main Street/Beech Street—Install Traffic Signals	<p>Prior to project operations, the contractor will install traffic signals at the following locations:</p> <ul style="list-style-type: none"> ▪ TR-MM#1a.1: Scott Street/San Mateo Avenue ▪ TR-MM#1a.2: North Lane/California Drive ▪ TR-MM#1a.3: North Lane/Carolan Avenue ▪ TR-MM#1a.4: Peninsula Avenue/Arundel Road ▪ TR-MM#1a.5: Brewster Avenue/Perry Street ▪ TR-MM#1a.6: Main Street/Beech Street <p>The following equipment and features are assumed as part of the traffic signal improvements to limit the potential for secondary effects:</p> <ul style="list-style-type: none"> ▪ Accessible pedestrian push buttons ▪ Pedestrian signal heads with countdown timers ▪ Directional curb ramps: one per crosswalk ▪ Marked crosswalks on all street approaches ▪ Where new traffic signals are installed at intersections near at-grade railroad crossings, additional signal equipment, interconnects, and/or special signal timing plans as required to minimize conflicts between trains and cross-street vehicle queues <p>The contractor will prepare all materials necessary for and seek the approval of the City of San Bruno, the City of Burlingame, and the City of Redwood City for these improvements.</p>	Design/Construction	Contract requirements; Compliance reporting	As needed	Authority/Contractor	Authority	Final design and prior to construction	Condition of construction contract	<p>Impact TR#5: Continuous Permanent Congestion/Delay Consequences on Intersection Operations</p> <p>Impact S&S#6: Continuous Permanent Impacts on Emergency Access and Response Times due to Station Traffic and Increased Gate-Down Time</p>
TR-MM#1b	Second Street/Townsend Street—Optimize Signal Timing (NEPA Effect Only)	<p>Prior to project operations, the contractor will furnish and install signal equipment at the Second Street/Townsend Street intersection to optimize timing to serve demand. The contractor will prepare all necessary materials and obtain approval from the City and County of San Francisco for the modification.</p>	Design/Construction	Contract requirements; Compliance reporting	As needed	Authority/Contractor	Authority	Final design and prior to construction	Condition of construction contract	Impact TR#5: Continuous Permanent Congestion/Delay Consequences on Intersection Operations
TR-MM#1c	Harney Way/Thomas Mellon Circle—Near-Term Harney Way Improvements (NEPA Effect Only)	<p>Prior to project operations, the contractor will construct the Near-Term SFMTA Harney Way-101 Transit Crossing Project Improvements if the City and County of San Francisco or other entities have not yet implemented this project. This project will involve realignment of Thomas Mellon Circle to intersect Harney Way at a new intersection approximately 100 feet northeast of Alana Way, installation of a traffic signal at the newly configured Harney Way/Thomas Mellon Circle intersection, and widening of Harney Way to provide four travel lanes. The contractor will prepare all necessary materials and obtain approval from the City and County of San Francisco for the modification.</p>	Design/Construction	Contract requirements; Compliance reporting	As needed	Authority/Contractor	Authority	Final design and prior to construction	Condition of construction contract	Impact TR#5: Continuous Permanent Congestion/Delay Consequences on Intersection Operations

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementing Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
TR-MM#1d	Scott Street/Herman Street—Install Traffic Signal, Extend Sidewalk, and Add Northbound and Southbound Right Turn Lanes (NEPA Effect Only)	Prior to project operations, the contractor will furnish and install traffic signal equipment at the Scott Street/Herman Street intersection; reconfigure lanes to provide exclusive northbound and southbound right turn lanes on Herman Street; and install approximately 120 feet of sidewalk, curb, and gutter on the north side of Scott Street to provide continuous pedestrian facilities on the north side of Scott Street between Montgomery Avenue and Herman Street including pedestrian safety features at the at-grade rail crossing as required by Caltrain. The contractor will prepare all necessary materials and obtain approval from the City of San Bruno for the modification.	Design/ Construction	Contract requirements; Compliance reporting	As needed	Authority/ Contractor	Authority	Final design and prior to construction	Condition of construction contract	Impact TR#5: Continuous Permanent Congestion/Delay Consequences on Intersection Operations
TR-MM#1e	El Camino Real (SR 82)/Murchison Drive—Reconfigure Westbound Approach to Add Left and Right Turn Lanes; Add Overlap Signal Phase; Install New Traffic Signal at California Drive/ Murchison Drive (NEPA Effect Only)	Prior to project operations, the contractor will reconfigure the westbound Murchison Drive approach to the El Camino Real (SR 82)/Murchison Drive intersection to add exclusive left and right turn lanes with an overlap signal phase for the westbound right turn and southbound left turn. This improvement will require modifying the northernmost of two eastbound lanes on Murchison Drive to provide left turn pockets of approximately 150 feet in each direction between El Camino Real and California Drive, removing parking on the south side of Murchison Drive between El Camino Real and California Drive, and replacing the parking with a protected eastbound bike facility as designated in the Burlingame Pedestrian and Bicycle Plan, and modifying the traffic signal. In conjunction with this improvement, the contractor will install a new traffic signal at the California Drive/Murchison Drive intersection to minimize eastbound queue spillback along eastbound Murchison Drive into El Camino Real. This improvement will include traffic signal interconnect equipment with the El Camino Real/Murchison Drive intersection to the extent necessary for coordinating signal phases and vehicle movements between both the El Camino Real/Murchison Drive and California Drive/ Murchison Drive intersection controllers. The contractor will prepare all necessary materials and seek approval from Caltrans, the City of Millbrae, and the City of Burlingame for the modification.	Design/ Construction	Contract requirements; Compliance reporting	As needed	Authority/ Contractor	Authority	Final design and prior to construction	Condition of construction contract	Impact TR#5: Continuous Permanent Congestion/Delay Consequences on Intersection Operations
TR-MM#1f	Millbrae Avenue/Rollins Road—Optimize Signal Timing and Coordination (NEPA Effect Only)	Prior to project operations, the contractor will furnish and install signal equipment at the Millbrae Avenue/Rollins Road intersection to optimize timing to serve demand at the intersection and coordinate signal timing along the Millbrae Avenue corridor between El Camino Real and the US 101 northbound ramps. Along the Millbrae Avenue corridor, the City of Millbrae plans to convert the northernmost westbound lane on Millbrae Avenue at El Camino Real from a westbound through lane to a westbound through/right turn lane for improved operations. The contractor will prepare all necessary materials and seek approval from the City of Millbrae for the modification.	Design/ Construction	Contract requirements; Compliance reporting	As needed	Authority/ Contractor	Authority	Final design and prior to construction	Condition of construction contract	Impact TR#5: Continuous Permanent Congestion/Delay Consequences on Intersection Operations

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementing Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
TR-MM#1g	Millbrae Avenue/US 101 Northbound Ramps—Widen Off-Ramp to Extend Northbound Left Turn Lane Storage (NEPA Effect Only)	Prior to project operations, the contractor will widen the northbound US 101 off-ramp to Millbrae Avenue to extend the left turn pocket to a length of approximately 600 feet. This improvement will require modifications to ramp lighting, barriers, signing, drainage, and landscaping. The contractor will prepare all materials necessary for and seek approval from Caltrans for the modification.	Design/ Construction	Contract requirements; Compliance reporting	As needed	Authority/ Contractor	Authority	Final design and prior to construction	Condition of construction contract	Impact TR#5: Continuous Permanent Congestion/Delay Consequences on Intersection Operations
TR-MM#1h	Whipple Avenue/El Camino Real—Add Overlap Signal Phase and Optimize Signal Timing	Prior to project operations, the contractor will add an overlap signal phase to the northbound right turn and westbound left turn movements, optimize signal timing at the Whipple Avenue/El Camino Real intersection, and coordinate timing changes with adjacent coordinated signals on Whipple Avenue. This improvement will require traffic signal modifications. The contractor will prepare all materials necessary for and seek approval from the City of Redwood City and Caltrans for the modification.	Design/ Construction	Contract requirements; Compliance reporting	As needed	Authority/ Contractor	Authority	Final design and prior to construction	Condition of construction contract	Impact TR#5: Continuous Permanent Congestion/Delay Consequences on Intersection Operations Impact S&S#6: Continuous Permanent Impacts on Emergency Access and Response Times due to Station Traffic and Increased Gate-Down Time
TR-MM#1i	Whipple Avenue/Arguello Street—Optimize Signal Timing	Prior to project operations, the contractor will optimize signal timing, including optimizing cycle length and splits at the Whipple Avenue/Arguello Street intersection and signal timing at adjacent intersections that are interconnected along Whipple Avenue. This improvement will require traffic signal modifications. The contractor will prepare all materials necessary for and seek approval from the City of Redwood City for the modification.	Design/ Construction	Contract requirements; Compliance reporting	As needed	Authority/ Contractor	Authority	Final design and prior to construction	Condition of construction contract	Impact TR#5: Continuous Permanent Congestion/Delay Consequences on Intersection Operations Impact S&S#6: Continuous Permanent Impacts on Emergency Access and Response Times due to Station Traffic and Increased Gate-Down Time
TR-MM#2	Install Transit Priority Treatments	<p>Prior to operations, the Authority's contractor will install bus transit priority treatments on the following roads to reduce the impact of permanent delays to MUNI Routes 30 and 45 due to added HSR station traffic, to SamTrans Route ECR along El Camino Real due to added HSR station traffic, and to SamTrans Route 296 at the Ravenswood at-grade crossing caused by increased gate-down time from added HSR trains:</p> <ul style="list-style-type: none"> ▪ Fifth Street and Townsend Street along MUNI Routes 30 and 45 (City and County of San Francisco) ▪ El Camino Real along SamTrans Route ECR between Hillcrest Boulevard and Trousdale Drive (City of Millbrae) ▪ Ravenswood Avenue along SamTrans Route 296 between El Camino Real and Middlefield Road (City of Menlo Park) ▪ Middlefield Road along SamTrans Route 296 between Marsh Road and Willow Road (City of Menlo Park) <p>The contractor will prepare all materials necessary for and seek the approval of the City and County of San Francisco, SamTrans, the City of Millbrae, the City of Menlo Park, and Town of Atherton for these improvements.</p>	Prior to operations	Design	Prior to commencement of operation	Authority/ Contractor	Authority	Improvements to traffic signals to address delays to bus transit.	Condition of construction contract	Impact TR#8: Temporary Impacts on Bus Transit Impact TR#11: Continuous Permanent Impacts on Bus Services
TR-MM#3	Implement Railway Disruption Control Plan	Prior to construction, the Authority will require the construction contractor to prepare a railway disruption control plan for Authority approval and will implement the	Pre-construction	Design	Prior to commencement of construction	Authority/ Contractor	Contractor	Develop and implement railway	Condition of construction contract	Impact TR#10: Temporary Impacts on Passenger Rail Operations Impact TR#18: Temporary Impacts on

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementing Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		<p>plan during construction. The goal of the plan will be to minimize the duration of disruption of passenger and freight operations and maintain reasonable LOS while allowing for an expeditious completion of construction. The Authority will require the construction contractor to coordinate with Caltrain and UPRR in advance and during any potential disruption to passenger or freight operations or Caltrain or UPRR facilities. The construction contractor will maintain emergency access to and from Caltrain and UPRR throughout construction.</p> <p>The Authority will require the construction contractor, in cooperation with Caltrain, to implement the following coordination and consultation requirements:</p> <ul style="list-style-type: none"> ▪ The contractor will establish a freight stakeholder committee to provide an information and feedback forum prior to and during construction with a minimum of quarterly coordination meetings during construction, which will include representatives from the Authority, Caltrain, UPRR, and freight operators and shippers. ▪ The contractor will consult with Caltrain, UPRR, and freight operators and shippers during preparation of the railway disruption control plan, including provision of a draft plan for comment prior to completion. Where the plan concerns the Caltrain right-of-way and facilities, Caltrain will approve the plan. The Authority will review and approve the final plan only after Caltrain approval relative to Caltrain right-of-way and facilities. ▪ As part of the railway disruption control plan, the contractor will prepare a track closure contingency plan for every proposed track closure describing the duration of closure and the alternative arrangements to facilitate freight operations, including approval of freight operations during daytime during weekdays (if feasible and approved by Caltrain). ▪ The contractor will notify Caltrain, UPRR, and freight operators and users of any planned mainline track closures or limitations of access to other rail facilities (spur tracks, rail yards, and maintenance facilities) at least 3 months prior to the closure or limitation of access. <p>The Authority will make efforts to contain and minimize disruption to freight and tenant passenger services during project construction, while allowing for expeditious completion of construction. Measures that will be implemented throughout the course of project construction will include, but would not be limited to, the following:</p> <ul style="list-style-type: none"> ▪ Limit number of simultaneous track closures within each subsection, with closure timeframe limited as much as feasible for each closure, unless bypass tracks or alternative routes are available ▪ Provide safety measures for freight and passenger rail operation through construction zones 						disruption control plan		Freight Rail Operations

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementing Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		<ul style="list-style-type: none"> Require contractors to coordinate with rail dispatch to minimize disruption of rail service in the corridor Where feasible, limit closure of any tracks for construction activities to periods when train service is less frequent (e.g., weekends, or midday and late evening periods on weekdays) Where one open track cannot be maintained for passenger or freight use, limit multitrack closures to one location at a time, as much as feasible Where multitrack closures result in temporary suspension of passenger rail service, work with local and regional transit providers to provide alternative transit service around the closure area (e.g., increased bus and shuttle service) Where multitrack closures result in temporary suspension of freight rail service, work with UPRR and freight operators and users to schedule alternative freight service timing to minimize disruption to freight customers Provide advance notice to transit riders of any temporary disruption in passenger rail service 								
TR-MM#5	Contribute to 4th and King Street Station Pedestrian Improvements	<p>Prior to construction, the Authority's contractor will work with Caltrain and the City and County of San Francisco to develop an improvement plan to increase sidewalk capacity on Fourth Street along the station frontage between Townsend Street and King Street. These improvements will build off of the ongoing construction of the Townsend Corridor Improvement Project by the City and County of San Francisco that will provide a protected bikeway between Fourth and Eighth Streets, an upgraded pedestrian walkway between Fourth Street and Seventh Street where no sidewalk exists, a raised islands between Fourth and Fifth Streets for passenger boarding, relocated and expanded commercial and passenger loading zones, high-visibility crosswalks and curb zones at intersections, and a modified bus routes (MUNI 47 Van Ness) and bus stop changes for various bus routes throughout the corridor. The PCEP EIR identified a pedestrian impact at the 4th and King Street Station. The contractor will construct pedestrian improvements based on the approved pedestrian improvement plan. The contractor will prepare all materials necessary for and seek the approval of the City and County of San Francisco for this improvement.</p>	Pre-construction	Contract requirements; Compliance reporting	Prior to commencement of construction	Authority/ Contractor	Contractor	Develop and implement improvement plan to increase sidewalk capacity	Condition of construction contract	Impact TR#17: Continuous Permanent Impacts on Pedestrian and Bicycle Access
Air Quality and Greenhouse Gases										
AQ-MM#1	Construction Emissions Reductions— Requirements for Use of Zero Emission and/or Near Zero Emission Vehicles and	<p>This mitigation measure will reduce the impact of construction emissions from project-related on-road vehicles and off-road equipment.</p> <p>The Authority and all project construction contractors will require that a minimum of 25 percent, with a goal of 100 percent, of all light-duty on-road vehicles (e.g., passenger</p>	Pre-construction	Contract requirements; Compliance reporting	Monthly and annually	Authority/ Contractor	Authority	Daily record keeping and monthly/annual reporting	A copy of each unit's certified tier specification and any required CARB or air pollution control district	Impact AQ#1: Temporary Direct and Indirect Impacts on Air Quality in the SFBAAB Impact AQ#4: Temporary Direct Impacts on Implementation of an Applicable Air Quality Plan

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementing Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
	Off-Road Equipment	<p>cars, light-duty trucks) associated with the project (e.g., on-site vehicles, contractor vehicles) use ZE or NZE technology.</p> <p>The Authority and all project construction contractors will have the goal that a minimum of 25 percent of all heavy-duty on-road vehicles (e.g., for hauling, material delivery and soil import/export) associated with the project use ZE or NZE technology.</p> <p>The Authority and all project construction contractors will have the goal that a minimum of 10 percent of off-road construction equipment use ZE or NZE vehicles.</p> <p>If local or state regulations mandate a faster transition to using ZE and/or NZE vehicles at the time of construction, the more stringent regulations will be applied. For example, EO N-79-20, issued by California Governor Newsom September 23, 2020, currently states the following:</p> <ul style="list-style-type: none"> ▪ Light-duty and passenger car sales be 100 percent ZE vehicles by 2035 ▪ Full transition to ZE short haul/drayage trucks by 2035 ▪ Full transition to ZE heavy-duty long-haul trucks, where feasible, by 2045 ▪ Full transition to ZE off-road equipment by 2035, where feasible. <p>The project will have a goal of surpassing the requirements of these or other future regulations as a mitigation measure.</p>							operating permit will be made available by the Authority at the time of mobilization of each piece of equipment	Impact AQ#5: Temporary Direct Impacts on Localized Air Quality in the SFBAAB — Criteria Pollutants
AQ-MM#2	Offset Project Construction Emissions in the SFBAAB	<p>Prior to issuance of construction contracts, the Authority will be required to enter into an agreement with BAAQMD to reduce ROG/VOC and NO_x emissions to the required levels. The required levels in the SFBAAB are as follows:</p> <ul style="list-style-type: none"> ▪ For emissions in excess of the General Conformity <i>de minimis</i> thresholds (NO_x): net zero. ▪ For emissions not in excess of General Conformity <i>de minimis</i> thresholds but above the BAAQMD's daily emission thresholds (ROG/VOC and NO_x): below the appropriate CEQA threshold levels. <p>The mitigation offset fee amount will be determined at the time of mitigation to fund one or more emissions reduction projects within the SFBAAB. The offset fee will be determined by the Authority and BAAQMD based on the type of projects that present appropriate emission reduction opportunities. These funds may be spent to reduce either VOC or NO_x emissions (O₃ precursors). Documentation of payment will be provided to the Authority or its designated representative.</p> <p>The agreement will include details regarding the annual calculation of required offsets the Authority must achieve, funds to be paid, administrative fee, and the timing of the emissions reductions projects. Acceptance of this fee by BAAQMD will serve as an acknowledgment and</p>	Pre-construction	Reporting; Funding	Weekly	Authority/ Contractor	Authority/ Contractor	Offset project construction criteria air pollutant emissions through funding	Authority to coordinate offset fees with BAAQMD per contractor reports	<p>Impact AQ#1: Temporary Direct and Indirect Impacts on Air Quality in the SFBAAB</p> <p>Impact AQ#4: Temporary Direct Impacts on Implementation of an Applicable Air Quality Plan</p>

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementing Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		commitment by BAAQMD to undertake the following steps: (1) implement an emissions reduction project(s) within a timeframe to be determined based on the type of project(s) selected after receipt of the mitigation fee designed to achieve the emissions reduction objectives; and (2) provide documentation to the Authority or its designated representative describing the project(s) funded by the mitigation fee, including the amount of emissions reduced (tons per year) in the SFBAAB from the emissions reduction project(s). To qualify under this mitigation measure, the specific emissions reduction project(s) must result in emissions reductions in the SFBAAB that are real, surplus, quantifiable, enforceable, and would not otherwise be achieved through compliance with existing regulatory requirements or any other legal requirement. Pursuant to 40 C.F.R. Section 93.163(a), the necessary reductions must be achieved (contracted and delivered) by the applicable year in question. Funding will need to be received prior to contracting with participants and should allow enough time to receive and process applications to fund and implement off-site reduction projects prior to commencement of project activities being reduced. This would equate roughly to 1 year prior to the required mitigation; additional lead time may be necessary depending on the level of off-site emissions reductions required for a specific year.								
Noise and Vibration										
NV-MM#1	Construction Noise Mitigation Measures	<p>Prior to construction (any ground-disturbing activities), the contractor will prepare a noise monitoring program for Authority approval. The noise monitoring program will describe how during construction the contractor will monitor construction noise to reduce noise levels to the noise limits (an 8-hour L_{eq}, dBA of 80 during the day and 70 at night for residential land use, 85 for both day and night for commercial land use, and 90 for both day and night for industrial land use) where a noise-sensitive receptor is present and wherever feasible. The contractor will be given the flexibility to reduce noise in the most efficient and cost-effective manner. This can be done by prohibiting certain noise-generating activities during nighttime hours or providing additional noise control measures to meet the noise limits. In addition, the noise monitoring program will describe the actions required of the contractor to meet required noise limits. These actions will include the following nighttime and daytime noise control mitigation measures, as necessary, and as feasible within the constraints of working in an active rail corridor:</p> <ul style="list-style-type: none"> ▪ Install a temporary construction site noise barrier near a noise source. ▪ Avoid nighttime construction in residential neighborhoods. ▪ Locate stationary construction equipment as far as 	Pre-construction/ Construction	Design/ Reporting	Prior to construction/ Weekly monitoring	Authority/ Contractor	Authority/ Contractor	Placement of temporary noise barriers and construction equipment to mitigate construction noise; weekly monitoring construction noise	Contract requirements and specifications	Impact NV#1: Temporary Exposure of Sensitive Receptors to Construction Noise

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementing Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		<p>possible from noise-sensitive sites.</p> <ul style="list-style-type: none"> ▪ Reroute construction truck traffic along roadways that would cause the least disturbance to residents. ▪ During nighttime work, use smart back-up alarms, which automatically adjust the alarm level based on the background noise level, use broadband alarms, or switch off back-up alarms and replace with spotters. ▪ Use low-noise emission equipment. ▪ Implement noise-deadening measures for truck loading and operations. ▪ Monitor and maintain equipment to meet noise limits. ▪ Line or cover storage bins, conveyors, and chutes with sound-deadening material. ▪ Use acoustic enclosures, shields, or shrouds for equipment and facilities. ▪ Use high-grade engine exhaust silencers and engine-casing sound insulation. ▪ Prohibit aboveground jackhammering and impact pile driving during nighttime hours. ▪ Minimize the use of generators to power equipment. ▪ Limit use of public address systems. ▪ Grade surface irregularities on construction sites. ▪ Use moveable noise barriers at the source of the construction activity. ▪ Limit or avoid certain noisy activities during nighttime hours. ▪ To mitigate noise related to pile driving, use an auger to install the piles instead of an impact or vibratory pile driver, which will reduce noise levels substantially. If pile driving is necessary, limit the time of day that the activity can occur. ▪ The Authority will establish and maintain in operation until completion of construction a toll-free "hotline" regarding the project construction activities. The Authority will arrange for all incoming messages to be logged (with summaries of the contents of each message) and for a designated representative of the Authority to respond to hotline messages within 24 hours (excluding weekends and holidays). The Authority will make a reasonable good-faith effort to address all concerns and answer all questions, and will include on the log its responses to all callers. The Authority will make a log of the incoming messages and the Authority's responsive actions publicly available via request on its website. <p>The contractor will provide the Authority with an annual report by January 31st of the following year documenting how it implemented the noise-monitoring program.</p>								

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementing Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
NV-MM#2	Construction Vibration Mitigation Measures	Prior to construction involving impact pile driving within 50 feet of any building the contractor will provide the Authority with a vibration technical memorandum documenting how project pile driving criteria will be met. Upon approval of the technical memorandum by the Authority, and where a vibration-sensitive receptor is present, the contractor will comply with the vibration reduction methods described in that memorandum. Potential construction vibration building damage is only anticipated from impact pile driving at very close distances to buildings. If pile driving occurs more than 25 to 50 feet from buildings, or if alternative methods such as push piling or auger piling are used, damage from construction vibration is not expected to occur. When a construction scenario has been established, the contractor will conduct pre-construction surveys at locations within 50 feet of pile driving to document the existing condition of buildings in case damage is reported during or after construction. The contractor will arrange for the repair of damaged buildings or will pay compensation to the property owner.	Pre-construction/ Construction/ post-construction	Reporting (technical memorandum)	Pre-construction surveys to establish baseline/weekly monitoring during construction/ post-construction repairs, as needed	Authority/ Contractor	Authority/ Contractor	Pre-construction surveys to establish baseline/weekly monitoring during construction/ post-construction repairs, as needed	Contract requirements and specifications	Impact NV#8: Temporary Exposure of Sensitive Receptors and Buildings to Construction Vibration
NV-MM#3	Implement Proposed California High-Speed Rail Project Noise Mitigation Guidelines	<p>Various options exist to address the potentially severe noise effects from HSR operations. The Authority has developed Noise and Vibration Mitigation Guidelines for the statewide HSR system that sets forth three categories of mitigation measures to reduce or offset severe noise impacts from HSR operations: noise barriers, sound insulation, and noise easements. The guidelines also set forth an implementation approach that considers multiple factors for determining the reasonableness of noise barriers as mitigation for severe noise impacts, including structural and seismic safety, cost, number of affected receptors, and effectiveness. Noise barrier mitigation will be designed to reduce the exterior noise level from HSR operations from severe to moderate, according to the provisions of the FRA noise and vibration manual (FRA 2012). The Noise and Vibration Mitigation Guidelines, included as Volume 2, Appendix 3.4-B, Noise and Vibration Mitigation Guidelines, describe the mitigation measures and approach in further detail. Noise barriers, sound insulation, and noise easement measures are described below.</p> <p>Noise Barriers</p> <p>Prior to operation of the HSR, the Authority will install noise barriers where they can achieve between 5 and 15 dB of exterior noise reduction, depending on their height and location relative to the tracks. The primary requirements for an effective noise barrier are that the barrier must (1) be high enough and long enough to break the line-of-sight between the sound source and the receptor, (2) be of an impervious material with a minimum surface density of 4 pounds per square foot, and (3) not have any gaps or holes between the panels or at the bottom. Because many materials meet these</p>	Pre-construction/ Construction/ Post-construction	Design	Prior to final design/prior to operation/ monthly reporting during operation	Authority/ Contractor	Authority/ Contractor	Implement noise barriers as needed or acquire easements on properties severely affected by noise	Contract requirements and specifications; California HSR System noise and vibration mitigation guidelines	<p>Impact NV#2: Intermittent Permanent Exposure of Sensitive Receptors to Noise from Operations</p> <p>Impact NV#6: Permanent Exposure of Sensitive Receptors to Vehicular Traffic Noise Increases</p> <p>Impact NV#7: Traction Power Facility Noise</p>

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		<p>requirements, aesthetics, durability, cost, and maintenance considerations usually determine the selection of materials for noise barriers.</p> <p>Depending on the situation, noise barriers can become visually intrusive. Typically, the noise barrier style will be selected with input from the local jurisdiction to reduce the visual effect of barriers on adjacent lands uses, refer to <i>Aesthetic Options for Non-Station Structures</i> (Authority 2017). For example, noise barriers could be solid or transparent, and made of various colors, materials, and surface treatments.</p> <p>Pursuant to the Authority's Noise and Vibration Mitigation Guidelines, recommended noise barriers must meet the following criteria to be considered a reasonable and feasible mitigation measure:</p> <ul style="list-style-type: none"> ▪ Achieve a minimum of 5 dB of noise reduction; which is then defined as a benefited receptor ▪ The minimum number of receptors should be at least 10 ▪ The length should be at least 800 feet ▪ Must be cost-effective; defined as mitigation not exceeding \$95,000 per benefited receptor <p>The maximum noise barrier height will be 14 feet for at-grade sections. Berm and berm/wall combinations are the preferred types of noise barriers where space and other environmental constraints permit. On aerial structures, the maximum noise barrier height will also be 14 feet, but barrier material will be limited by engineering weight restrictions for barriers on the structure. All noise barriers will be designed to be as low as possible to achieve a substantial noise reduction.</p> <p>Noise barriers on both aerial structures and at-grade structures could consist of solid, semitransparent, or transparent materials as defined in <i>Aesthetic Options for Non-Station Structures</i> (Authority 2017). Volume 2, Appendix 3.4-B provides more details.</p> <p>Install Building Sound Insulation</p> <p>If noise barriers are not proposed for receptors with severe impacts, or if proposed noise barriers would not reduce exterior sound levels to below a severe impact level, the Authority will consider providing sound insulation as a potential additional mitigation measure on a case-by-case basis. Sound insulation of residences and institutional buildings to improve outdoor-to-indoor noise reduction is a mitigation measure that can be considered when the use of noise barriers is not feasible in providing a reasonable level (5 to 7 dBA) of noise reduction. Although this approach has no effect on noise in exterior areas, it may be the best choice for sites where noise barriers are not feasible or desirable and for buildings where indoor sensitivity is of most concern. Substantial improvements in building sound insulation (on the order of 5 to 10 dBA) can</p>								

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		<p>often be achieved by adding an extra layer of glazing to windows, by sealing holes in exterior surfaces that act as sound leaks, and by providing forced ventilation and air conditioning so that windows do not need to be opened.</p> <p>Noise Easements</p> <p>If a substantial noise reduction cannot be completed through installation of noise barriers or installing sound insulation, the Authority will consider acquiring a noise easement on properties with a severe impact on a case-by-case basis. An agreement between the Authority and the property owner can be established wherein the property owner releases the right to petition the Authority regarding the noise level and subsequent disruptions. This will take the form of an easement that will encompass the property boundaries to the right-of-way of the rail line. The Authority will consider this mitigation measure only in isolated cases where other mitigation is ineffective or infeasible.</p>								
NV-MM#4	Support Potential Implementation of Quiet Zones by Local Jurisdictions	Trains sound the warning horns approaching at-grade crossings because it is required by the FRA as a safety precaution (49 C.F.R. Parts 222 and 229). FRA does allow for the possibility of establishing horn-free quiet zones, which would eliminate the requirement for all trains to routinely sound their warning horns when approaching at-grade highway/rail crossings. Establishing quiet zones can only be legally undertaken by local jurisdictions; the Authority cannot legally establish or require a quiet zone. However, the Authority will assist local communities with this process through the installation of four-quadrant gates and channelization at all at-grade crossings without them presently on the Project Section, which will help cities to implement quiet zones, should they choose to do so. The Authority will assist with the preparation of technical analysis and provide input for the Quiet Zone application, which the local communities could then use as part of their application to the FRA. Establishing quiet zones will eliminate train warning horns for all trains approaching at-grade highway/rail crossings under normal, non-emergency situations.	Post-construction	Design	As needed	Authority/ Contractor	Authority/ Contractor	Ongoing management of horn use within quiet zones	Contract requirements and specifications	Impact NV#2: Intermittent Permanent Exposure of Sensitive Receptors to Noise from Operations
NV-MM#5	Vehicle Noise Specification	During HSR vehicle technology procurement, the Authority will require bidders to meet the federal regulations (40 C.F.R. § 201.12/13) at the time of procurement for locomotives (currently a 90-dB-level standard) operating at speeds faster than 45 mph.	Post-construction	HSR vehicle purchasing	HSR operation	Authority	Authority	HSR vehicle noise specification	Contract requirements and specifications	Impact NV#2: Intermittent Permanent Exposure of Sensitive Receptors to Noise from Operations
NV-MM#6	Special Trackwork at Crossovers, Turnouts, and Insulated Joints	Prior to construction, the contractor will provide the Authority with an HSR operation noise technical report for review and approval. The report will address the minimization/elimination of rail gaps at crossovers and turnouts. Because the impacts of HSR wheels over rail gaps at turnouts increase HSR noise by approximately 6 dB over typical operations, turnouts can be a major source of noise impact. If the turnouts cannot be moved from	Pre-construction	Design	Prior to construction	Authority/ Contractor	Authority/ Contractor	Provide operation noise technical report to determine if special trackwork is required	Submit assessment and if required, supplemental environmental documentation	Impact NV#2: Intermittent Permanent Exposure of Sensitive Receptors to Noise from Operations

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		sensitive areas, the noise technical report will recommend the use of special types of trackwork that eliminate the gap. The Authority will require the project design to follow the recommendations in the approved noise technical report.								
NV-MM#7	Additional Noise Analysis during Final Design	Prior to construction, the contractor will provide the Authority with an HSR operation noise technical report for review and approval. If final design or final vehicle specifications result in changes to the assumptions underlying the noise technical report, the Authority will prepare necessary environmental documentation, as required by CEQA and NEPA, to reassess noise impacts and mitigation.	Pre-construction	Design	Prior to Construction/ Final vehicle specification	Authority/ Vehicle Contractor	Authority/ Vehicle Contractor	Reassessment of noise and vibration impacts and recommended mitigation following final design	Submit assessment and if required, supplemental environmental documentation	Impact NV#2: Intermittent Permanent Exposure of Sensitive Receptors to Noise from Operations Impact NV#6: Permanent Exposure of Sensitive Receptors to Vehicular Traffic Noise Increases Impact NV#7: Traction Power Facility Noise
NV-MM#8	Project Vibration Mitigation Measures	Mitigation for operations vibration impacts can take place at the source, at the sensitive receptor, or along the propagation path from the source to the sensitive receptor. As detailed in Chapter 9, Detailed Vibration Assessment, of the 2012 FRA guidance manual, additional vibration propagation tests will occur and analyses will be performed to assess site-specific conditions during final design. This will then inform the specific design and implementation of vibration mitigation measures. These additional tests will be conducted in areas where the general vibration assessment identifies potential vibration impacts. The tests will consist of vibration propagation testing specific to the locations of potential vibration impacts. The tests will identify a range of potential vibration mitigation measures that will reduce the vibration levels to below the FRA vibration impact thresholds. The range of measures that will be considered for implementation include those listed in Table 3.4-20 in the Final EIR/EIS.	Pre-construction/ Post-construction	Design	As needed	Authority/ Contractor	Authority/ Contractor and Vehicle Contractor	Design/ Construction/ Ongoing management to address vibration impacts.	Contract requirements and specifications; Noise and vibration mitigation guidelines	Impact NV#9: Intermittent Permanent Exposure of Sensitive Receptors to Vibration from Operations

Electromagnetic Fields and Electromagnetic Interference

No mitigation measures are required.

Public Utilities and Energy

No mitigation measures are required.

Biological and Aquatic Resources

BIO-MM#1	Prepare and Implement a Restoration and Revegetation Plan	Prior to any ground-disturbing activity, the project biologist will prepare an RRP to address temporary impacts resulting from ground-disturbing activities within areas that potentially support special-status species, wetlands, or other aquatic resources. Restoration activities may include, but not be limited to: grading landform contours to approximate pre-disturbance conditions, revegetating disturbed areas with native plant species (including host and nectar plants for butterflies), and using certified weed-free straw and mulch. The Authority will implement the RRP in all temporarily disturbed areas outside of the permanent right-of-way that potentially support special-	Pre-construction/ Construction/ Post-construction	Surveying/ monitoring/ reporting	In accordance with agency permit requirements	Authority/ Contractor/ Project Botanist	Authority/ Contractor/ Project Botanist	Prepare and implement RRP/ report findings	Condition of construction contract/condition of regulatory permits	Impact BIO#1: Permanent Conversion or Degradation of Habitat for Special-Status Plant Species Impact BIO#2b: Permanent Conversion or Degradation of Habitat for and Mortality of Monarch Butterfly Impact BIO#3: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Central California Coast Steelhead, Pacific Lamprey, and Green Sturgeon, and Permanent Conversion or
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		<p>status species, wetlands, or other aquatic resources. Consistent with Section 1415 of the Fixing America's Surface Transportation Act restoration activities will provide habitat for native pollinators through plantings of native forbs and grasses. The project biologist will obtain a locally sourced native seed mix. The restoration success criteria will 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 will outline at a minimum:</p> <ul style="list-style-type: none"> 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 quantitative data gathering Maintenance, monitoring, and reporting schedules, including an annual report due to the Authority by January 31st of the following year <p>The RRP will be submitted to the Authority and regulatory agencies, as defined in the conditions of regulatory authorizations, for review and approval.</p>								<p>Degradation of Essential Fish Habitat</p> <p>Impact BIO#6: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Burrowing Owl</p> <p>Impact BIO#8: Permanent Conversion and Degradation of Habitat for and Direct Mortality or Disturbance of Least Bell's Vireo, Yellow Warbler, and Tricolored Blackbird</p> <p>Impact BIO#10: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Francisco Dusky-Footed Woodrat and Ringtail</p> <p>Impact BIO#18: Permanent Conversion or Degradation of Special-Status Plant Communities</p> <p>Impact BIO#20: Permanent Conversion or Degradation of Aquatic Resources Considered Jurisdictional under Section 404 of the Federal Clean Water Act and the State Porter-Cologne Act, or under Section 10 of the Rivers and Harbors Act</p> <p>Impact BIO#21: Permanent Conversion or Degradation of Aquatic Resources, including Riparian Communities, Subject to Notification under California Fish and Game Code Section 1600 et seq.</p> <p>Impact HYD#4: Temporary Impacts on Surface Water Quality during Construction</p>
BIO-MM#2	Prepare and Implement a Weed Control Plan	<p>Prior to any ground-disturbing activity during the construction phase, the project biologist will develop a 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 will include, at a minimum, the following:</p> <ul style="list-style-type: none"> A requirement to delineate ESAs 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 will be linked to the BRMP standards for on-site work during ground-disturbing activities. In particular, the criteria will establish limits on the introduction and spread of invasive species, as defined by the California 	Design/ Pre-construction	Prepare plan/ Reporting	Monthly	Authority/ Contractor	Authority	Monthly reporting	Condition of construction contract/condition of regulatory permits	<p>Impact BIO#1: Permanent Conversion or Degradation of Habitat for Special-Status Plant Species</p> <p>Impact BIO#6: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Burrowing Owl</p> <p>Impact BIO#8: Permanent Conversion and Degradation of Habitat for and Direct Mortality or Disturbance of Least Bell's Vireo, Yellow Warbler, and Tricolored Blackbird</p> <p>Impact BIO#10: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Francisco Dusky-Footed Woodrat and Ringtail</p> <p>Impact BIO#18: Permanent Conversion or</p>

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		<p>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 will 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 will continue the monitoring and control efforts, and remedial actions will be identified and implemented until the success criteria are met.</p> <ul style="list-style-type: none"> Provisions for consistency between the WCP and the RRP, including verification that the RRP includes measures to minimize the risk of the spread 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 								<p>Degradation of Special-Status Plant Communities</p> <p>Impact BIO#20: Permanent Conversion or Degradation of Aquatic Resources Considered Jurisdictional under Section 404 of the Federal Clean Water Act and the State Porter-Cologne Act, or under Section 10 of the Rivers and Harbors Act</p> <p>Impact BIO#21: Permanent Conversion or Degradation of Aquatic Resources, including Riparian Communities, Subject to Notification under California Fish and Game Code Section 1600 et seq.</p>
BIO-MM#3	Establish Environmentally Sensitive Areas and Nondisturbance Zones	<p>Prior to any ground-disturbing activity in a work area, the project biologist will 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 will also direct the installation of WEF to prevent special-status wildlife species from entering work areas. The WEF will have exit doors to allow animals that may be inside an enclosed area to leave the area. The project biologist will also direct the installation of construction 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 ESAs, WEF, and exclusionary fencing will be delineated by the project biologist based on the results of habitat mapping or modeling and any pre-construction surveys, and in coordination with the Authority. The ESA, WEF, and exclusionary fencing will be regularly inspected and maintained by the project biologist.</p> <p>The ESA, WEF, and exclusionary fencing locations will be identified and depicted on an exclusion fencing exhibit. The purpose of the ESAs and WEF will be explained at WEAP training and the locations of the ESA and WEF areas will be noted during worker tailgate sessions.</p>	Pre-construction/ Construction	Identify and establish ESAs, WEF, and construction exclusionary fencing	In accordance with reporting schedule established by agency permit requirements	Authority/ Contractor	Authority	In accordance with reporting schedule established by agency permit requirements	Condition of construction contract/condition of regulatory permits	<p>Impact BIO#1: Permanent Conversion or Degradation of Habitat for Special-Status Plant Species</p> <p>Impact BIO#3: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Central California Coast Steelhead, Pacific Lamprey, and Green Sturgeon, and Permanent Conversion or Degradation of Essential Fish Habitat</p> <p>Impact BIO#4: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Red-Legged Frog and Western Pond Turtle</p> <p>Impact BIO#5: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Francisco Garter Snake</p> <p>Impact BIO#6: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Burrowing Owl</p> <p>Impact BIO#8: Permanent Conversion and Degradation of Habitat for and Direct Mortality or Disturbance of Least Bell's Vireo, Yellow Warbler, and Tricolored Blackbird</p> <p>Impact BIO#10: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Francisco Dusky-Footed Woodrat and Ringtail</p>

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										Impact BIO#18: Permanent Conversion or Degradation of Special-Status Plant Communities Impact BIO#20: Permanent Conversion or Degradation of Aquatic Resources Considered Jurisdictional under Section 404 of the Federal Clean Water Act and the State Porter-Cologne Act, or under Section 10 of the Rivers and Harbors Act Impact BIO#21: Permanent Conversion or Degradation of Aquatic Resources, including Riparian Communities, Subject to Notification under California Fish and Game Code Section 1600 et seq. Impact HYD#4: Temporary Impacts on Surface Water Quality during Construction
BIO-MM#4	Conduct Monitoring of Construction Activities	During any initial ground-disturbing activity, the project biologist will be present in the work area to verify compliance with avoidance and minimization measures, to establish ESAs, and install WEF and construction exclusion fencing.	Construction	Compliance Report	Monthly or at other appropriate interval	Authority/ Contractor	Authority	In accordance with reporting schedule established by agency permit requirements	Condition of construction contract/condition of regulatory permits	Impact BIO#1: Permanent Conversion or Degradation of Habitat for Special-Status Plant Species Impact BIO#3: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Central California Coast Steelhead, Pacific Lamprey, and Green Sturgeon, and Permanent Conversion or Degradation of Essential Fish Habitat Impact BIO#4: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Red-Legged Frog and Western Pond Turtle Impact BIO#5: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Francisco Garter Snake Impact BIO#6: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Burrowing Owl Impact BIO#8: Permanent Conversion and Degradation of Habitat for and Direct Mortality or Disturbance of Least Bell's Vireo, Yellow Warbler, and Tricolored Blackbird Impact BIO#10: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Francisco Dusky-Footed Woodrat and Ringtail Impact BIO#18: Permanent Conversion or Degradation of Special-Status Plant Communities Impact BIO#20: Permanent Conversion or Degradation of Aquatic Resources Considered Jurisdictional under Section 404 of the Federal Clean Water Act and

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										the State Porter-Cologne Act, or under Section 10 of the Rivers and Harbors Act Impact BIO#21: Permanent Conversion or Degradation of Aquatic Resources, including Riparian Communities, Subject to Notification under California Fish and Game Code Section 1600 et seq. Impact HYD#4: Temporary Impacts on Surface Water Quality during Construction
BIO-MM#5	Establish and Implement a Compliance Reporting Program	<p>The project biologist will prepare monthly and annual reports documenting compliance with all IAMFs, mitigation measures, and requirements set forth in regulatory agency authorizations. The Authority will review and approve all compliance reports prior to submittal to the regulatory agencies. Reports will be prepared in compliance with the content requirements outlined in the regulatory agency authorizations.</p> <p>Pre-activity survey reports will be submitted within 15 days of completing the surveys and will include:</p> <ul style="list-style-type: none"> Location(s) of where pre-activity surveys were completed, including latitude and longitude, and Assessor Parcel Number Written description of the surveyed area. A figure of each surveyed location will 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 <p>Daily compliance reports will be submitted to the Authority via EMMA within 24 hours of each monitoring day. Noncompliance events will be reported to the Authority the day of the occurrence. Daily compliance reports will include:</p> <ul style="list-style-type: none"> 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 <p>Daily compliance reports will also be included in the</p>	Construction	Compliance Report	Monthly and annual or at other appropriate intervals	Authority/ Contractor	Authority	In accordance with reporting schedule established by agency permit requirements	Condition of construction contract/condition of regulatory permits	<p>Impact BIO#1: Permanent Conversion or Degradation of Habitat for Special-Status Plant Species</p> <p>Impact BIO#2b: Permanent Conversion or Degradation of Habitat for and Mortality of Monarch Butterfly</p> <p>Impact BIO#3: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Central California Coast Steelhead, Pacific Lamprey, and Green Sturgeon, and Permanent Conversion or Degradation of Essential Fish Habitat</p> <p>Impact BIO#4: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Red-Legged Frog and Western Pond Turtle</p> <p>Impact BIO#5: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Francisco Garter Snake</p> <p>Impact BIO#6: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Burrowing Owl</p> <p>Impact BIO#8: Permanent Conversion and Degradation of Habitat for and Direct Mortality or Disturbance of Least Bell's Vireo, Yellow Warbler, and Tricolored Blackbird</p> <p>Impact BIO#10: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Francisco Dusky-Footed Woodrat and Ringtail</p> <p>Impact BIO#18: Permanent Conversion or Degradation of Special-Status Plant Communities</p> <p>Impact BIO#20: Permanent Conversion or Degradation of Aquatic Resources Considered Jurisdictional under Section 404 of the Federal Clean Water Act and the State Porter-Cologne Act, or under Section 10 of the Rivers and Harbors Act</p> <p>Impact BIO#21: Permanent Conversion or Degradation of Aquatic Resources,</p>

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		<p>monthly compliance reports, which will be submitted to the Authority by the 10th of each month and will include:</p> <ul style="list-style-type: none"> ▪ 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: <ul style="list-style-type: none"> – An accounting of the number of acres of habitats for which we provide compensatory mitigation that has been disturbed during the reporting month – 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 <p>Annual reports will be submitted to the Authority by the 20th of January and will include:</p> <ul style="list-style-type: none"> ▪ 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, NMFS, 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. <p>In addition to the compliance reporting requirements, the following items will be provided for compliance documentation purposes:</p> <ul style="list-style-type: none"> ▪ If agency personnel visit the construction footprint in accordance with BIO-IAMF#2, the project biologist will 								including Riparian Communities, Subject to Notification under California Fish and Game Code Section 1600 et seq.

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		<p>prepare a memorandum within 1 day of the visit that memorializes the issues raised during the field meeting. This memorandum will be submitted to the Authority via EMMA. Any issues regarding regulatory compliance raised by agency personnel will be reported to the Authority and the contractor.</p> <ul style="list-style-type: none"> ▪ Compliance reporting will be submitted to the Authority via EMMA in accordance with the report schedule. The project biologist will prepare and submit compliance reports that document the following: <ul style="list-style-type: none"> – Implementation and performance of the RRP described in BIO-MM#1 – Summary of progress made regarding 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#9 – Compliance with BIO-IAMF#10 – Compliance with BIO-IAMF#11 – Compliance with BIO-IAMF#12 – 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#12, will 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#6	Conduct Presence/Absence Pre-Construction Surveys for Special-Status Plant Species and Special-Status Plant Communities	Prior to any ground-disturbing activity, the project biologist will conduct presence/absence botanical surveys for special-status plant species and special-status plant communities in all potentially suitable habitats. The surveys will be consistent with <i>Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities</i> (CDFW 2018) and <i>Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Plants</i> (USFWS 2000). The project biologist will flag and record in GIS the locations of any observed special-status plant species and special-status plant communities.	Pre-construction	Surveying/ monitoring/ reporting	Report findings at least 30 days prior to ground disturbance	Authority/ Contractor/ Project Biologist/ Mitigation Manager	Authority/ Contractor/ Project Biologist/ Mitigation Manager	Conduct protocol-level surveys for special-status Report findings at least 30 days prior to ground disturbance	Condition of construction contract following requirements established by regulatory compliance permits	Impact BIO#1: Permanent Conversion or Degradation of Habitat for Special-Status Plant Species Impact BIO#18: Permanent Conversion or Degradation of Special-Status Plant Communities
BIO-MM#7	Prepare and Implement Plan for Salvage, Relocation, or Propagation of Special-Status Plant Species	Prior to any ground-disturbing activity, the project biologist will collect seeds and plant materials and stockpile and segregate the top 4 inches of topsoil from locations within the work area where species listed as threatened or endangered under the FESA, threatened, endangered, or candidate for listing under CESA, state-designated "Rare" species, and CRPR 1B and 2 species were observed during surveys for use on off-site locations. Suitable sites to receive salvaged material include Authority mitigation	Pre-construction/ Construction/ Post-construction	Surveying/ monitoring/ reporting	In accordance with agency permit requirements	Authority/ Contractor/ Project Botanist/ Mitigation Manager	Authority/ Contractor/ Project Botanist/ Mitigation Manager	Prepare and implement monitoring, salvage, relocation, and propagation of special-status plant species/ report findings	Condition of construction contract	Impact BIO#1: Permanent Conversion or Degradation of Habitat for Special-Status Plant Species

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		<p>sites, refuges, reserves, federal or state lands, and public/private mitigation banks.</p> <p>If relocation or propagation is required by authorizations issued under the FESA, CESA, or both, the project biologist will prepare a plant species salvage plan to address monitoring, salvage, relocation, or seed banking of federal or state-listed plant species. The plan will 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 will also include requirements related to outcomes such as percent absolute cover of highly invasive species, as defined by the California Invasive Plant Council (less than documented baseline conditions), maintenance, monitoring, implementation, and the annual reporting. The plan will reflect conditions required under regulatory authorizations issued for federal or state-listed species. The project biologist will submit the plan to the Authority for review and approval.</p>								
BIO-MM#8	Prepare a Compensatory Mitigation Plan for Species and Species Habitat	<p>The Authority will prepare a 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 certain other special-status species. The CMP will include the following:</p> <ul style="list-style-type: none"> ▪ 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 will include one or more of the following: <ul style="list-style-type: none"> – 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 will be transferred to CDFW and conservation easements will 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 will be subject to approval of the applicable regulatory agencies, and the conservation easement will 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 will be used to confirm impacts. Actual impacts on species and habitat could 	Pre-construction/ Construction/ Post-construction	Design/ final design/ surveying/ compensatory mitigation/ reporting	Monthly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist/ Mitigation Manager	Authority/ Contractor/ Project Biologist/ Mitigation Manager	Compensatory mitigation based on amount of habitat loss and methods described in the CMP.	Condition of construction contract/condition of regulatory permits	<p>Impact BIO#1: Permanent Conversion or Degradation of Habitat for Special-Status Plant Species</p> <p>Impact BIO#2b: Permanent Conversion or Degradation of Habitat for and Mortality of Monarch Butterfly</p> <p>Impact BIO#3: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Central California Coast Steelhead, Pacific Lamprey, and Green Sturgeon, and Permanent Conversion or Degradation of Essential Fish Habitat</p> <p>Impact BIO#4: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Red-Legged Frog and Western Pond Turtle</p> <p>Impact BIO#5: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Francisco Garter Snake</p> <p>Impact BIO#6: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Burrowing Owl</p> <p>Impact BIO#8: Permanent Conversion and Degradation of Habitat for and Direct Mortality or Disturbance of Least Bell's Vireo, Yellow Warbler, and Tricolored Blackbird</p>

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		<p>differ from estimates. Should this occur, adjustments will be made to the compensatory mitigation that will be provided. Adjustments to impact estimates and compensatory mitigation would occur in the following circumstances:</p> <ul style="list-style-type: none"> – 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 <ul style="list-style-type: none"> ▪ An overview of the strategy for mitigating impacts on species. The overview will include the ratios to be applied to determine mitigation levels and the resulting mitigation totals. ▪ A description of habitat restoration or enhancement projects, if any, that will contribute to compensatory mitigation commitments. ▪ A description of the success criteria that will be used to evaluate the performance of habitat restoration or enhancement projects, and a description of the types of monitoring that will be used to verify that such criteria have been met. ▪ A description of the management actions that will 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 will be used in the management of species habitat. ▪ A description of financial assurances that will be provided to demonstrate that the funding to implement mitigation is assured. 								
BIO-MM#9	Implement Measures to Minimize Impacts during Off-Site Habitat Restoration, or Enhancement, or Creation on Mitigation Sites	<p>Prior to ground-disturbing activities associated with habitat restoration, enhancement, or creation actions at a mitigation site, the Authority will 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.</p> <p>Based on the results of the site assessment, the Authority will obtain any necessary regulatory authorizations prior to conducting habitat restoration, enhancement, or creation activities, including authorization under FESA or CESA, Cal. Fish and Game Code Section 1600 et seq., the CWA, and the Porter-Cologne Act.</p> <p>Restoration, enhancement, or creation of aquatic resources may result in the permanent conversion of</p>	Pre-construction/ Construction/ Post-construction	Design/ final design/ surveying/ compensatory mitigation/ reporting	Yearly or as established by regulatory compliance permits	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Implement measure to avoid and minimize impacts during off-site habitat restoration, enhancement, and creation/ report findings	Condition of construction contract/condition of regulatory permits	<p>Impact BIO#1: Permanent Conversion or Degradation of Habitat for Special-Status Plant Species</p> <p>Impact BIO#2b: Permanent Conversion or Degradation of Habitat for and Mortality of Monarch Butterfly</p> <p>Impact BIO#3: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Central California Coast Steelhead, Pacific Lamprey, and Green Sturgeon, and Permanent Conversion or Degradation of Essential Fish Habitat</p> <p>Impact BIO#4: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Red-Legged Frog</p>

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementing Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		grassland to wetland or riparian habitat. While such activities would be beneficial for 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, nonbreeding habitat for 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).								and Western Pond Turtle Impact BIO#5: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Francisco Garter Snake Impact BIO#6: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Burrowing Owl Impact BIO#8: Permanent Conversion and Degradation of Habitat for and Direct Mortality or Disturbance of Least Bell's Vireo, Yellow Warbler, and Tricolored Blackbird
BIO-MM#10	Compensate for Impacts on Listed Plant Species	The Authority will provide compensatory mitigation for direct impacts on federally and state-listed plant species based on the number of acres of plant habitat directly affected. Such mitigation will include the following measures: <ul style="list-style-type: none"> Compensatory mitigation will be provided at a 1:1 ratio to offset direct impacts on federally listed plant species habitat, unless a higher ratio is required pursuant to regulatory authorizations issued under FESA. Compensatory mitigation will be provided at a 1:1 ratio to offset direct impacts on state-listed plant species habitat, unless a higher ratio is required pursuant to regulatory authorizations issued under CESA. Compensatory mitigation will be provided using one or more of the methods described in BIO-MM#8. 	Pre-construction/ Construction/ Post-construction	Design/ final design/ mitigation	Yearly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Prepare and implement CMP for temporary and permanent impacts on special-status species and their habitat	Condition of construction contract/condition of regulatory permits	Impact BIO#1: Permanent Conversion or Degradation of Habitat for Special-Status Plant Species
BIO-MM#12	Work Stoppage	In the event that any special-status wildlife species is found in a work area, the project biologist will have the authority to halt work to prevent the death or injury to the species. Any such work stoppage will 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. Relocation areas for listed reptiles or amphibians will be a minimum of 500 feet from the work area boundary and will not include staging areas or roads. Relocation of fully protected species is prohibited; rather, the individual will be allowed to move out of the work area of its own volition before construction resumes. Any such work stoppages and the measures taken to facilitate the removal of the species, if any, will be documented in a memorandum prepared by the project biologist and submitted to the Authority within 2 business days of the work stoppage.	Construction	Monitoring/ Reporting	Weekly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Halt work to relocate special-status wildlife species (if possible)/ report findings	Condition of construction contract/condition of regulatory permits	Impact BIO#3: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Central California Coast Steelhead, Pacific Lamprey, and Green Sturgeon, and Permanent Conversion or Degradation of Essential Fish Habitat Impact BIO#4: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Red-Legged Frog and Western Pond Turtle Impact BIO#5: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Francisco Garter Snake Impact BIO#6: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Burrowing Owl Impact BIO#7: Removal or Disturbance of Active Alameda Song Sparrow and Saltmarsh Common Yellowthroat Nests Impact BIO#8: Permanent Conversion and Degradation of Habitat for and Direct Mortality or Disturbance of Least Bell's Vireo, Yellow Warbler, and Tricolored

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										Blackbird Impact BIO#9: Removal or Disturbance of Active White-Tailed Kite Nests Impact BIO#10: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Francisco Dusky-Footed Woodrat and Ringtail
BIO-MM#13	Restore Temporary Riparian Habitat Impacts	Within 90 days of completing construction in a work area, the project biologist will direct the revegetation of any riparian areas temporarily disturbed as a result of the construction activities, using appropriate native plants and seed mixes (including host and nectar plants for butterflies). Native plants and seed mixes will be obtained from stock originating from areas within the local watershed, to the extent feasible. The project biologist will monitor restoration activities consistent with provisions in the RRP (BIO-MM#1).	Construction/ Post-construction	Restoration/ Monitoring/ Reporting	Weekly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Revegetate disturbed riparian areas/ report findings	Condition of construction contract/condition of regulatory permits	Impact BIO#3: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Central California Coast Steelhead, Pacific Lamprey, and Green Sturgeon, and Permanent Conversion or Degradation of Essential Fish Habitat Impact BIO#8: Permanent Conversion and Degradation of Habitat for and Direct Mortality or Disturbance of Least Bell's Vireo, Yellow Warbler, and Tricolored Blackbird Impact BIO#10: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Francisco Dusky-Footed Woodrat and Ringtail Impact BIO#18: Permanent Conversion or Degradation of Special-Status Plant Communities Impact BIO#20: Permanent Conversion or Degradation of Aquatic Resources Considered Jurisdictional under Section 404 of the Federal Clean Water Act and the State Porter-Cologne Act, or under Section 10 of the Rivers and Harbors Act Impact BIO#21: Permanent Conversion or Degradation of Aquatic Resources, including Riparian Communities, Subject to Notification under California Fish and Game Code Section 1600 et seq. Impact HYD#4: Temporary Impacts on Surface Water Quality during Construction
BIO-MM#14	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 will prepare a dewatering plan, which will be subject to review and approval by the applicable regulatory agencies. The plan will incorporate measures to minimize turbidity and siltation. The project biologist will monitor the dewatering 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 will 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	Pre-construction/ Construction	Design/ final design/ monitoring/ reporting	Weekly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Prepare and implement dewatering and waste diversion plan/report findings	Condition of construction contract/condition of regulatory permits	Impact BIO#3: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Central California Coast Steelhead, Pacific Lamprey, and Green Sturgeon, and Permanent Conversion or Degradation of Essential Fish Habitat Impact HYD#4: Temporary Impacts on Surface Water Quality during Construction

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		project biologist will relocate the species (unless the species is fully protected under state law), consistent with any regulatory authorizations applicable to the species.								
BIO-MM#15	Prepare and Implement a Cofferdam Fish Rescue Plan	<p>If cofferdam construction or stream dewatering is required, the Authority will develop a fish rescue plan. The fish rescue plan will outline the methods for removing and relocating fish to adjacent waterways and will be implemented by a qualified fisheries biologist. The plan will 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. NMFS and CDFW will 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 will be submitted to CDFW and NMFS within 30 days of the fish rescue. The area to be dewatered will 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 Guidelines for Electrofishing Waters Containing Salmonids Listed under the Endangered Species Act (NMFS 2000). A fisheries biologist will be on-site during initial dewatering to confirm compliance with the fish rescue plan. In streams bearing anadromous fish, in-water construction will avoid migration periods, and dewatering (installation of cofferdams) will begin no earlier than June 1 and will be completed (i.e., cofferdams removed) by October 15.</p> <p>If a cofferdam is required, the Authority will implement the following measures, unless other methods are approved by NMFS:</p> <ul style="list-style-type: none"> ▪ Build cofferdams 30 to 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 ▪ Build 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 <p>The agency-approved biologist will continuously monitor the placement of cofferdams and dewatering of isolated areas for the purpose of removing and relocating any</p>	Pre-construction/ Construction	Implement fish rescue plan including minimization measures and monitoring, if required	During construction	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	During construction	Condition of construction contract/condition of regulatory permits	Impact BIO#3: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Central California Coast Steelhead, Pacific Lamprey, and Green Sturgeon, and Permanent Conversion or Degradation of Essential Fish Habitat

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		listed species that were not detected or could not be removed and relocated prior to construction. The agency-approved biologist will be present at the work site until all listed species have been removed and relocated.								
BIO-MM#16	Prepare and Implement an Underwater Sound Control Plan	<p>The Authority will develop an underwater sound control plan to avoid and minimize potential adverse impacts from in-water pile-driving activities on federally-listed special-status fish species. The underwater sound control plan will include the following:</p> <ul style="list-style-type: none"> ▪ Measures to minimize underwater sound pressure levels to below the following thresholds for peak pressure and accumulated sound exposure levels: <ul style="list-style-type: none"> – Peak pressure = 206 dB – Accumulated sound exposure levels = 183 dB – Cumulative sound limit = 187 dB for fish over 2 grams – Cumulative sound limit = 183 dB for fish under 2 grams ▪ Underwater sound monitoring during pile-driving activities <ul style="list-style-type: none"> – Hydroacoustic monitoring and construction oversight will be conducted by a hydroacoustic monitoring specialist. ▪ 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 will be low energy with reduced impact frequency, gradually increasing in energy and frequency until necessary full force and frequency are achieved. <p>The underwater sound control plan will be provided to CDFW for review and approval a minimum of 30 days prior to starting work. The underwater sound control plan will also be submitted to NMFS for approval for federally listed species. The underwater sound control plan will include work location and timing, summary of engineering plans, and pile driving methods. The plan will also include a sound attenuation system for impact-driven piles. Sound attenuation systems may include, but are not limited to, a confined bubble curtain, an unconfined bubble curtain, isolation casings, and wooden pile cushions.</p>	Pre-construction/ Construction	Implement underwater sound control plan measures and monitoring, if required	During construction	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	During construction	Contract requirements and specifications following requirements established by regulatory compliance permits	Impact BIO#3: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Central California Coast Steelhead, Pacific Lamprey, and Green Sturgeon, and Permanent Conversion or Degradation of Essential Fish Habitat
BIO-MM#17	Provide Compensatory Mitigation for Permanent Impacts on Steelhead Habitat, Green Sturgeon	<p>The Authority will provide compensatory mitigation for permanent impacts on habitat for CCC steelhead, green sturgeon, and EFH that is commensurate with the type (rearing, migratory, or critical habitat) and amount of habitat lost as follows:</p>	Post-construction/ Construction/ Post-Construction	Design/ Final design/ Compensatory mitigation/ Reporting	Monthly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Authority will provide compensatory mitigation for Steelhead	Condition of construction contract/condition of regulatory permits	Impact BIO#3: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Central California Coast Steelhead, Pacific Lamprey, and Green Sturgeon, and Permanent Conversion or

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	Habitat, and Essential Fish Habitat	<ul style="list-style-type: none"> All rearing and migratory aquatic and riparian habitat within critical habitat will be protected and restored or protected and enhanced at a minimum of 2:1 (protected:affected) or as specified in authorizations issued under FESA All other rearing and migratory aquatic and riparian habitat will be protected and restored or protected and enhanced at a minimum of 1:1 (protected:affected) or as specified in authorizations issued under FESA <p>The Authority will purchase riparian and aquatic habitat credits at an NMFS-approved anadromous fish conservation bank, or another NMFS-approved conservation option, for the areal extent of riparian and suitable aquatic habitat affected by the project. In the event the Authority chooses not to utilize existing mitigation banks, it will propose other approaches to the applicable regulatory agencies for consideration. Any such approaches will take into account the following:</p> <ul style="list-style-type: none"> 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 <p>Conservation options developed to offset impacts to steelhead and green sturgeon habitat and EFH will be considered in the development of the CMP (BIO-MM#8), RRP (BIO-MM#1) and flood protection plan (HYD-IAMF#2).</p>						Habitat, Green Sturgeon Habitat, and Essential Fish Habitat impacts		Degradation of Essential Fish Habitat
BIO-MM#18	Conduct Pre-Construction Surveys for Special-Status Reptile and Amphibian Species	<p>Prior to any ground-disturbing activities in suitable habitat for special-status reptile and amphibian species, the project biologist will conduct a pre-construction survey of the work area no more than 30 days before the start of ground-disturbing activities in the work area. The results of the pre-construction survey will be used to guide the placement of ESAs or conduct species relocation. The following species are subject to this measure:</p> <ul style="list-style-type: none"> California red-legged frog San Francisco garter snake Western pond turtle <p>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 FESA.</p>	Pre-construction/ Construction	Surveying/ monitoring/ reporting	Monthly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Conduct pre-construction surveys; establish ESAs and WEFs; compliance reporting Surveys conducted 30 days prior to ground-disturbance; submit monthly reports during construction	Condition of construction contract/condition of regulatory permits	Impact BIO#4: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Red-Legged Frog and Western Pond Turtle Impact BIO#5: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Francisco Garter Snake
BIO-MM#19	Implement Avoidance and Minimization Measures for Special-Status Reptile and Amphibian Species	<p>The project biologist will monitor all initial ground-disturbing activities that occur within suitable habitat for special-status reptiles and amphibians, and will conduct clearance surveys of suitable habitat in the work area on a daily basis. If a special-status reptile or amphibian is</p>	Construction	Surveying/ monitoring/ reporting	Weekly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Clearance surveys as needed for special-status reptiles and	Condition of construction contract/condition of regulatory permits	Impact BIO#4: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Red-Legged Frog and Western Pond Turtle Impact BIO#5: Permanent Conversion or

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		observed, the project biologist will 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 will relocate any of the species observed from the work area. For federal or state-listed species, relocations will be undertaken in accordance with regulatory authorizations issued under the FESA, CESA, or both. Fully protected species will not be relocated and will instead be allowed to leave the work area of their own volition.						amphibians/ avoidance or relocation of such species/ report findings		Degradation of Habitat for and Direct Mortality of San Francisco Garter Snake
BIO-MM#20	Install San Francisco Garter Snake and California Red-Legged Frog Exclusion Fencing at SFO West-of-Bayshore Property	Prior to any ground-disturbing activity adjacent to or within San Francisco garter snake and California red-legged frog habitat at the SFO West-of-Bayshore property (between MP 11.4 and 13.4), the contractor, under the direction of the project biologist, will install temporary WEF along the boundary of the work area or will implement similar measures as otherwise required pursuant to regulatory authorizations issued under FESA. WEF must be installed for a 2-week period prior to the initiation of ground-disturbing activity and trenched into the soil at least 6 inches deep, with the soil compacted against both sides of the fence for its entire length to prevent San Francisco garter snakes and California red-legged frogs from passing under the fence. The WEF must have intermittent exit points. The project biologist will monitor construction activities inside the WEF on a full-time basis during the peak activity period for San Francisco garter snakes and California red-legged frogs (March to July [SFO 2014]) and will conduct daily inspections of the WEF prior to and during any construction activities inside the WEF from August to February. Vehicle speeds inside WEF work areas will be limited to 5 mph. Any needed repairs to the WEF will be made within 24 hours. During monitoring and daily inspections, the project biologist will check for San Francisco garter snakes and California red-legged frogs under vehicles and equipment that have been inactive for periods of 8 hours or more. Temporary WEF will be removed after all ground disturbance and equipment use (including vehicles) for the activity is completed.	Pre-construction/ Construction	Construct exclusionary fencing; Monitoring; Compliance reporting	Daily monitoring; Monthly reporting	Authority/ Contractor	Authority	In accordance with reporting schedule established by agency permit requirements	Condition of construction contract/condition of regulatory permits	Impact BIO#4: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Red-Legged Frog and Western Pond Turtle Impact BIO#5: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Francisco Garter Snake

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BIO-MM#21	Compensate for Impacts on San Francisco Garter Snake and California Red-Legged Frog Habitat	<p>The Authority will provide compensatory mitigation to offset the loss of modeled San Francisco garter snake and California red-legged frog habitat. Compensatory mitigation will be provided in the following ratios, unless higher ratios are required through regulatory authorizations issued under the FESA:</p> <ul style="list-style-type: none"> ▪ 2:1 for permanent impacts on aquatic habitat ▪ 1:1 for permanent impacts on refugia habitat <p>Compensatory mitigation will be provided using one or more of the methods described in BIO-MM#8.</p>	Pre-construction/ Construction/ Post-construction	Design/ final design/ compensatory mitigation/ reporting	Monthly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Authority to provide compensation based on amount suitable habitat affected by the project	Condition of construction contract/condition of regulatory permits	<p>Impact BIO#4: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Red-Legged Frog and Western Pond Turtle</p> <p>Impact BIO#5: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Francisco Garter Snake</p>
BIO-MM#22	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 will conduct pre-construction surveys for burrowing owl within suitable habitat in the work area and extending 250 feet from the boundary of the work area, where access is available. Surveys will 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 Staff Report on Burrowing Owl Mitigation (CDFG 2012), but it may be updated based on future changes by the SCVHA.	Pre-construction	Surveying/ monitoring/ reporting	Monthly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Conduct protocol-level surveys; compliance reporting; monthly reporting	Condition of construction contract/condition of regulatory permits	Impact BIO#6: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Burrowing Owl
BIO-MM#23	Implement Avoidance and Minimization Measures for Burrowing Owls	<p>Occupied burrowing owl burrows found during pre-construction surveys will 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 will 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 surveys. 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 (February 1 to August 31) if the following criteria described in the SCVHP are met:</p> <ul style="list-style-type: none"> ▪ The nest is not disturbed ▪ The Authority develops an avoidance and minimization and monitoring plan that will be sent to CDFW for technical review prior to construction in the work area based on the following criteria: <ul style="list-style-type: none"> – A qualified biologist monitors the owls for at least 3 days prior to construction to determine baseline nesting and foraging behavior (i.e., behavior without construction). – The same qualified biologist monitors the owls during construction and finds no change in owl nesting and foraging behavior in response to construction activities. 	Pre-construction	Surveying/ monitoring/ reporting	Weekly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Establish no-work buffers around occupied burrowing owl burrows/ relocation as needed/ report findings	Condition of construction contract/condition of regulatory permits	Impact BIO#6: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Burrowing Owl

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementing Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		<ul style="list-style-type: none"> - If there is any change in owl nesting and foraging behavior as a result of construction activities, these activities will cease within the 250-foot buffer. Construction cannot resume within the 250-foot buffer until the adults and juveniles from the occupied burrows have moved out of the project site. - If monitoring indicates that the nest is abandoned prior to the end of nesting season and the burrow is no longer in use by owls, the nondisturbance buffer zone may be removed. The biologist will excavate the burrow to prevent reoccupation. <p>Construction may proceed inside the 250-foot nondisturbance no-work buffer zone during the non-breeding season (September 1 to January 31) if the following criteria described in the SCVHP are met:</p> <ul style="list-style-type: none"> ▪ A qualified biologist monitors the owls for at least 3 days prior to construction to determine baseline foraging behavior (i.e., behavior without construction). ▪ The same qualified biologist monitors the owls during construction and finds no change in owl foraging behavior in response to construction activities. ▪ If there is any change in owl foraging behavior as a result of construction activities, these activities will cease within the 250-foot buffer. Construction cannot resume within the 250-foot buffer until the adults and juveniles from the occupied burrows have moved out of the project site. ▪ If the owls are gone for at least 1 week, a qualified biologist will excavate usable burrows to prevent owls from re-occupying the site. After all usable burrows are excavated, the buffer zone will be removed and construction may continue. ▪ Passive relocation may be employed in work areas during the non-breeding season if other measures described in this condition do not allow work to continue. Passive relocation would only be considered if the burrow needed to be removed, or had the potential of collapsing (e.g. from construction activities). Passive relocation would occur as described in the SCVHP (County of Santa Clara et al. 2012: page 6-66) in consultation with CDFW. 								
BIO-MM#24	Provide Compensatory Mitigation for Loss of Active Burrowing Owl Burrows and Habitat	<p>To compensate for permanent impacts on occupied burrowing owl breeding and foraging habitat, the Authority will provide compensatory mitigation at a minimum 1:1 ratio for occupied breeding and foraging habitat or other actions (e.g., habitat enhancement, provide funding to SCVHA burrowing owl program) of equivalent value for the species.</p> <p>Compensatory mitigation lands proposed as compensatory mitigation will meet the following criteria:</p>	Pre-construction/ Construction/ Post-construction	Design/ final design/ surveying/ compensatory mitigation/ reporting	Monthly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Authority to provide compensation for number of burrowing owl burrows affected by the project; prior to operation	Condition of construction contract/condition of regulatory permits	Impact BIO#6: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Burrowing Owl

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementing Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		<ul style="list-style-type: none"> ▪ Support at least two breeding adult owls for every breeding adult owl displaced by construction of the project or 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: <ul style="list-style-type: none"> – 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 (e.g., arthropods, small rodents, amphibians, lizards) ▪ Located as close to the impact location and existing western burrowing occupied habitat as feasible 								
BIO-MM#25	Conduct Pre-Construction Surveys and Delineate Active Nest Buffers Exclusion Areas for Breeding Birds	<p>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 will conduct visual pre-construction surveys within 0.5 mile of the work area for nesting birds and active nests (nests with eggs or young) of native bird species listed under the MBTA, the Cal. Fish and Game Code, or both.</p> <p>In the event that active bird nests are observed during the pre-construction survey, the project biologist will delineate no-work buffers. No-work buffers will be set at a distance of 0.5 mile for white-tailed kite, 500 feet for other raptor species, and 250 feet for other birds protected by the MBTA or Cal. Fish and Game Code. No-work buffers will 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 determines that the smaller size will be sufficient to avoid impacts, and the project biologist monitors the active nest during the construction activity to determine whether or not the nesting birds become agitated. If the biologist observes signs of agitation, work within the buffer will halt until the nestlings have fledged or the nest is abandoned.</p>	Pre-construction/ Construction	Surveying/ monitoring/ reporting	Weekly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Conduct pre-construction surveys; identify no-work buffers Surveys conducted prior to ground disturbance	Condition of construction contract/condition of regulatory permits	<p>Impact BIO#7: Removal or Disturbance of Active Alameda Song Sparrow and Saltmarsh Common Yellowthroat Nests</p> <p>Impact BIO#8: Permanent Conversion and Degradation of Habitat for and Direct Mortality or Disturbance of Least Bell's Vireo, Yellow Warbler, and Tricolored Blackbird</p> <p>Impact BIO#9: Removal or Disturbance of Active White-Tailed Kite Nests</p>
BIO-MM#30	Conduct Pre-Construction Surveys for Special-Status Bat Species	<p>Prior to replacement or modification of any bridges modeled as bat habitat, the project biologist will conduct pre-construction bridge surveys as follows:</p> <ul style="list-style-type: none"> ▪ The project biologist will conduct a survey of the bridge looking for evidence of roosting bats no less than 2 months prior to construction. If bat sign is detected, 	Pre-construction	Surveying/ monitoring/ reporting	Weekly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Conduct visual and acoustic pre-construction survey for roosting bats/ report findings	Condition of construction contract/condition of regulatory permits	Impact BIO#12: Removal of Roost Sites for and Direct Mortality or Disturbance of Special-Status Bats

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementing Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		<p>biologists will conduct an evening visual emergence survey of the bridge, from a half hour before sunset to 1 to 2 hours after sunset for a minimum of 2 nights within the season that construction would be taking place. Night-vision goggles, full-spectrum acoustic detectors, or both will be used during emergence surveys to assist in species identification. All emergence surveys will be conducted during favorable weather conditions (calm nights with temperatures conducive to bat activity and no precipitation predicted).</p> <ul style="list-style-type: none"> ▪ If a potentially active bat roost is in the bridge, passive monitoring with full-spectrum bat detectors will be used to assist in determining species present. A minimum of 4 nights of acoustic monitoring surveys will be conducted within the season that construction would be taking place. If site security allows, detectors will be set to record bat calls for the duration of each night. To the extent possible, all monitoring will be conducted during favorable weather conditions (calm nights with temperatures conducive to bat activity and no precipitation predicted). The biologists will analyze the bat call data using appropriate software and will prepare a report to be submitted to the Authority. <p>Prior to the removal of large (i.e., greater than 24 inches diameter-at-breast-height) trees, the project biologist will conduct pre-construction tree removal surveys as follows:</p> <ul style="list-style-type: none"> ▪ Within 2 weeks prior to tree removal, the project biologist will examine trees to be removed for suitable bat roosting habitat. High-quality habitat features (e.g., large tree cavities, basal hollows, loose or peeling bark, larger snags) will be identified, and the area around these features searched for bats and bat sign (e.g., guano, culled insect parts, staining). ▪ If bat sign is detected, biologists will conduct an evening visual emergence survey of the source habitat feature, from a half hour before sunset to 1 to 2 hours after sunset for a minimum of 2 nights within the season that construction would be taking place. Night-vision goggles, full-spectrum acoustic detectors, or both will be used during emergence surveys to assist in species identification. All emergence surveys will be conducted during favorable weather conditions (calm nights with temperatures conducive to bat activity and no precipitation predicted). ▪ If a potentially active bat roost is identified within a tree proposed for removal, passive monitoring with full-spectrum bat detectors will be used to assist in determining species present. A minimum of 4 nights of acoustic monitoring surveys will be conducted within the season that construction would be taking place. If site security allows, detectors should be set to record bat calls for the duration of each night. To the extent possible, all monitoring will be conducted during 								

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		favorable weather conditions (calm nights with temperatures conducive to bat activity and no precipitation predicted). The biologists will analyze the bat call data using appropriate software and prepare a report to be submitted to the Authority.								
BIO-MM#31	Implement Bat Avoidance and Relocation Measures	<p>If active hibernacula or maternity roosts are found in the work area during pre-construction surveys, avoidance will be the preferred approach to minimize impacts. If avoidance of the roost is not feasible, the project biologist will prepare a relocation plan and provide for an alternative bat roost outside the project footprint.</p> <p>The project biologist will implement the relocation plan before the commencement of any ground-disturbing activities in the work area and within 75 feet of the roost. Removal of roosts will only occur between August 1 and October 31 and will be guided by accepted exclusion and deterrent techniques. If delay of construction activities until the period between August 1 and October 31 for removal of a roost is not feasible, then construction may proceed.</p>	Pre-construction/ Construction	Surveying/ monitoring/ reporting	Weekly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Avoid active or hibernation roosts, if feasible/ if necessary, prepare and implement relocation plan for bat roosts/ report findings	Condition of construction contract/condition of regulatory permits	Impact BIO#12: Removal of Roost Sites for and Direct Mortality or Disturbance of Special-Status Bats
BIO-MM#32	Implement Bat Exclusion and Deterrence Measures	<p>If nonbreeding or nonhibernating individuals or groups of bats are found roosting within the work area, the project biologist will 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.</p> <p>To the extent feasible, the Authority will leave the roost undisturbed by project activities for a minimum of 1 week after implementing exclusion or eviction activities. Steps will not be taken to evict bats from active maternity or hibernacula; instead such features may be relocated pursuant to a relocation plan.</p>	Pre-construction/ Construction	Surveying/ monitoring/ reporting	Weekly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Safely evict bats from roosts except for established maternity roosts and occupied hibernation roosts/ report findings	Condition of construction contract/condition of regulatory permits	Impact BIO#12: Removal of Roost Sites for and Direct Mortality or Disturbance of Special-Status Bats
BIO-MM#33	Install Aprons or Barriers within Security Fencing	<p>Prior to final construction design the project biologist will review the fencing plans along any portion of the permanent right-of-way that is adjacent to natural habitats and confirm that the permanent security fencing will be enhanced with a barrier (e.g., fine mesh fencing) that extends at least 12 inches below ground and 12 inches above ground to prevent special-status reptiles, amphibians, and mammals from moving through or underneath the fencing and gaining access to areas within the right-of-way. At the 12-inch depth of the below-grade portion of the apron, it will extend or be bent at an approximately 90-degree angle and oriented outward from the right-of-way a minimum of 12 inches, to prevent fossorial mammals, reptiles, and amphibians from digging or tunneling below the security fence and gaining access to the right-of-way. A climber barrier (e.g., rigid curved or bent overhang) will be installed at the top of the apron to prevent reptiles, amphibians and mammals from climbing over the apron.</p> <p>The project biologist will make sure that the selected apron material and climber barrier does not cause harm,</p>	Design/ Pre-construction/ Construction	Design and installation of apron or fencing	As needed	Authority/ Contractor	Authority/ Contractor	Design of wildlife movement plans	Condition of construction contract/condition of regulatory permits	Impact BIO#14: Intermittent Disturbance of Habitat for and Direct Mortality of Special-Status Wildlife during Operations

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementing Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		injury, entanglement, or entrapment to wildlife species. The Authority will provide for quarterly inspection and repair of the fencing. The specific design and method for installation of an apron or barrier may vary as required by regulatory authorizations issued under FESA, CESA, or both. Prior to operation the project biologist will field inspect the fencing along any portion of the permanent right-of-way that is adjacent to natural habitats and confirm that the fencing has been appropriately installed. Fencing plan review and field inspection will be documented in a memorandum from the project biologist and provided to the Authority.								
BIO-MM#34	Minimize Permanent Intermittent Impacts on Aerial Species Movement	To address the permanent intermittent impact of operations on aerial wildlife movement from train strike and entrapment, the Authority will implement an array of deterrent and diversion features for avian species. These features include the following: <ul style="list-style-type: none"> Install pigeon wire or other features to discourage birds from perching on OCS throughout the project In selected areas near SJC, place flight barriers such as fencing, pole barriers or a tubular screen (Life Impacto Cero 2015) to the height of OCS to avoid birds (especially burrowing owls) flying into the rail alignment and being struck by the train: Alternative B between Stations B2270 and 2390 (near SJC); Alternative A between Stations B2872 and 2930 (near SJC). 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 	Design/ Pre-construction/ Construction	Design of OCS and other wildlife movement plans	As needed	Authority/ Contractor	Authority/ Contractor	Design of wildlife movement plans	Condition of construction contract	Impact BIO#14: Intermittent Disturbance of Habitat for and Direct Mortality of Special-Status Wildlife during Operations
BIO-MM#35	Provide Compensatory Mitigation for Permanent Impacts on Riparian Habitat	The Authority will compensate for permanent impacts on riparian habitats at a ratio of 2:1, 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, or participation in an in-lieu fee program.	Pre-construction/ construction/ post-construction	Design/ final design/ surveying/ compensatory mitigation/ reporting	Yearly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Mitigate permanent riparian habitat impacts through compensation/ report findings	Condition of construction contract/condition of regulatory permits	Impact BIO#18: Permanent Conversion or Degradation of Special-Status Plant Communities Impact BIO#20: Permanent Conversion or Degradation of Aquatic Resources Considered Jurisdictional under Section 404 of the Federal Clean Water Act and the State Porter-Cologne Act, or under Section 10 of the Rivers and Harbors Act Impact BIO#21: Permanent Conversion or Degradation of Aquatic Resources, including Riparian Communities, Subject to Notification under California Fish and Game Code Section 1600 et seq. Impact HYD#5: Permanent Impacts on Surface Water Quality

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementing Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
BIO-MM#36	Restore Aquatic Resources Subject to Temporary Impacts	Within 90 days of the completion of construction activities in a work area, the Authority will begin to restore aquatic resources that were temporarily affected by the construction. Aquatic resources are those resources considered waters of the U.S. under the federal CWA or waters of the state under the Porter-Cologne Act. As set out in the RRP (BIO-MM#1), such areas will 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 will be removed and the affected features would be restored. The Authority will revegetate affected aquatic resources using appropriate native plants and seed mixes (from local vendors where available). The Authority will conduct maintenance monitoring consistent with the provisions of the RRP.	Construction/ Post-construction	Restoration/ monitoring/ reporting	Weekly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Restore disturbed aquatic resources/ conduct revegetation/ report findings	Condition of construction contract/condition of regulatory permits	Impact BIO#18: Permanent Conversion or Degradation of Special-Status Plant Communities Impact BIO#20: Permanent Conversion or Degradation of Aquatic Resources Considered Jurisdictional under Section 404 of the Federal Clean Water Act and the State Porter-Cologne Act, or under Section 10 of the Rivers and Harbors Act Impact BIO#21: Permanent Conversion or Degradation of Aquatic Resources, including Riparian Communities, Subject to Notification under California Fish and Game Code Section 1600 et seq.
BIO-MM#37	Prepare and Implement a Compensatory Mitigation Plan for Impacts on Aquatic Resources	The Authority will 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 waters of the state under the Porter-Cologne Act. Compensatory mitigation will prevent net loss of functions and values and may involve the restoration, establishment, enhancement, and/or preservation of aquatic resources through one or more of the following methods: <ul style="list-style-type: none"> ▪ 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 will be used for compensatory mitigation for aquatic resources unless a higher ratio is required pursuant to regulatory authorizations issued under Section 404 of the CWA, the Porter-Cologne Act, or Section 10 of the RHA: <ul style="list-style-type: none"> ▪ Seasonal wetlands: between 1.1:1 and 1.5:1 based on impact type, function and values lost <ul style="list-style-type: none"> – 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 nonwetland types: mitigated on-site at 1:1 or off-site 1:1 if on-site mitigation is not practicable. For mitigation involving establishment, restoration, enhancement, or preservation of aquatic resources by the Authority, the CMP will contain, but will not be limited to,	Pre-construction/ Construction/ Post-construction	Design/ final design/ surveying/ compensatory mitigation/ reporting	Yearly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Prepare and implement CMP for temporary and permanent impact on aquatic resources/ report findings	Condition of construction contract/condition of regulatory permits	Impact BIO#18: Permanent Conversion or Degradation of Special-Status Plant Communities Impact BIO#20: Permanent Conversion or Degradation of Aquatic Resources Considered Jurisdictional under Section 404 of the Federal Clean Water Act and the State Porter-Cologne Act, or under Section 10 of the Rivers and Harbors Act Impact BIO#21: Permanent Conversion or Degradation of Aquatic Resources, including Riparian Communities, Subject to Notification under California Fish and Game Code Section 1600 et seq.3 Impact HYD#4: Temporary Impacts on Surface Water Quality during Construction Impact HYD#5: Permanent Impacts on Surface Water Quality

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementing Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		<p>the following primary information:</p> <ul style="list-style-type: none"> Objectives—A description of the resource types and amounts that will 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 will 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 will be provided for the success of compensatory mitigation. <p>Additional information required in a CMP as outlined in 33 C.F.R. Section 332.4(c), as deemed appropriate and necessary by USACE will 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.</p>								
BIO-MM#38	Prepare and Implement an Annual Vegetation Control Plan	<p>Prior to O&M of the HSR, the Authority will prepare an annual 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 will generally follow the procedures established in Chapter C2 of the Caltrans Maintenance Manual to manage vegetation on Authority property (Caltrans 2017). Vegetation will be controlled by chemical, thermal, biological, cultural, mechanical, structural, and manual methods. The VCP will 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 will include a section addressing issues encountered during the prior year and changes to be incorporated into the VCP. The plan will describe site-specific vegetation control methods:</p> <ul style="list-style-type: none"> Chemical vegetation control methods Mowing program consistent with Section 1415 of the Fixing America's Surface Transportation Act Other nonchemical vegetation control Other chemical pest control methods (e.g., insects, snail, rodent) <p>Only Caltrans-approved herbicides may be used in the vegetation control program. Pesticide application will be</p>	Pre-construction/ construction/ post-construction	Design/ final design/ compensatory mitigation/ reporting	Yearly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Prepare and implement VCP for vegetation removal for the purpose of maintaining clear areas/ report findings	Condition of construction contract/condition of regulatory permits	Impact BIO#22: Intermittent Disturbance or Degradation of Aquatic Resources during Operations

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		conducted by certified pesticide applicators in accordance with all requirements of the California Department of Pesticide Regulation and County Agricultural Commissioners. Noxious/invasive weeds will be treated where requested by County Agricultural Commissioners. The Authority will cooperate in area-wide efforts to control noxious/invasive weeds if such programs have been established by local agencies.								
BIO-MM#39	Implement Transplantation and Compensatory Mitigation Measures for Protected Trees	<p>Prior to ground-disturbing activities, the project biologist will conduct surveys in the work area to identify protected trees.</p> <p>The project biologist will establish ESAs around protected trees with the potential to be affected by construction activities, but do not require removal. The ESAs will extend outward 5 feet from the drip lines of such protected trees. For protected trees greater than 50 feet in height, the ESAs will extend outward 10 feet from the drip line.</p> <p>The Authority will provide compensatory mitigation for impacts on protected trees, including impacts associated with removing or trimming a protected tree. Compensation will 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:</p> <ul style="list-style-type: none"> ▪ 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. 	Pre-construction/ Construction/ Post-construction	Surveying/ monitoring/ restoration/ reporting	Monthly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Conduct protected trees surveys/ compensate for impacts and effects on protected tree resources/ prepare and implement a monitoring and maintenance program to monitor transplanted trees/ report findings	Condition of construction contract	Impact BIO#23: Removal of Trees Protected under Municipal Tree Ordinances
BIO-MM#40	Avoid Direct Impacts on Listed Butterfly Host Plants	<p>Prior to construction, the project biologist will survey for monarch butterfly larval host plants within suitable habitat. If host plants are found, the project biologist will conduct surveys for adult monarch butterflies during the peak of the flight period to determine presence/absence, or presence may be assumed. Where adult monarch butterflies are present, or assumed to be present, construction personnel will avoid host plants in temporary impact areas during the flight season.</p>	Pre-construction	Surveying/ monitoring/ reporting	Monthly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Pre-construction surveys of listed butterfly host plants and maintain no-work buffer/report findings	Condition of construction contract/condition of regulatory permits	Impact BIO#2b: Permanent Conversion or Degradation of Habitat for and Mortality of Monarch Butterfly
BIO-MM#41	Provide Compensatory Mitigation for Impacts on Monarch Butterfly Habitat	<p>To compensate for permanent impacts on monarch butterfly habitat (breeding and foraging habitat), the Authority will provide compensatory mitigation at a 1:1 ratio for occupied breeding and foraging habitat, unless a higher ratio is required by FESA. Compensatory mitigation could include one or more of the following:</p> <ul style="list-style-type: none"> ▪ Purchase of credits from an agency-approved conservation bank ▪ Acquisition in fee title of USFWS-approved property ▪ Purchase or establish a conservation easement with an 	Pre-construction/ construction/ post-construction	Design/ final design/ compensatory mitigation/ reporting	Monthly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Compensate for impacts on habitat for monarch butterfly/ report findings	Condition of construction contract/condition of regulatory permits	Impact BIO#2b: Permanent Conversion or Degradation of Habitat for and Mortality of Monarch Butterfly

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementing Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		<p>endowment for long-term management of the property-specific conservation values</p> <ul style="list-style-type: none"> An in-lieu fee contribution determined through negotiation and consultation with the USFWS <p>Mitigation for monarch butterfly will prioritize areas with any future designated critical habitat (if the monarch is listed, and critical habitat is designated) and with existing monarch butterfly populations and suitable milkweed populations to support breeding. The secondary priority will be to create suitable habitat in other areas, if feasible (i.e., establish self-sustaining milkweed populations). The compensatory mitigation areas and methods selected will 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.</p> <p>As described under BIO-MM#8, the Authority will prepare and implement a compensatory mitigation plan that will include considerations listed in this measure.</p>								

Hydrology and Water Resources

No mitigation measures are required.

Hazardous Materials and Waste

HMW-MM#1	Limit Use of Extremely Hazardous Materials near Schools during Construction	<p>Prior to construction, the contractor will prepare a memorandum regarding hazardous materials BMPs related to construction activity for approval by the Authority. The memorandum will confirm that the contractor will not handle or store an extremely hazardous substance (as defined in California Public Resources Code § 21151.4) or a mixture containing extremely hazardous substances in a quantity equal to or greater than the state threshold quantity specified pursuant to subdivision (j) of Section 25532 of the Health and Safety Code within 0.25 mile of a school, unless within the designated staging area with appropriate procedures and protocols in place. The memorandum will acknowledge that prior to construction activities, signage will be installed to delimit all work areas within 0.25 mile of a school, informing the contractor not to bring extremely hazardous substances into the area. The contractor will be required to monitor all use of extremely hazardous substances. The memorandum will be submitted to the Authority prior to any construction involving an extremely hazardous substance.</p>	Pre-Construction/ Construction	Reporting; Monitoring	Memorandum approved 30 days prior to start of construction; during construction, submit weekly reports or reporting requirements as established by the approved memorandum	Authority/ Contractor/ Hazardous Material Monitor	Contractor	Hazardous materials memorandum/ weekly reporting	Hazardous materials memorandum	Impact HMW#13: Intermittent Direct Impacts from Hazardous Material and Waste Activities near Schools during Construction
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Safety and Security

SS-MM#3	Install Emergency Vehicle Priority Treatments near HSR Stations	<p>Prior to construction, to mitigate fire station emergency access and response time impacts related to the 4th and King Street Station, the Authority's contractor will develop an emergency vehicle priority plan and install emergency vehicle priority treatments and new traffic control devices as needed for San Francisco Fire Station 8. It is</p>	Pre-construction/ Construction	Install emergency vehicle priority treatments and monitor	As needed	Authority/ Contractor	Authority/ Contractor	Install treatments	Condition of construction contract	Impact S&S#6: Continuous Permanent Impacts on Emergency Access and Response Times due to Station Traffic and Increased Gate-Down Time
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Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementing Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		<p>anticipated that this may include installation of a new traffic signal for fire station access at the intersection of either Fourth Street/Bluxome Street or Fifth Street/Bluxome Street, as well as emergency vehicle priority treatments where they do not exist along Fifth Street between Townsend Street and Bryant Street and along Fourth Street between Channel Street and Bryant Street. The contractor will prepare all materials necessary for and obtain the approval of the City and County of San Francisco for the implementation of these emergency vehicle priority treatments. This mitigation measure will be effective in minimizing impacts on emergency response time.</p> <p>Prior to construction and to mitigate fire station/first responder response time impacts related to added traffic from the Millbrae Station, the Authority's contractor will develop an emergency vehicle priority plan and install emergency vehicle priority treatments as needed for Millbrae Fire Station 37. It is anticipated that this will include installation of emergency vehicle priority treatments where they do not exist along El Camino Real between Millwood Drive in Millbrae and Broadway in Burlingame. The contractor will prepare all materials necessary for and obtain the approval of the City of Millbrae and City of Burlingame for the implementation of these emergency vehicle priority treatments. This mitigation measure will be effective in minimizing impacts on emergency response time.</p>								
SS-MM#4	Install Emergency Vehicle Priority Treatments Related to Increased Gate-Down Time Impacts	<p>Prior to operations that are expected to result in an exceedance of the 30-second delay threshold, to mitigate fire station/first responder emergency access impacts related to added travel time from increased gate-down time at the at-grade crossings, the Authority will conduct monitoring and implement phased emergency vehicle priority treatment strategies. Where impacts are identified based on monitoring or predicted to occur due to planned HSR service increases, the Authority will develop an emergency vehicle priority treatment plan in conjunction with local agencies. The Authority will make a fair share contribution towards emergency vehicle priority treatments, including local cities, local fire departments, and local first responders. The Authority's fair share contribution will take the form of providing capital funds for project implementation to local agencies, who will be responsible for implementation of capital improvements as well as ongoing O&M of any facilities constructed.</p> <p>Monitoring will involve collecting travel time data for a 1-mile section (i.e., 0.5 mile on either side of the at-grade crossing) of the at-grade crossing street. The data will be collected during weekday peak periods (7 a.m. to 9 a.m. and 4 p.m. to 6 p.m.). The data will be collected on 12 days during each monitoring year from Tuesday to Thursday over a 2-week period in early May and early</p>	Pre-construction/ Construction	Install emergency vehicle priority treatments and monitor	As needed	Authority/ Contractor	Authority/ Contractor	Install treatments	Condition of construction contract	Impact S&S#6: Continuous Permanent Impacts on Emergency Access and Response Times due to Station Traffic and Increased Gate-Down Time

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementing Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		<p>October.</p> <p>Travel time data will be collected at the following intervals:</p> <ul style="list-style-type: none"> ▪ 1 year prior to and after addition of Caltrain service with the Caltrain Electrification project (i.e., planned additional one peak-hour round trip), to determine if the addition of initial HSR train service (i.e., planned two peak-hour round trips) is likely to require development and implementation of emergency response priority treatments at any of the eight at-grade crossing locations prior to initiation of initial HSR service ▪ 1 year prior to initiation of new HSR service to establish baseline emergency response travel times for each corridor ▪ Monthly for the first 6 months of initial operations³ and annually thereafter for 3 years ▪ Starting approximately 6 months after initiation of any subsequent increase in new HSR service, and annually thereafter for 3 years <p>Travel time data will be collected at the following at-grade crossing locations:</p> <ol style="list-style-type: none"> 1. Oak Grove Avenue (Burlingame) 2. North Lane (Burlingame) 3. Howard Avenue (Burlingame) 4. Whipple Avenue (Redwood City) 5. Brewster Avenue (Redwood City) 6. Broadway (Redwood City) 7. Ravenswood Avenue (Menlo Park) 8. Rengstorff Avenue (Mountain View) <p>An emergency vehicle priority treatment plan will be developed for at-grade crossing locations where an increase in emergency response times of 30 seconds or more above baseline travel time due to HSR service occurs after initiation of HSR service. The performance standard for the plan is to reduce the response time increases resulting from HSR train operation effects on gate-down time to less than 30 seconds. If initial operations do not result in exceedance of the 30-second threshold, then, using monitoring data for initial operations, the Authority will evaluate whether future planned HSR service increases are likely to result in new or additional delays above the 30-second threshold. If such effects are predicted for planned HSR service increases, then the Authority will develop the emergency vehicle priority treatment plan to account for those effects and will coordinate with local cities, fire departments, and first responders to implement the appropriate treatments prior to the planned HSR service increases that would result in</p>								

³ Initial HSR operations would be more limited in scope than full operations expected by 2040. Chapter 2, Alternatives, of the Final EIR/EIS identifies that initial operations would include a maximum of two trains per peak hour per direction, which corresponds to up to four one-way trains per hour or every 15 minutes on average, which would have much less effect on emergency vehicle response times than full Phase I operations. With full Phase I operations, the project would have up to four trains per peak hour per direction, which corresponds to up to eight one-way trains per hour on average at full service by 2040. The intent of monitoring initial operations is to identify the potential need for emergency vehicle response time improvements early enough to be in place prior to full operations.

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementing Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		<p>exceedance of the 30-second threshold.</p> <p>Emergency vehicle priority treatment strategies may include building improvements to streets parallel to the HSR corridor in order to speed travel to adjacent grade-separated crossings of the rail line or to provide new emergency service facilities (i.e., new fire stations or ambulance/paramedic staging facilities) on the opposite side of the corridor where there are no adjacent grade-separated crossings. The strategies may include, but are not limited to, the following:</p> <ul style="list-style-type: none"> ▪ Emergency vehicle preemption equipment at traffic signals ▪ Route-based traffic signal priority control systems ▪ Emergency vehicle and transit queue bypass lanes ▪ Roadway capacity and operational improvements to facilities paralleling the rail line to improve access to adjacent grade-separated rail crossings ▪ Construction of new fire stations to reduce fire station response times in affected areas ▪ Provision of additional equipment for existing fire stations to expand the capacity of existing fire stations to respond to multiple emergency calls in affected areas ▪ Increase the contracted first responder ambulance services to reduce first responder ambulance response times in affected areas <p>As an alternative to the listed strategies, the Authority and a local agency may reach a mutual agreement to have the Authority make an in-lieu payment towards other infrastructure projects including nearby grade-separation projects. The in-lieu payment will be the capital contribution that the Authority would have otherwise made to one or more of the above emergency vehicle priority treatment strategies.</p> <p>Planned grade-separation projects at Ravenswood Avenue in Menlo Park and Rengstorff Avenue in Mountain View would mitigate impacts on emergency access and response time at these at grade crossings. These two grade-separation projects are, however, being planned by local agencies, and therefore their implementation is beyond the control of the Authority. Mitigation measures in Menlo Park would not be required if the planned Ravenswood Avenue rail grade-separation project is built prior to implementation of full HSR service. Similarly, mitigation measures would not be required in Mountain View if the planned Rengstorff Avenue rail grade-separation project is built prior to implementation of full HSR service.</p> <p>If cities choose not to implement and operate emergency vehicle priority treatments using construction funds provided by the Authority, impacts would be considered</p>								

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementing Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		<p>significant and unavoidable. In that case, some of the site-specific traffic mitigation measures identified in Section 3.2.7 would be required to help reduce traffic congestion and delays at intersections adjacent or near at-grade crossings during peak hours at certain intersections where the project would affect emergency vehicle response times due to increased gate-down time. The following traffic mitigation measures will help to reduce peak-hour traffic delays at intersections adjacent to or near at-grade crossings with significant emergency vehicle response time delays:</p> <ul style="list-style-type: none"> ▪ TR-MM#1a.2: North Lane/California Drive—Install Traffic Signal ▪ TR-MM#1a.3: North Lane/Carolan Avenue—Install Traffic Signal ▪ TR-MM#1a.5: Brewster Avenue/Perry Street—Install Traffic Signal ▪ TR-MM#1h: Whipple Avenue/El Camino Real—Add Overlap Signal Phase and Optimize Signal Timing ▪ TR MM#1i: Whipple Avenue/Arguello Street—Optimize Signal Timing 								

Socioeconomics and Communities

No mitigation measures are required.

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementing Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
Station Planning, Land Use, and Development										
LU-MM#1	Implement Noise Mitigation in Conjunction with Land Use Development in Brisbane	<p>Several options exist to address the noise impacts on planned land uses without resulting in changes in land use patterns in Brisbane. These include noise barriers, building insulation, and building location.</p> <p>The performance standards for noise mitigation are those established by the City of Brisbane General Plan as follows:</p> <ul style="list-style-type: none"> ▪ Residential/Hotel: <ul style="list-style-type: none"> – Exterior areas: normally acceptable noise levels up to 65 dBA (without building insulation); conditionally acceptable noise levels of 70 dBA (may require building insulation) – Interior area: noise levels of 45 dBA ▪ Commercial/office exterior areas: normally acceptable noise levels up to 70 dBA (without building insulation); conditionally acceptable noise levels up to 77.5 dBA (may require building insulation) <p>The specific mitigation will be developed in consultation with the City of Brisbane and the site developer, since the specific designs for adjacent development are still in progress. This mitigation is only required to address noise resultant from HSR operations, and not other existing or future noise sources.</p> <p>Noise Barriers</p> <p>Prior to HSR operations adjacent to residential or commercial development in Brisbane, the Authority will install noise barriers where noise levels would not meet the performance standards for mitigation. The primary requirements for an effective noise barrier are that the barrier must (1) be high enough and long enough to break the line-of-sight between the sound source and the receiver, (2) be of an impervious material with a minimum surface density of 4 pounds per square foot, and (3) not have any gaps or holes between the panels or at the bottom. Because many materials meet these requirements, aesthetics, durability, cost, and maintenance considerations usually determine the selection of materials for noise barriers.</p> <p>Modelling of noise barriers (up to 16 feet in height) in planned land use areas at Brisbane indicate that noise barriers could reduce noise in mixed-use areas (residential allowed) within 40 feet of the mainline tracks to 66 dBA and 68 dBA for first and second floors and in areas designated as planned development (residential prohibited) within 40 feet of the mainline tracks to 65 dBA and 67 dBA for first and second floors. These levels will be conditionally acceptable (with insulation) for residential development and normally acceptable for commercial uses. Noise barriers (up to 16 feet in height) will only reduce noise 1 to 3 dBA for third floors, which may result</p>	Pre-construction/ Construction	Design and install noise mitigation in conjunction with land use development in Brisbane	As needed	Authority/ Contractor	Authority/ Contractor	Install treatments	Condition of construction contract	Impact LU#6: Permanent Alteration of Land Use Patterns from Increased Noise, Light, and Glare

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementing Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		<p>in unacceptable noise levels for residential uses without additional measures.</p> <p>Depending on the situation, noise barriers can become visually intrusive. Typically, the noise barrier style will be selected with input from the local jurisdiction to reduce the visual effect of barriers on adjacent lands uses, refer to Aesthetic Options for Non-Station Structures (Authority 2017). For example, noise barriers could be solid or transparent, and made of various colors, materials, and surface treatments.</p> <p>Berm and berm/wall combinations are the preferred types of noise barriers where space and other environmental constraints permit. On aerial structures, barrier material will be limited by engineering weight restrictions for barriers on the structure. All noise barriers will be designed to be as low as possible to achieve a substantial noise reduction.</p> <p>Noise barriers on both aerial structures and at-grade structures could consist of solid, semitransparent, or transparent materials as defined in Aesthetic Options for Non-Station Structures (Authority 2017). Volume 2, Appendix 3.4-B, Noise and Vibration Mitigation Guidelines, provides more details.</p> <p>Install Building Sound Insulation</p> <p>The Authority will provide sound insulation as an additional mitigation measure where necessary to meet the interior noise performance standard. Substantial improvements in building sound insulation (on the order of 5 to 10 dBA) can often be achieved by adding an extra layer of glazing to windows, by sealing holes in exterior surfaces that act as sound leaks, and by providing forced ventilation and air conditioning so that windows do not need to be opened. With noise barriers and building sound insulation, residential uses within 40 feet of the tracks can be conditionally acceptable for first and second floors but may not be for third flows. With noise barriers and building sound insulation, commercial uses can be conditionally acceptable.</p>								
LU-MM#2	Shoreline Access Improvements in Brisbane	<p>The Authority will provide for additional and enhanced public access consistent with the Bay Plan's requirements to increase public access to the Bay to the maximum extent feasible, by building and providing for maintenance of the following:</p> <ul style="list-style-type: none"> ▪ A new bike/pedestrian path approximately where Lagoon Road currently exists along the northern edge of Brisbane Lagoon and south of the proposed East Brisbane LMF between Sierra Point Parkway and Tunnel Avenue. ▪ An extension of the Bay Trail from Candlestick State Recreation Area at the intersection of Alanna Way and Thomas Mellon Circle west along Alanna Way under US 101 then southward to cross Beatty Avenue and 	Pre-construction/ Construction	Design and install shoreline access improvements in Brisbane	As needed	Authority/ Contractor	Authority/ Contractor	Install treatments	Condition of construction contract	Impact LU#7: Conflict with BCDC Shoreline Band Policies

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementing Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		<p>then southward west of US 101 to just north of Brisbane Lagoon where it would connect with the new Lagoon Road bike/pedestrian path.</p> <p>These proposed shoreline access improvements may continue to be refined in coordination with BCDC throughout the environmental process.</p> <p>The new bike/pedestrian path will be in previously developed areas consisting of the following, from north to south: (1) Alanna Way; (2) landscaped areas along Alanna Way; (3) Beatty Avenue; (4) access roads on the west side of the landfill; (5) ruderal grassland areas of the prior landfill along the east and south sides of the landfill and along Lagoon Road. There is one waterway crossing (Visitacion Creek) where the Bay Trail extension will cross on an existing culvert, thus avoiding fill within the creek. Near Visitacion Creek there are some drainage ditches with associated wetland vegetation, but these ditches could be avoided by placing the trail in the upland areas along the existing roads. The ruderal grassland areas do not contain sensitive habitat for special-status species.</p>								

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementing Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
LU-MM#3	Collaborative Final Station Design Process with the City of Millbrae	The Authority will work jointly with the City of Millbrae to refine the Preliminary Station Design into a Final Station Design. Joint design means Authority will consult with the City at intermediate milestones in the design development process and make good faith efforts to incorporate City input into a Final Station Design that both maximizes property interests available for the City's TOD and meets Authority operational requirements.	Design/ Pre-construction	Prepare final station design jointly with the City of Millbrae	Prior to final design	Authority/ Contractor	Authority/ Contractor	Final design and prior to construction	Condition of construction contract	Impact LU#4: Permanent Alteration of Land Use Patterns from Land Use Conversion and Introduction of Incompatible Uses at Stations
LU-MM#4	Collaborative Final Design with the City of Brisbane to Maximize Development at the Brisbane Baylands Adjacent to the Light Maintenance Facility	<p>While the operational viability of the state's HSR system as a whole relies on the proposed LMF in the San Francisco to San Jose Project Section, the Authority recognizes that housing and TOD is also an important statewide priority and is critical to the City. The Authority further acknowledges that the design of the LMF was based on a Preliminary Design and a conservative estimate of the footprint of the LMF required within the San Francisco to San Jose Project Section.</p> <p>In an effort to resolve differences with the City of Brisbane and to jointly advance these two important statewide priorities (HSR and TOD), the Authority commits to working jointly with the City of Brisbane to refine the Preliminary Design into a Final Design. Joint design means Authority will consult with the City at intermediate milestones in the design development process and make good faith efforts to incorporate City input into a Final Design that both maximizes property interests available for the Brisbane Baylands adjacent to the LMF and meets Authority operational requirements.</p>	Design/ Pre-construction	Prepare final design for the LMF jointly with the City of Brisbane	Prior to final design	Authority/ Contractor	Authority/ Contractor	Final design and prior to construction	Condition of construction contract	Impact LU#5: Permanent Alteration of Land Use Patterns from Land Use Conversion at the Brisbane Light Maintenance Facility

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementing Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
Parks, Recreation, and Open Space										
No mitigation measures are required.										
Aesthetics and Visual Quality										
AVQ-MM#3	Incorporate Design Aesthetic Preferences into Final Design and Construction of Non-Station Structures	Prior to construction (any ground-disturbing activity) the contractor will work with the Authority and local jurisdictions to incorporate the Authority-approved aesthetic preferences for non-station structures into final design and construction (refer to Authority 2014). A technical memorandum will be submitted to the Authority to document compliance.	Pre-construction/ construction	Compliance report	Prior to construction	Contractor	Contractor	Prior to construction	Contract requirements/ specifications	Potential impact of noise barriers
AVQ-MM#5	Replant Unused Portions of Lands Acquired for the HSR	Prior to operations and maintenance, the contractor will plant vegetation within land acquired for the project (e.g., shifting roadways) that are not used for the HSR or related supporting infrastructure, or other higher or better use. Plantings will allow adequate space between the vegetation and the HSR alignment and catenary lines. All street trees and other visually important vegetation removed in these areas during construction will be replaced with similar vegetation that, upon maturity, will be similar in size and character to the removed vegetation. Replaced shrubs will be minimum 5 gallon and trees will be minimum 24-inch box and 8 feet in height. The Authority will provide for continuous maintenance with appropriate irrigation systems. The contractor will install the irrigation system within the planting areas. No species listed on the Invasive Species Council of California's list of invasive species will be planted.	Post-construction/ operations	Plant vegetation; reporting	Prior to operation and maintenance planting trees; monthly reporting	Authority	Authority	Prior to operation and maintenance planting trees; monthly reporting	Authority to implement appropriate landscape and maintenance plan	Potential impact of noise barriers
AVQ-MM#6	Provide Noise Barrier Treatment	Prior to construction (any ground-disturbing activity), the contractor will design a range of noise barrier treatments for visually sensitive areas, such as those areas where residential views of open landscaped areas would change or in urban areas where noise barriers would adversely affect the existing character and setting. The contractor will develop the treatments during the final design process and integrate them into the final project design. The treatments will include, but are not limited to, the following: <ul style="list-style-type: none"> Noise barriers along elevated guideways that may incorporate transparent materials where sensitive views would be adversely affected by opaque noise barriers Noise barriers made with nonreflective materials and of a neutral color Surface design enhancements and vegetation appropriate to the visual context of the area will be installed with the noise barriers. Vegetation will be installed consistent with the provisions of AVQ-MM#5. Surface enhancements will be consistent with the design features developed for AVQ-MM#3 and will include architectural elements (e.g., stamped pattern, surface articulation, decorative texture treatment), as determined acceptable to the local jurisdiction. Surface 	Pre-construction/ construction	Reporting	Monthly	Contractor	Contractor	Construction/ monthly	Contract requirements/ specifications	Potential impact of noise barriers

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementing Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		coatings will be used on wood and concrete noise barriers to facilitate cleaning and the removal of graffiti. The contractor will prepare a technical memorandum documenting implementation and submit it to the Authority to demonstrate compliance.								
Cultural Resources										
CUL-MM#1	Mitigate Adverse Effects on Archaeological and Built Resources Identified during Phased Identification and Comply with the Stipulations Regarding the Treatment of Archaeological and Historic Built Resources in the PA and MOA	<p>No properties in the APE have been identified as containing buildings built in or prior to 1966, that could not be adequately recorded from public right-of-way. Therefore, no known properties in the current APE will be surveyed and formally evaluated under NRHP and CRHR criteria during the post ROD design phase and prior to construction. However, while the degree of design development completed as of ROD does not require additional survey and evaluation, additional design development could precipitate changes to the APE, and may result in the need to survey and evaluate additional properties. Once parcels are accessible and surveys have been completed, including consultation as stipulated in the MOA, additional archaeological and built resources may be identified. For newly identified eligible properties that would be adversely affected, the following process will be followed, which is presented in detail in the BETP and ATP:</p> <ul style="list-style-type: none"> ▪ The Authority will consult with the MOA signatories and concurring parties to determine the preferred treatment of the properties/resources and appropriate mitigation measures. ▪ For CRHR-eligible archaeological resources, the Authority will determine if these resources could feasibly be preserved in place, or if data recovery is necessary. The methods of preservation in place will be considered in the order of priority provided in CEQA Guidelines Section 15126.4(b)(3). If data recovery is the only feasible treatment the Authority will adopt a data recovery plan as required under CEQA Guidelines Section 15126.4(b)(3)(C). ▪ Should data recovery be necessary, the PI, in consultation with the MOA signatories and consulting parties, will prepare a data recovery plan for approval from the Authority and in consultation with the MOA signatories. Upon approval, the PI will implement the plan. ▪ For archaeological resources, the Authority will also determine if the resource is a unique archaeological resource under CEQA. If the resource is not a historical resource but is an archaeological resource, the resource will be treated as required in Cal. Public Res. Code Section 21083.2 by following protection, data recovery, and other appropriate steps outlined in the ATP. The ATP outlines the review and approval requirements for these documents. 	Pre-construction/ Construction	Reporting	Weekly	Contractor/ Authority	Contractor/ Authority	Pre-construction surveys and construction/ weekly reporting or as dictated by the ATP, BETP, and the MOA	PA/MOA/ATP/BETP	Impact CUL#1: Permanent Disturbance of Unknown Archaeological Resources Impact CUL#2: Permanent Disturbance of a Known Archaeological Resource

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementing Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		<ul style="list-style-type: none"> For historic built resources, the PI will amend the BETP to include the treatment and mitigation measures identified by the Authority in consultation with the MOA signatories and concurring parties. The PI will implement the treatment and mitigation measures accordingly. 								
CUL-MM#2	Halt Work in the Event of an Archaeological Discovery, and Comply with the PA, MOA, ATP, and all State and Federal Laws, as Applicable	<p>During construction (any ground-disturbing activities, including cleaning and grubbing) should there be an unanticipated discovery, the contractor will follow the procedures for unanticipated discoveries as stipulated in the PA, MOA, and associated ATP. The procedures must also be consistent with the following: the SOI's Standards and Guidelines for Archaeology and Historic Preservation (48 <i>Federal Register</i> 44716-42), as amended; and Guidelines for the Implementation of CEQA, as amended (14 Cal. Code Regs. Chapter 3, Article 9, §§ 15120-15132). Should the discovery include human remains, the Authority will comply with federal and state regulations and guidelines regarding the treatment of human remains, including relevant sections of NAGPRA (§ 3(c)(d)); California Health and Safety Code, Section 8010 et seq.; and Cal. Public Res. Code Section 5097.98; and consult with the NAHC, tribal groups, and the SHPO.</p> <p>In the event of an unanticipated archaeological discovery, the contractor will cease work in the immediate vicinity of the find, based on the direction of the archaeological monitor or the apparent location of cultural resources if no monitor is present. When the archaeological monitor issues the temporary work stoppage, all ground-disturbing construction activities within a 50-foot radius of the discovery will halt immediately for up to 4 hours. If no qualified archaeologist is present, no work can commence until it is approved by the qualified archaeologist in accordance with the MOA, ATP, and monitoring plan. The contractor's qualified archaeologist will assess the potential significance of the find and make recommendations for further evaluation and treatment as necessary. These steps may include evaluation for the CRHR and NRHP, and necessary treatment to resolve significant impacts if the resource is a historical resource or historic property. If, after documentation is reviewed by the Authority, and it determines it is a historic property and the SHPO concurs that the resource is eligible for the NRHP, or the Authority determines it is eligible for the CRHR, the Authority will consider preservation in place in the order of priority provided in CEQA Guidelines Section 15126.4(b)(3) and in consultation with the signatories and consulting parties to the MOA. If data recovery is the only feasible mitigation, then the PI will prepare a data recovery plan as required under CEQA Guidelines Section 15126.4(b)(3)(C), the MOA, and ATP, for the Authority's approval.</p> <p>The contractor will notify the Authority, who will notify the CSLC, if the find is a cultural resource on or in the</p>	Construction	Reporting	During construction	Contractor/ Authority	Contractor	Daily logs during active monitoring	ATP/MOA/PA	Impact CUL#1: Permanent Disturbance of Unknown Archaeological Resources Impact CUL#2: Permanent Disturbance of a Known Archaeological Resource

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementing Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		<p>submerged lands of California and consequently under the jurisdiction of the CSLC. The Authority will comply with all applicable rules and regulations promulgated by CSLC with respect to cultural resources in submerged lands.</p> <p>If human remains are discovered on state-owned or private lands, the contractor will contact the relevant County Coroner to allow the Coroner to determine if an investigation regarding the cause of death is required. If no investigation is required and the remains are of Native American origin the Authority will contact the NAHC to identify the MLD. The MLD is charged with inspecting the remains and providing recommendations on respectful treatment and disposition of the remains once agreed-upon archaeological treatment (if any) has been implemented. If the MLD fails to make a recommendation the remains will be reinterred in a location not subject to further disturbance and the location will be recorded with the NAHC and relevant Information Center of the California Historic Resources Information System. If human remains are part of an archaeological resource (in other words, not recent human remains), the Authority and contractor will, in consultation with the MLD and other consulting parties, consider preservation in place as the first option, in the order of priority called for in CEQA Guidelines Section 15126.4(b)(3).</p> <p>In consultation with the relevant Native American tribes, the Authority may conduct scientific analysis on the human remains if called for under a data recovery plan and amenable to all consulting parties. The Authority will work with the MLD to satisfy the requirements of Cal. Public Res. Code Section 5097.98. Performance tracking of this mitigation measure will be based on successful implementation and acceptance of the documentation by the SHPO and appropriate consulting parties.</p>								
CUL-MM#3	Other Mitigation for Effects on NRHP-Eligible Pre-Contact Archaeological Resources	<p>As a result of limited access to private properties during the environmental review phase of this project, the Authority's ability to fully identify and evaluate archaeological resources in the APE has also been limited. Thus, most of the project APE has not been subject to archaeological field inventories. Because pedestrian field surveys are a necessary component of the archaeological resource identification and evaluation effort, the commitment to complete the field surveys prior to ground-disturbing activities associated with the project, is codified in the MOA.</p> <p>Access to previously inaccessible properties to complete the archaeological resource identification effort is expected to be available after the ROD, during the design-build phase of the project. However, because of the design constraints associated with constructing an HSR system, the ability to shift the alignment to avoid any newly identified archaeological resources at this late phase of the project delivery process is substantially limited or</p>	Pre-construction	Pre-construction surveys	Prior to ground-disturbing activities	Authority	Authority	Prior to ground-disturbing activities	ATP/ MOA	Impact CUL#1: Permanent Disturbance of Unknown Archaeological Resources Impact CUL#2: Permanent Disturbance of a Known Archaeological Resource

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementing Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		<p>unlikely, because the alignment is already established. As a result, impacts on as-yet-unidentified significant archaeological resources from the project are anticipated; however, the nature and quantity of such impacts remains unknown until completion of the archaeological field identification and evaluation effort.</p> <p>The MOA and ATP include protocols for the identification, evaluation, treatment, and data-recovery mitigation of as-yet-unidentified archaeological resources. Efforts to develop meaningful mitigation measures for impacts on as-yet-unidentified Native American archaeological resources that cannot be avoided will be negotiated with the tribal consulting parties. Measures negotiated among the MOA signatories and tribal consulting parties will be the Authority's responsibility to implement.</p>								

Regional Growth

No mitigation measures required.

APE	area of potential effects	MOA	memorandum of agreement	VCP	vegetation control plan
ATC	automatic train control	MOU	memorandum of understanding	VMT	vehicle miles traveled
ATP	archaeological treatment plan	mph	miles per hour	VOC	volatile organic compound
Authority	California High-Speed Rail Authority	MUNI	San Francisco Municipal Railway	VTA	Santa Clara Valley Transportation Authority
BAAQMD	Bay Area Air Quality Management District	NAGPRA	Native American Grave Protection and Repatriation Act	WCP	weed control plan
BCDC	San Francisco Bay Conservation and Development Commission	NAHC	Native American Heritage Commission	WEAP	worker environmental awareness program
BEMP	built environment monitoring plan	NEPA	National Environmental Policy Act	WEF	wildlife exclusion fencing
BETP	built environment treatment plan	NMFS	National Marine Fisheries Service	ZE	zero emissions
BMP	best management practice	NOx	nitrogen oxides		
BRMP	biological resources management plan	NRHP	National Register of Historic Places		
C.F.R.	Code of Federal Regulations	NZE	near zero emissions		
CAA	Clean Air Act	O ₃	ozone		
Cal.	California	O&M	operations and maintenance		
CCC	Central California coast	OCS	overhead contact system		
CDFW	California Department of Fish and Wildlife	PA	Programmatic Agreement		
CEQA	California Environmental Quality Act	PCEP	Peninsula Corridor Electrification Project		
CESA	California Endangered Species Act	PI	principal investigator		
cm	centimeter	PM _{2.5}	particulate matter less than or equal to 2.5 microns in diameter		
CMP	compensatory mitigation plan	PM ₁₀	particulate matter less than or equal to 10 microns in diameter		
CRHR	California Register of Historical Resources	RHA	Rivers and Harbors Act		
CRPR	California Rare Plant Ranks	ROD	record of decision		
CSLC	California State Lands Commission	ROG	reactive organic gases		
CWA	Clean Water Act	RRP	restoration and revegetation plan		
dB	decibel	RSA	resource study area		
dba	A-weighted decibel	RTP	regional transportation plan		
EFH	essential fish habitat	RWQCB	Regional Water Quality Control Board		
EIR	environmental impact report	SamTrans	San Mateo County Transit District		
EMMA	Environmental Mitigation Management and Assessment system	SB	Senate Bill		
EO	Executive Order	SR	State Route		
ESA	environmentally sensitive area	SCVHA	Santa Clara Valley Habitat Agency		
FESA	federal Endangered Species Act	SCVHP	Santa Clara Valley Habitat Plan		
Foundation	Bay Area Clean Air Foundation	SFBAAB	San Francisco Bay Area Air Basin		
FRA	Federal Railroad Administration	SFO	San Francisco International Airport		
GHG	greenhouse gas	SHPO	State Historic Preservation Officer		
GIS	geographic information system	SJC	Norman Y. Mineta San Jose International Airport		
HSR	high-speed rail	SOI	Secretary of the Interior		
I-	Interstate	SWRCB	State Water Resources Control Board		
IAMF	impact avoidance and minimization feature	TOD	transit-oriented development		
L _{eq}	equivalent sound level	UPRR	Union Pacific Railroad		
LMF	light maintenance facility	US	U.S. Highway		
LOS	level of service	USACE	U.S. Army Corps of Engineers		
MBTA	Migratory Bird Treaty Act	U.S.C.	United States Code		
MLD	most likely descendant	USFWS	U.S. Fish and Wildlife Service		

Table 2 San Francisco to San Jose Project Section Impact Avoidance and Minimization Features

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
Transportation									
TR-IAMF#1	Protection of Public Roadways during Construction	Prior to construction, the contractor will provide a photographic survey documenting the condition of the public roadways along truck routes providing access to the proposed project site. The photographic survey will be submitted for approval to the agency responsible for road maintenance and the Authority. The contractor will be responsible for the repair of any structural damage to public roadways caused by HSR construction or construction access, returning any damaged sections to the equivalent of their original pre-HSR construction structural condition or better. The contractor will survey the condition of the public roadways along truck routes providing access to the proposed project site after construction is complete. The contractor will complete a before-and-after-survey report and submit it to the Authority for review, indicating the location and extent of any damage.	Pre-construction/ Post-construction	Survey/Reporting	Immediately prior to and immediately following construction, and during construction as needed.	Authority/ Contractor	Contractor	Provide a photographic survey	Condition of construction contract
TR-IAMF#2	Construction Transportation Plan	<p>The contractor will prepare a detailed CTP for the purpose of minimizing the impact of construction and construction traffic on adjoining and nearby roadways in close consultation with the local jurisdiction having authority over the site. The Authority must review and approve the CTP before the contractor commences any construction activities. This plan will address, in detail, the activities to be carried out in each construction phase, with the requirement that the requirement of maintaining traffic flow during peak travel periods. Such activities include, but are not limited to, the routing and scheduling of materials deliveries, materials staging and storage areas, construction employee arrival and departure schedules, employee parking locations, and temporary road closures, if any. The CTP will provide traffic controls pursuant to the <i>California Manual on Uniform Traffic Control Devices</i> sections on temporary traffic controls (Caltrans 2017c) and would include a traffic control plan that includes, at a minimum, the following elements:</p> <ul style="list-style-type: none"> ▪ Temporary signage to alert drivers and pedestrians to the construction zone. ▪ Flag persons or other methods of traffic control. ▪ Traffic speed limitations in the construction zone. ▪ Temporary road closures and provisions for alternative access during the closure. ▪ Detour provisions for temporary road closures—alternating one-way traffic will be considered as an alternative to temporary closures where practicable and where it will result in better traffic flow than will a detour. ▪ Identified routes for construction traffic. ▪ Provisions for safe ADA-compliant pedestrian and bicycle passage or convenient nearby detour. ▪ Provisions to minimize access disruption to residents, businesses, customers, delivery vehicles, and buses to the extent practicable—where road closures are required during construction, limit to the hours that are least disruptive to access for the adjacent land uses. ▪ Provisions for farm equipment access. ▪ Provisions for 24-hour access by emergency vehicles. ▪ Safe vehicular and pedestrian access to local businesses and residences during construction. The plan will provide for scheduled transit access where construction will otherwise impede such access. Where an existing bus stop is within the work zone, the design-builder will provide a temporary bus stop at a safe and convenient location away from where construction is occurring in close coordination with the transit operator. Adequate measures will be taken to separate students and parents walking to and from the temporary bus stop from the construction zone. ▪ Advance notification to the local school district of construction activities and rigorously 	Design/ Construction	Prepare plan/ Reporting Consult with local city, county, transit agencies, and any key stakeholders identified by the Authority on the draft CTP. Such consultation shall be undertaken prior to seeking Authority review and approval of the CTP. Comments from consulted entities on the CTP will be included in any draft CTP submitted for Authority approval.	At incorporation or completion of design/ implementation during construction	Authority/ Contractor	Contractor	Prepare and implement CTP	Condition of construction contract

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		<p>maintained traffic control at all school bus loading zones, to provide for the safety of schoolchildren. Review existing or planned Safe Routes to Schools with school districts and emergency responders to incorporate roadway modifications that maintain existing traffic patterns and fulfill response route and access needs during project construction and HSR operations.</p> <ul style="list-style-type: none"> ▪ Identification and assessment of the potential safety risks of project construction to children, especially in areas where the project is located near homes, schools, day care centers, and parks. ▪ Promotion of child safety within and near the project area. For example, crossing guards could be provided in areas where construction activities are located near schools, day care centers, and parks. <p>CTPs will consider and account for the potential for overlapping construction projects.</p>							
TR-IAMF#3	Off-Street Parking for Construction-Related Vehicles	The contractor will identify adequate off-street parking for all construction-related vehicles throughout the construction period to minimize impacts on public on-street parking areas. If adequate parking cannot be provided on the construction sites, the contractor will designate a remote parking area and arrange for the use a shuttle bus to transfer construction workers to and from the job site. This measure will be addressed in the CTP.	Design/ Construction	Prepare plan	Prior to construction	Authority/ Contractor	Contractor	Prepare CTP/Identify adequate off-street parking for all construction-related vehicles	Condition of construction contract
TR-IAMF#4	Maintenance of Pedestrian Access	The contractor will prepare specific CMPs, as part of the CTP, to address maintenance of pedestrian access during the construction period, to the extent feasible, in accordance with design, safety, and ADA requirements. Construction actions that limit pedestrian access may include, but not be limited to, sidewalk closures, bridge closures, crosswalk closures or pedestrian rerouting at intersections, placement of construction-related material within pedestrian pathways or sidewalks, and other actions that may affect the mobility or safety of pedestrians during the construction period. If sidewalks are maintained along the construction site frontage, the contractor will provide covered walkways and fencing.	Design/ Construction	Prepare plan	Prior to construction	Authority/ Contractor	Contractor	Prepare CMPs that address maintenance of pedestrian access	Condition of construction contract
TR-IAMF#5	Maintenance of Bicycle Access	The contractor will prepare specific CMPs, as part of the CTP, to address maintenance of bicycle access during the construction period, to the extent feasible, in accordance with design, safety, and ADA requirements. Construction actions that limit bicycle access may include, but not be limited to, bike lane closures or narrowing, closure or narrowing of streets that are designated bike routes, bridge closures, placement of construction-related materials within designated bike lanes or along bike routes, and other actions that may affect the mobility or safety of bicyclists during the construction period.	Design/ Construction	Prepare plan	Prior to construction	Authority/ Contractor	Contractor	Prepare CMPs that address maintenance of bicycle access	Condition of construction contract
TR-IAMF#6	Restriction on Construction Hours	The contractor will limit construction material deliveries between 7 a.m. and 9 a.m. and between 4 p.m. and 6 p.m. on weekdays to minimize impacts on traffic on roadways. The contractor will limit the number of construction employees arriving or departing the site between the hours of 7 a.m. and 8:30 a.m. and 4:30 p.m. and 6 p.m. Areas where these restrictions will be implemented will be determined as part of the CTP. Based on Authority review of the CTP, the restricted hours may be altered due to local travel patterns.	Construction	CTP to be prepared prior to construction followed by reporting	Prior to construction/ Weekly	Authority/ Contractor	Contractor	Prepare CTP/Limit construction materials deliveries and employee arrival and departures	Condition of construction contract
TR-IAMF#7	Construction Truck Routes	The contractor will deliver all construction-related equipment and materials on the designated truck routes identified in the CTP and will prohibit heavy-construction vehicles from using alternative routes to get to the site. Truck routes will be established away from schools, day care centers, and residences, or along routes with the least impact if the Authority determines those areas are unavoidable. This measure will be addressed in the CTP.	Construction	CTP to be prepared prior to construction followed by reporting.	Prior to construction/ Weekly	Authority/ Contractor	Contractor	Prepare CTP/ Establish truck routes	Condition of construction contract
TR-IAMF#8	Construction during Special Events	The contractor will provide a mechanism to prevent roadway construction activities from reducing roadway capacity during major athletic events or other special events that substantially (10 percent or more) increase traffic on roadways affected by project construction. Mechanisms include the presence of police officers directing traffic, special-	Design/ Construction	CTP to be prepared prior to construction followed by	Prior to construction/ Weekly	Authority/ Contractor	Contractor	Prepare CTP/ Event coordination	Condition of construction contract

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		event parking, use of within-the-curb parking, or shoulder lanes for through-traffic and traffic cones. This measure will be addressed in the CTP.		reporting					
TR-IAMF#9	Protection of Freight and Passenger Rail during Construction	The contractor will repair any structural damage to freight or public railways that may occur during the construction period and return any damaged sections to their original structural condition. If necessary, during construction, a "shoofly" track will be constructed to allow existing train lines to bypass any areas closed for construction activities. Upon completion, tracks will be opened and repaired; or new mainline track will be constructed, and the "shoofly" will be removed. The cost of the contractor's repair responsibility will be included in the design-build contract.	Construction	CTP to be prepared prior to construction followed by reporting	Weekly	Authority/ Contractor	Contractor	Repair structural damage to freight or public railways	Condition of construction contract
TR-IAMF#11	Maintenance of Transit Access	The contractor will prepare specific CMPs, as part of the CTP, to address maintenance of transit access during the construction period, to the extent feasible, in accordance with design, safety, and ADA requirements. Construction actions that limit transit access may include, but not be limited to, roadway lane closures or narrowing, closure or narrowing of streets that are designated transit routes, bus stop closures, bridge closures, placement of construction-related materials within designated transit lanes, bus stop or layover zones or along transit routes, and other actions that may affect the mobility or safety of bus transit during the construction period.	Construction	CTP to be prepared prior to construction followed by reporting	Prior to construction/ Weekly	Authority/ Contractor	Contractor	Prepare CMPs to address maintenance of transit access	Condition of construction contract
TR-IAMF#12	Pedestrian and Bicycle Safety	Prior to construction, the contractor will provide a technical memorandum describing how during operation pedestrian and bicycle accessibility will be provided and supported across the HSR corridor, to and from stations, and on station property. Priority for the safety for pedestrians and bicycles and vulnerable populations over motor vehicle access will be carried out in a manner to encourage maximum potential access from nonmotorized modes. Local access programs, such as Safe Routes to Schools, will be maintained or enhanced. Access to community facilities for vulnerable populations will be maintained or enhanced.	Pre-construction	Prepare technical memorandum	Prior to construction	Authority/ Contractor	Contractor	Preparation of a pedestrian and bicycle accessibility technical memorandum	Condition of construction contract
Air Quality and Greenhouse Gases									
AQ-IAMF#1	Fugitive Dust Emissions	<p>During construction, the contractor will employ the following measures to minimize and control fugitive dust emissions. The contractor will prepare a fugitive dust control plan for each distinct construction segment. At a minimum, the plan will describe how each measure will be employed and identify an individual responsible for ensuring implementation. At a minimum, the plan will address the following components unless alternative measures are approved by the applicable air quality management district:</p> <ul style="list-style-type: none"> ▪ Cover all vehicle loads transported on public roads to limit visible dust emissions, and maintain at least 6 inches of freeboard space from the top of the container or truck bed. ▪ Clean all trucks and equipment before exiting the construction site using an appropriate cleaning station that does not allow runoff to leave the site or mud to be carried on tires off the site. ▪ Water exposed surfaces and unpaved roads at a minimum three times daily with adequate volume to result in wetting the top 1 inch of soil while avoiding overland flow. Rain events may sufficiently wet the top 1 inch of soil to alleviate the need to manually apply water. ▪ Limit vehicle travel speed on unpaved roads to 15 mph. ▪ Suspend any dust-generating activities when average wind speed exceeds 25 mph. ▪ Stabilize all disturbed areas, including storage piles that are not being used on a daily basis for construction purposes, by using water, a chemical stabilizer/suppressant, or hydro mulch or by covering with a tarp or other suitable cover or vegetative ground cover. In areas adjacent to organic farms, the Authority will use nonchemical means of dust suppression. ▪ Stabilize all on-site unpaved roads and off-site unpaved access roads using water or a 	Construction	Prepare plan/ Reporting	Weekly	Authority/ Contractor	Contractor	Prepare a fugitive dust control plan	Condition of construction contract

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		<p>chemical stabilizer/suppressant. In areas adjacent to organic farms, the Authority will use nonchemical means of dust suppression.</p> <ul style="list-style-type: none"> Apply water to or presoak all areas where land clearing, grubbing, scraping, excavation, land leveling, grading, cut-and-fill, and demolition activities are carried out. For buildings up to six stories tall, wet all exterior surfaces of buildings during demolition. Limit or expeditiously remove the accumulation of mud or dirt from adjacent public streets at a minimum of once daily, using a vacuum type sweeper. After the addition of materials to or the removal of materials from the surface or outdoor storage piles, apply sufficient water or a chemical stabilizer/suppressant. Where feasible, install wind breaks (e.g., dust curtains, plastic tarps, solid fencing) on the average dominant windward side(s) of station construction areas. For purposes of implementation, chain-link fencing with added landscape mesh fabric adequately qualifies as solid fencing. Post a publicly visible sign with the telephone number and person to contact at the Authority regarding dust complaints. This person would respond and take corrective action within 48 hours. The phone number for the local air district would also be visible to ensure compliance with applicable regulations. 							
AQ-IAMF#2	Selection of Coatings	<p>During construction, the contractor will use:</p> <ul style="list-style-type: none"> Low-VOC paint that contains less than 10 percent of VOC contents. Super-compliant or Clean Air paint that has a lower VOC content than that required by Bay Area Air Quality Management District Regulation 8, Rule 3 when available. If not available, the contractor will document the lack of availability, recommend alternative measure(s) to comply with Regulation 8, Rule 3, or disclose absence of measure(s) for full compliance, and obtain concurrence from the Authority. 	Construction	Low-VOC paint use	Monthly	Authority/ Contractor	Contractor	Use of low-VOC paint during construction	Condition of construction contract
AQ-IAMF#3	Renewable Diesel	<p>During construction, the contractor will use renewable diesel fuel to minimize and control exhaust emissions from all heavy-duty off-road diesel-fueled construction equipment and on-road diesel trucks. Renewable diesel must meet the most recent ASTM specification for diesel with the lowest carbon intensity among petroleum fuels sold in California. The contractor will provide the Authority with monthly and annual reports, through the EMMA system, of renewable diesel purchase records and equipment and vehicle fuel consumption. Exemptions to use traditional diesel can be made where renewable diesel is not available from suppliers within 200 miles of the project site. The construction contract must identify the quantity of traditional diesel purchased and fully document the availability and price of renewable diesel to meet project demand.</p>	Construction	Renewable diesel fuel use	Monthly	Authority/ Contractor	Contractor	Use of renewable diesel fuel during construction	Contract requirements and specifications
AQ-IAMF#4	Reduce Criteria Exhaust Emissions from Construction Equipment	<p>Prior to issuance of construction contracts, the Authority will incorporate the following construction equipment exhaust emissions requirements into the contract specifications:</p> <ul style="list-style-type: none"> All heavy-duty off-road construction diesel equipment used during the construction phase will meet Tier 4 engine requirements. A copy of each unit's certified tier specification and any required CARB or air pollution control district operating permit will be made available to the Authority at the time of mobilization of each piece of equipment. The contractor will keep a written record (supported by equipment-hour meters where available) of equipment usage during project construction for each piece of equipment. The contractor will provide the Authority with monthly reports of equipment operating hours (through the EMMA system) and annual reports documenting compliance. 	Pre-construction	Contract specifications	Prior to construction	Authority	Authority	Exhaust emissions requirements incorporated into contract specifications	Contract requirements and specifications
AQ-IAMF#5	Reduce Criteria Exhaust Emissions	<p>Prior to issuance of construction contracts, the Authority will incorporate the following material-hauling truck fleet mix requirements into the contract specifications:</p>	Pre-construction	Contract specifications	Prior to construction	Authority	Authority	Material hauling truck fleet mix	Contract requirements and

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
	from On-Road Construction Equipment	<ul style="list-style-type: none"> All on-road trucks used to haul construction materials, including fill, ballast, rail ties, and steel, will consist of an average fleet mix of equipment model year 2010 or newer, but no less than the average fleet mix for the current calendar year as set forth in the CARB's EMFAC 2014 database. The contractor will provide documentation to the Authority of efforts to secure such a fleet mix. The contractor will keep a written record of equipment usage during project construction for each piece of equipment and provide the Authority with monthly reports of VMT (through EMMA) and annual reports documenting compliance. 						requirements incorporated into contract specifications	specifications
AQ-IAMF#6	Reduce the Potential Impact of Concrete Batch Plants	Prior to construction of any concrete batch plant, the contractor will provide the Authority with a technical memorandum documenting consistency with the Authority's concrete batch plant siting criteria and utilization of typical control measures. Concrete batch plants will be sited at least 1,000 feet from sensitive receptors, including places such as day care centers, hospitals, senior care facilities, residences, parks, and other areas where people may congregate. The concrete batch plant will implement typical control measures to reduce fugitive dust, such as water sprays, enclosures, hoods, curtains, shrouds, movable and telescoping chutes, central dust collection systems, and other suitable technology, to reduce emissions to be equivalent to the USEPA AP-42 controlled emission factors for concrete batch plants. The contractor will provide to the Authority documentation that each batch plant meets this standard during operation.	Construction	Prepare plan/ Reporting	Prior to construction of concrete batch plants	Authority/ Contractor	Contractor	Preparation of a concrete batch plant technical memorandum	Contract requirements and specifications
Noise and Vibration									
NV-IAMF#1	Noise and Vibration	<p>Prior to construction, the contractor will prepare and submit to the Authority a noise and vibration technical memorandum documenting how the FTA and FRA guidelines for minimizing construction noise and vibration impacts will be employed when work is being conducted within 1,000 feet of sensitive receptors. Typical construction practices contained in the FTA and FRA guidelines for minimizing construction noise and vibration impacts include the following:</p> <ul style="list-style-type: none"> Construct noise barriers, such as temporary walls or piles on excavated material, between noisy activities and noise sensitive resources. Route truck traffic away from residential streets, when possible. Construct walled enclosures around especially noisy activities or around clusters or noise equipment. Combine noisy operations so that they occur in the same period. Phase demolition, earthmoving, and ground impacting operations so they do not occur in the same time period. Avoid impact pile driving where possible in vibration-sensitive areas. 	Pre-construction/ Construction	Prepare technical memorandum/ Compliance reporting	Monthly	Authority/ Contractor	Contractor	Prepare a construction noise and vibration technical memorandum	Condition of construction contract

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
Electromagnetic Fields and Electromagnetic Interference									
EMF/EMI-IAMF#1	Preventing Interference with Adjacent Railroads	<p><i>Technical Memorandum: CHSTP Implementation Stage EMC Program Plan</i> (ISEP) (TM 3.00.10) (Authority 2014b) requires coordination with adjacent railroads. During project design, the contractor will work with the engineering departments of railroads that operate parallel the HSR to apply current standard design practices to prevent interference with the electronic equipment operated by these railroads. The <i>California High-Speed Rail Authority Design Criteria Manual</i> (HSR Design Criteria Manual) (Authority 2019) Chapter 7, Electromagnetic Compatibility, summarizes the specific design standards listed in Section 7.1.2, Regulations, Codes, Standards, and Guidelines, including the following: CPUC Decisions 93-11-013 and 06-01-042, APTA Standard PR-E-S-010-98, and IEEE Std C95.1, C95.6 and 1143.</p> <p>Prior to O&M of each operating segment, the contractor will certify through issuance of a technical memorandum to the Authority that design provisions to prevent interference have been established and have been determined to be effective prior to the activation of potentially interfering systems of the HSR.</p> <p>The contractor will work with the railroad engineering departments where these railways parallel the HSR to apply the current standard design practices to prevent interference with the electronic equipment operated by these railroads. Design provisions to prevent interference will be put in place and determined to be adequately effective by a qualified electrical engineering professional prior to the HSR activation of potentially interfering systems.</p>	Design/ Construction	Prepare technical memorandum/ Compliance reporting	Monthly	Authority/ Contractor	Contractor/ Authority	Prepare EMC technical memorandum	Condition of construction contract
EMF/EMI-IAMF#2	Controlling Electromagnetic Fields/ Electromagnetic Interference	<p>Prior to construction, the contractor will prepare an EMF/EMI technical memorandum for review and approval by the Authority. The project will adhere to and comply with applicable federal and state laws and regulations. These guidelines are listed in Chapter 7 of the HSR Design Criteria Manual, and include the following: CPUC Decisions 93-11-013 and 06-01-042, APTA Standard PR-E-S-010-98, and IEEE Std C95.1, C95.6 and 1143. The project design will follow ISEP (TM 300.10) (Authority 2014b), and the current HSR Design Criteria Manual Chapter 7, which provides detailed EMC design criteria for the HSR systems and equipment, and Chapter 13, Grounding and Bonding, which addresses grounding requirements for third-party metallic items on utility support structures, pipework, metallic casings, public network grounding systems, fences and fence segments, other facilities utility lines, which are adjacent and crossing under and over tracks to the HSR right-of-way. These documents describe the design practices to avoid EMI and to provide for HSR operational safety. Some measures of the ISEP include:</p> <ul style="list-style-type: none"> ▪ During the planning stage through system design, the Authority will perform EMC safety analyses, which will include identification of existing nearby radio systems, design of systems to prevent EMI with identified neighboring uses, and incorporation of these design requirements into bid specifications used to procure radio systems. ▪ Pipelines and other linear metallic objects that are not sufficiently grounded through direct contact with earth will be separately grounded in coordination with the affected owner or utility to avoid possible shock hazards. For cases where metallic fences are purposely electrified to inhibit livestock or wildlife from traversing the barrier, specific insulation design measures will be implemented. ▪ HSR standard corrosion protection measures will be implemented to eliminate risk of substantial corrosion of nearby metal objects. 	Design/ Construction	Prepare technical memorandum/ Compliance reporting	Monthly	Authority/ Contractor	Contractor/ Authority	Prepare EMF/EMI technical memorandum	Condition of construction contract
Public Utilities and Energy									
PUE-IAMF#1	Design Measures	The HSR project design incorporates design elements that minimize impacts on public utilities. A key objective is to minimize electricity consumption (e.g., using regenerative braking, energy-saving equipment on rolling stock and at station facilities, implementing energy saving measures during construction, and automatic train operations to maximize	Design/ Construction	Reporting	At incorporation or completion of design/monthly reporting (during	Authority/ Contractor	Contractor	Incorporate utilities and design elements that minimize electrical	Condition of construction contract

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		<p>energy efficiency during operations). Thus, the project would not overburden electric utility services during construction or operation. These design elements are included in the design-build contracts.</p> <p>Additionally, the Authority has adopted a Sustainability Policy (POLI-1007) that establishes project design and construction requirements that avoid and minimize impacts on public utilities. The policy commits the Authority to work toward net-zero water consumption during operations with compliance with the California Green Building Standards Code and net-zero energy consumption with facilities LEED-certified at the Platinum level. The Authority also has committed to using 100 percent renewable energy for operation.</p> <p>During construction, the policy calls for implementing the following:</p> <ul style="list-style-type: none"> ▪ Follow construction waste practices that divert at least 85 percent of waste from landfill, unless the local regulation is higher. ▪ Recycle all steel and concrete waste generated. ▪ Reduce potable water use. ▪ Maximize the use of renewable transportation fuels. ▪ In compliance with the International Standards Organization 14001 standard, the Authority's contract requirements for the design-build contractor will be monitored throughout construction, performance data collected through the EMMA database, and data compiled into annual reports for verification and continuous improvement of sustainability practices, including minimizing impacts on public utilities. 			construction)			consumption into design	
PUE-IAMF#3	Public Notifications	<p>Prior to construction in areas where utility service interruptions are unavoidable, the contractor will obtain written consent from utility owners prior to construction consistent with the HSR Design Criteria Manual Chapter 28, Utilities, Section 28.2.2.3.4, Level of Service and Service Interruptions. The contractor will notify the public through a combination of communication media (e.g., by phone, email, mail, newspaper notices, or other means) within that jurisdiction and the affected service providers of the planned outage. The notification will specify the estimated duration of the planned outage and will be published no less than 7 days prior to the outage. Construction will be coordinated to avoid interruptions of utility service to hospitals and other critical users. The contractor will submit the public communication plan to the Authority 60 days in advance of the work for verification that appropriate messaging and notification are to be provided.</p>	Pre-construction/ Construction	Public notification	Monthly	Authority/ Contractor	Contractor	Public notification of utility service interruptions 60 days in advance of work for verification	Condition of construction contract
PUE-IAMF#4	Utilities and Energy	<p>Prior to construction, the contractor will prepare a technical memorandum documenting how construction activities will be coordinated with utility service providers to minimize or avoid planned and accidental temporary interruptions. The memorandum will identify all affected utility service providers, proposed coordination activities before and during construction, as well as the location of all known underground utilities. The technical memorandum will be provided to the Authority for review and approval prior to the start of coordination with any utility service providers. Confirmation of existing utilities will be conducted with all utility service providers consistent with the HSR Design Criteria Manual Section 28.2.2.3.2, Utility Verification Request to Owner. In addition, the contractor and each utility service provider will agree on the best ways to coordinate during construction for all planned and accidental interruptions of utility service. Following these initial contractor coordination activities with the utility service providers, the contractor will prepare a second technical memorandum to document the location of confirmed utility infrastructure that will be affected by construction activities consistent with the HSR Design Criteria Manual Chapter 28, Utilities, and California Government Code Section 4215 as well as the negotiated protocols the contractor will use to coordinate during construction with each affected utility service provide. This technical memorandum will be reviewed and approved by the Authority.</p>	Design/ Pre-construction	Prepare a technical memorandum	At incorporation or completion of design/monthly reporting (during construction)	Authority/ Contractor	Contractor	Prepare service provider coordination technical memorandum	Condition of construction contract

Biological Resources

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
BIO-IAMF#1	Designate Project Biologist, Designated Biologists, Species-Specific Biological Monitors and General Biological Monitors	At least 15 business days prior to commencement of any ground-disturbing activity, including but not limited to geotechnical investigations, utility realignments, creation of staging areas, or initial clearing and grubbing, the Authority will submit the name(s) 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. No ground-disturbing activity will begin until the Authority has received written approval from USFWS, NMFS, where applicable, and CDFW that the biologists and monitors have been approved to conduct the specified work. The project biologist is responsible for ensuring the timely implementation of the biological avoidance and minimization measures as outlined in the BRMP, and for guiding and directing the work of the designated biologists and biological monitors. Designated biologists will be responsible for directly overseeing and reporting the implementation of general and species-specific conservation measures. In some instances, designated biologists will only be approved for specific species, in which case they will only be authorized to conduct surveys and implement measures for the species for which they have been approved. Species-specific biological monitors will be responsible for implementation of species-specific measures for the species for which they have been approved, and will report directly to a designated biologist. General biological monitors will report directly to a designated biologist or to the project biologist. General biological monitors will be responsible for conducting WEAP training, implementing general conservation measures, conducting general compliance monitoring, and reporting on compliance monitoring activities. When the Authority is specified as implementing an IAMF, it is assumed that the Authority, or its contractor or agent, is implementing the IAMF under the supervision of biologists and biological monitors, as appropriate.	Pre-construction	Compliance reporting	15 days prior to ground disturbance	Authority	Authority	Submit names of biologists and monitors to regulatory agencies	Condition of construction contract
BIO-IAMF#2	Facilitate Agency Access	Throughout the construction period, the Authority will allow access by USEPA, USFWS, NMFS, USACE, CDFW, SWRCB, BCDC, and the San Francisco Bay RWQCB to the project site. Because of safety concerns, all visitors will check in with the Authority's resident engineer prior to entering the project footprint. In the event that agency personnel visit the project footprint, the project biologist will prepare a memorandum within 3 business days after the visit documenting the issues raised during the field meeting. The project biologist will report any issues regarding regulatory compliance raised during visits by agency personnel to the Authority.	Construction	Compliance reporting	3 days after regulatory agency site visit	Authority/ Contractor	Contractor	Prepare memorandum documenting agency site visit	Condition of construction contract
BIO-IAMF#3	Prepare WEAP Training Materials and Conduct Construction Period WEAP Training	<p>Prior to any ground-disturbing activity, the project biologist will prepare a WEAP for the purpose of training construction crews to recognize and identify sensitive biological resources that may be encountered in the vicinity of the project footprint. The WEAP training materials will be submitted to the Authority for review and approval. A video of the WEAP training prepared and presented by the project biologist and approved by the Authority may be used if the project biologist is not available to present the training in person.</p> <p>At a minimum, WEAP training materials will include the following information: the key provisions of FESA, CESA, BGEPA, MBTA, Cal. Fish and Game Code Section 1600, Porter-Cologne Act, and CWA; the consequences and penalties for violation or noncompliance with these laws and regulations and project authorizations; identification and characteristics of special-status plants, special-status wildlife, jurisdictional waters, and special-status plant communities and explanations about their ecological value; hazardous substance spill prevention and containment measures; the contact person in the event of the discovery of a dead or injured wildlife species; a review of avoidance, minimization, and mitigation measures; characteristics of special-status plants, special-status wildlife, jurisdictional waters, and special-status plant communities; and explanations about their ecological value.</p> <p>The project biologist will present WEAP training to all construction personnel before they work in the project footprint. As part of the WEAP training, construction timing in relation to</p>	Pre-construction	Training program/ Reporting	Annual (training)/ Monthly (reporting)	Contractor/ Authority	Contractor/ Authority	Prepare WEAP/Annual (training)/Monthly (reporting)	WEAP

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		<p>species' habitat and life-stage requirements will be detailed and discussed on project maps, which will show areas for planned minimization and avoidance measures. Crews will be informed during the WEAP training that, except when necessary as determined in consultation with the project biologist, travel within the project footprint is restricted to established roadbeds, which include all pre-existing and project-constructed unimproved and improved roads. A fact sheet conveying this information will be prepared by the project biologist for distribution to the construction crews and others who enter the project footprint. Fact sheet information will be duplicated in a wallet-sized format and will be provided in other languages as necessary to accommodate non-English-speaking workers. All construction staff will attend the WEAP training prior to beginning work on-site and will attend the WEAP training on an annual basis thereafter.</p> <p>Upon completion of the WEAP training, each member of the construction crew will sign a form stating that they attended the training, understood the information presented, and agreed to comply with the requirements set out in the WEAP training. The project biologist will submit the signed WEAP training forms to the Authority on a monthly basis. On an annual basis, the Authority will certify that WEAP training had been provided to all construction personnel. On a monthly basis, the project biologist will provide updates relevant to the training to construction personnel during the daily safety ("tailgate") meeting.</p>							
BIO-IAMF#4	Conduct Operation and Maintenance Period WEAP Training	<p>Prior to initiating O&M activities, O&M personnel will attend a WEAP training session arranged by the Authority.</p> <p>At a minimum, O&M WEAP training materials will include the following information: key provisions of the FESA, CESA, BGEPA, MBTA, Cal. Fish and Game Code Section 1600, Porter-Cologne Act, and CWA; the consequences and penalties for violation or noncompliance with these laws and regulations and project authorizations; identification and characteristics of special-status plants, special-status wildlife, jurisdictional waters, and special-status plant communities and explanations about their ecological value; hazardous substance spill prevention and containment measures; and the contact person in the event of the discovery of a dead or injured wildlife species. In addition, the training will include an overview of provisions of the BRMP, annual vegetation, and management plan, WCP, and security fencing and wildlife exclusion fencing maintenance plans pertinent to O&M activities. A fact sheet prepared by the Authority environmental compliance staff will be prepared for distribution to the O&M employees. The training will be provided by the Authority environmental compliance staff. The training sessions will be provided to employees prior to their involvement in any O&M activity and will be repeated for all O&M employees on an annual basis. Upon completion of the WEAP training, O&M employees will, in writing, verify their attendance at the training sessions and confirm their willingness to comply with the requirements set out in those sessions.</p>	Post-construction	Training program/ Reporting	Annual	Contractor/ Authority	Contractor/ Authority	WEAP Training/Annual reporting	WEAP
BIO-IAMF#5	Prepare and Implement a Biological Resources Management Plan	<p>Prior to any ground-disturbing activity, the project biologist will prepare the BRMP, which will include a compilation of the biological resources' avoidance and minimization measures applicable to the HSR section. Project environmental plans, such as the RRP and WCP, will be included as appendices to the BRMP. The BRMP is intended to serve as a comprehensive document that sets out the range of avoidance and minimization measures to support the appropriate and timely implementation of those measures. The implementation of these measures will be tracked through final design, construction, and operation phases. The BRMP will contain, but not be limited to, the following information:</p> <ul style="list-style-type: none"> ▪ A master schedule that shows construction of the project, pre-construction surveys, and establishment of buffers and exclusions zones to protect sensitive biological resources. ▪ Specific measures for the protection of special-status species. ▪ Identification (on construction plans) of the locations and quantity of habitats to be avoided or removed, along with the locations where habitats are to be restored. ▪ Identification of agency-approved project biologist(s) and biological monitor(s), including 	Pre-construction	Prepare plan	Prior to any ground-disturbing activity	Authority/ Contractor	Contractor	Prepare BRMP	USFWS, USACE, SWRCB, and CDFW permits

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		<p>those responsible for notification and report of injury or death of federally or state-listed species.</p> <ul style="list-style-type: none"> Measures to preserve topsoil and control erosion. Design of protective fencing around environmentally sensitive areas and the construction staging areas. Locations of trees to be protected as wildlife habitat (roosting sites) and locations for planting replacement trees. Specification of the purpose, type, frequency, and extent of chemical use for insect and disease control operations as part of vegetative maintenance within sensitive habitat areas. Specific measures for the protection of vernal pool habitat and riparian areas. These measures may include erosion and siltation control measures, protective fencing guidelines, dust control measures, grading techniques, construction area limits, and biological monitoring requirements. Provisions for biological monitoring during ground-disturbing activities to confirm compliance and success of protective measures. The monitoring will: (1) identify specific locations of wildlife habitat and sensitive species to be monitored; (2) identify the frequency of monitoring and the monitoring methods (for each habitat and sensitive species to be monitored); (3) list required qualifications of biological monitor(s); (4) identify the reporting requirements; and (5) provide an accounting of impacts on special-status species habitat compared to pre-construction impact estimates. <p>The BRMP will be submitted to the Authority for review and approval prior to any ground-disturbing activity.</p>							
BIO-IAMF#6	Establish Monofilament Restrictions	<p>Prior to any ground-disturbing activity, the project biologist will verify that plastic monofilament netting (erosion control matting) or similar material is not being used as part of erosion control activities. The project biologist will identify acceptable material for such use, including: geomembranes, coconut coir matting, tackified hydroseeding compounds, and rice straw wattles (e.g., Earthsaver wattles: biodegradable, photodegradable, burlap). Within developed or urban areas, the project biologist may allow exceptions to the restrictions on the type of erosion control material if the project biologist determines that the construction area is of sufficient distance from natural areas to avoid potential impacts on wildlife.</p>	Pre-construction	Compliance reporting	Monthly	Authority/ Contractor	Contractor	Monthly reporting	Condition of construction contract
BIO-IAMF#7	Prevent Entrapment in Construction Materials and Excavations	<p>At the end of each work day during construction, the Authority will cover all excavated, steep-sided holes or trenches more than 8 inches deep and that have sidewalls steeper than 1:1 (45 degree) slope with plywood or similar materials, or provide a minimum of one escape ramp per 100 feet of trenching (with slopes no greater than 3:1) constructed of earth fill or wooden planks. The project biologist will thoroughly inspect holes and trenches for trapped animals at the start and end of each work day.</p> <p>The Authority will screen, cover, or elevate at least 1 foot above ground, all construction pipe, culverts, or similar structures with a diameter of 3 inches or greater that are stored overnight within the project footprint. These pipes, culverts, and similar structures will be inspected by the project biologist for wildlife before such material is moved, buried, or capped.</p>	Construction	Monitoring/ Compliance reporting	Daily monitoring/ Monthly reporting	Authority/ Contractor	Contractor	Daily monitoring/ monthly reporting	Condition of construction contract
BIO-IAMF#8	Delineate Equipment Staging Areas and Traffic Routes	<p>Prior to any ground-disturbing activity, the Authority will establish staging areas for construction equipment in areas that minimize impacts on sensitive biological resources, including habitat for special-status species, seasonal wetlands, and wildlife movement corridors. Staging areas (including any temporary material storage areas) will be located in areas that will be occupied by permanent facilities, where practicable. Equipment staging areas will be identified on final project construction plans. The Authority will flag and mark access routes to restrict vehicle traffic within the project footprint to established roads,</p>	Pre-construction	Compliance reporting	Monthly	Authority/ Contractor	Contractor	Monthly reporting	Condition of construction contract

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		construction areas and other designated areas.							
BIO-IAMF#9	Dispose of Construction Spoils and Waste	During ground-disturbing activities, the Authority may temporarily store excavated materials produced by construction activities in areas at or near construction sites within the project footprint. Where practicable, the Authority will return excavated soil to its original location to be used as backfill. Any excavated waste materials unsuitable for treatment and reuse will be disposed at an off-site location, in conformance with applicable state and federal laws.	Construction	Compliance reporting	Monthly	Authority/ Contractor	Contractor	Monthly reporting	Condition of construction contract
BIO-IAMF#10	Clean Construction Equipment	Prior to any ground-disturbing activity, the Authority will check that all equipment entering the work area is free of mud and plant materials. The Authority will establish vehicle cleaning locations designed to isolate and contain organic materials and minimize opportunities for weeds and invasive species to move in and out of the project footprint. Cleaning may be done by washing with water, blowing with compressed air, brushing, or other hand cleaning. The cleaning areas will be located to avoid impacts on surface waters and appropriate SWPPP BMPs will be implemented to further control any potential for the spread of weeds or other invasive species. Cleaning stations will be inspected regularly (at least monthly).	Pre-construction	Compliance reporting	Monthly	Authority/ Contractor	Contractor	Monthly reporting	Condition of construction contract
BIO-IAMF#11	Maintain Construction Sites and BMP Training	Prior to any ground-disturbing activity, the Authority will prepare a construction site BMP field manual. The manual will contain standard construction site housekeeping practices required to be implemented by construction personnel. The manual will identify BMPs for the following topics: temporary soil stabilization, temporary sediment control, wind erosion control, nonstormwater management, waste management and materials control, rodenticide use, and other general construction site cleanliness measures. All construction personnel will receive training on BMP field manual implementation prior to working within the project footprint. All personnel will acknowledge, in writing, their understanding of the BMP field manual implementation requirements. The BMP field manual will be updated by January 31st of each year. The Authority will provide, on an annual basis, training updates to all construction personnel.	Pre-construction	Reporting	Monthly	Authority/ Contractor	Contractor	Monthly reporting	Condition of construction contract
BIO-IAMF#12	Design the Project to be Bird Safe	Prior to final construction design, the Authority will ensure that the catenary system, masts, and other structures such as fencing, electric lines, communication towers and facilities are designed to be bird and raptor-safe in accordance with the applicable recommendations presented in <i>Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006</i> (APLIC 2006) and <i>Reducing Avian Collisions with Power Lines: State of the Art in 2012</i> (APLIC 2012). Applicable APLIC recommendations include, but are not limited to: <ul style="list-style-type: none"> Ensuring sufficient spacing of phase conductors to prevent bird electrocution Configuring lines to reduce vertical spread of lines and/or decreasing the span length if such options are feasible Marking lines and fences (e.g., Bird Flight Diverter for fencing and lines) to increase the visibility of lines and reduce the potential for collision. Where fencing is necessary, using bird-compatible design standards to increase visibility of fences to prevent collision and entanglement Installing perch guards to discourage avian presence on and near project facilities Minimizing the use of guywires. Where the use of guywires is unavoidable, demarcating guywires using the best available methods to minimize avian strikes (e.g., line markers). Reusing or co-locating new transmission facilities and other ancillary facilities with existing facilities and disturbed areas to minimize habitat impacts and avoid collision risks Structures will be monopole or dual-pole design versus lattice tower design to minimize perching and nesting opportunities. Communication towers will conform to Recommended Best Practices for Communication Tower Design, Siting, Construction, 	Pre-construction	Design	Prior to final design	Authority	Authority	Bird and raptor-safe design catenary system, masts, and other structures such as fencing	Condition of construction contract

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		<p>Operation, Maintenance, and Decommissioning (USFWS 2018).</p> <ul style="list-style-type: none"> ▪ Use of facility lighting that does not attract birds or their prey to project sites. These include using non-steady burning lights (red, dual red and white strobe, strobe-like flashing lights) to meet Federal Aviation Administration requirements, using motion or heat sensors and switches to reduce the time when lights are illuminated, using appropriate shielding to reduce horizontal or skyward illumination, and avoiding the use of high-intensity lights (e.g., sodium vapor, quartz, halogen). Lighting will not be installed under viaduct and bridge structures in riparian habitat areas. <p>Additional bird operational actions will be required for dry lakes and playas, Audubon Important Bird Areas, and documented avian movement corridors. These measures include:</p> <ul style="list-style-type: none"> ▪ Avoid, to the extent feasible, siting transmission lines across canyons or on ridgelines to prevent bird and raptor collisions. ▪ Install bird flight diverters on all facilities spanning or within 1,000 feet of stream and wash channels, canals, ponds, and any other natural or artificial body of water. ▪ Fencing or other type of flight diverter will be installed on all viaduct structures to encourage birds and raptors to fly over the HSR and avoid flying directly in the path of oncoming trains. ▪ Ensure poles do not have openings that could entrap birds. Measures may include sealing or capping all openings in poles or providing for escape routes (e.g., openings accommodating escape for various species). ▪ Design aerial structures (e.g., viaducts and bridges) and tunnel portals to discourage birds and bats from roosting in expansion joints or other crevices. 							
Hydrology and Water Resources									
HYD-IAMF#1	Stormwater Management	<p>Prior to construction, the contractor will prepare a stormwater management and treatment plan in compliance with municipal separate storm sewer systems and construction stormwater general permits, issued by the SWRCB for review and approval by the Authority. During the detailed design phase, each receiving stormwater system's capacity to accommodate project runoff will be evaluated. As necessary, on-site stormwater BMPs, such as detention or selected upgrades to the receiving system, will be designed to provide adequate capacity and to comply with the design standards in the latest version of Authority Technical Memorandum 2.6.5 <i>Hydraulics and Hydrology Guidelines</i> (Authority 2011a), HSR Design Criteria Manual, <i>Caltrans Stormwater Quality Handbook: Project Planning and Design Guide</i> (Caltrans 2017d), and the requirements stated in the applicable state and local NPDES permits and guidelines. On-site stormwater management treatment BMPs will be designed and built to capture runoff and provide treatment prior to discharge of pollutant-generating surfaces, including station parking areas, access roads, new road over- and underpasses, reconstructed interchanges, and new or relocated roads and highways. These treatment BMPs will include measures to incorporate permeable surfaces into facility design plans where feasible, and how treated stormwater will be retained or detained on-site. Other BMPs will include strategies to manage the amount and quality of overall stormwater runoff. The design will prioritize low-impact development techniques, as referenced in the Caltrans <i>Project Planning and Design Guide</i> and the local NPDES guidelines as applicable, will be used to detain runoff on-site and to reduce off-site runoff. Low-impact development techniques will be used, where appropriate and include but are not limited to constructed wetland systems, biofiltration and bioretention systems, wet ponds, and vegetated systems (biofilters), such as vegetated swales and grass filter strips. The stormwater management and treatment plan will also address hydromodification such that pre-project hydrology is maintained. Hydromodification design measures will include incorporating on-site retention of</p>	Design	Prepare plan	At incorporation or completion of design	Authority/ Contractor	Contractor	Prepare a stormwater management and treatment plan	Condition of construction contract

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		stormwater runoff by using flow dispersion, infiltration, and evaporation (supplemented by detention where required). Additional flow control measures will be implemented where local regulations or drainage requirements dictate.							
HYD-IAMF#2	Flood Protection	<p>Prior to construction, the contractor will prepare a flood protection plan for Authority review and approval. The flood protection plan will be prepared to ensure that the project is designed both to remain operational during flood events and to minimize increases in 100-year or 200-year flood elevations, as applicable to locale. The contractor will be responsible for implementation of the design standards as presented in the flood protection plan. Design standards, as itemized in the flood protection plan, will include the following:</p> <ul style="list-style-type: none"> ▪ Establish track elevation to prevent saturation and infiltration of stormwater into the subballast. ▪ Minimize development within the floodplain, to such an extent that water surface elevation in the floodplain will not increase by more than 1 foot, or as required by state or local agencies, during the 100-year or 200-year flood flow [as applicable to locale]. Avoid placement of facilities in the floodplain or raise the ground with fill above the base-flood elevation.⁴ ▪ Design the floodplain crossings to maintain a 100-year floodwater surface elevation of no greater than 1 foot above current levels, or as required by state or local agencies, and project features within the floodway itself will not increase existing 100-year floodwater surface elevations in Federal Emergency Management Agency–designated floodways, or as otherwise agreed upon with the local county flood control district. <p>The following design standards will minimize the impacts of pier placement on floodplains and floodways:</p> <ul style="list-style-type: none"> ▪ Design site crossings to be as nearly perpendicular to the channel as feasible to minimize bridge length. ▪ Orient piers to be parallel to the expected high-water flow direction to minimize flow disturbance. ▪ Elevate bridge crossings at least 3 feet above the high-water surface elevation to provide adequate clearance for floating debris, or as required by local agencies. ▪ Conduct engineering analyses of channel scour depths at each crossing to evaluate the depth for burying the bridge piers and abutments. Implement scour-control measures to reduce erosion potential. ▪ Use quarry stone, cobblestone, or their equivalent for erosion control along rivers and streams, complimented with native riparian plantings or other natural stabilization alternatives that will restore and maintain a natural riparian corridor. ▪ Place bedding materials under the stone protection at locations where the underlying soils require stabilization as a result of stream-flow velocity. 	Design	Prepare plan	At incorporation or completion of design	Authority/ Contractor	Contractor	Prepare flood protection plan	Condition of construction contract
HYD-IAMF#3	Prepare and Implement a Construction Stormwater Pollution Prevention Plan	<p>Prior to construction (i.e., any ground-disturbing activities), the contractor’s fully trained and certified Qualified SWPPP Developer will prepare a site-specific SWPPP that complies with the California General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (Construction General Permit) (NPDES No. CAS000002) issued by the SWRCB. The contractor will submit the following permit registration documents to the Authority for review and approval:</p> <ul style="list-style-type: none"> ▪ Site-specific SWPPP ▪ Risk assessment determination 	Pre-construction/ Construction	Permit compliance	At incorporation or completion of design/during monthly construction report	Authority/ Contractor	Contractor	Prepare construction SWPPP	Condition of construction contract

⁴ This text that indicates the water surface elevation in the floodplain “will not increase by more than 1 foot” conflicts with TM 2.6.5, Hydraulics and Hydrology Design Guidelines (2011), which states the water surface elevation in the floodplain “cannot be higher than the 100-year BFE” (base flood elevation).

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		<ul style="list-style-type: none"> ▪ Site map <p>The site map will include all the features referenced in Appendix B of the Construction General Permit. No ground disturbance activity shall commence until a waste discharge identification number is issued by the SWRCB. Until a new order is adopted and becomes effective, the contractor will comply with Construction General Permit Order No. 2009-0009-DWQ as listed in the SWRCB's stormwater website at: https://www.waterboards.ca.gov/water_issues/programs/stormwater/constpermits.html.</p> <p>The site-specific SWPPP shall identify BMPs that will be implemented to reduce or eliminate pollutants in stormwater and authorize nonstormwater discharges. The site-specific SWPPP will include water pollution control drawings that clearly present BMPs that will be implemented during each construction phase. For affected stream crossings, the site-specific SWPPP will identify BMPs that will be implemented for stream diversions. If dewatering is required, the site specific SWPPP will describe, list, and comply with applicable local and RWQCB permits for dewatering. Based on the potential pollutant sources, the site-specific SWPPP will identify and implement BMPs in the following categories to reduce or eliminate pollutant discharges from the site:</p> <ul style="list-style-type: none"> ▪ Erosion Controls ▪ Sediment Controls ▪ Nonstormwater Management ▪ Materials Management ▪ Waste Management <p>Furthermore, site-specific SWPPP will include, but is not limited to, the following measures to address water pollution control:</p> <ul style="list-style-type: none"> ▪ Implement practices to minimize the contact of construction materials, equipment, and maintenance supplies with stormwater. ▪ Identify and eliminate, control, or treat nonstormwater discharges. ▪ Limit fueling and other activities using hazardous materials to areas at least 50 feet from surface water, provide drip pans under equipment, and perform daily checks for vehicle condition. ▪ Implement practices to reduce erosion of exposed soil, including preserving existing vegetation, soil stabilization with erosion control blankets, soil binders, and/or hydraulic mulch; watering for dust control per the opacity limits referenced in the local air quality management district permit; installing linear sediment controls along the toe of the slope, face of the slope, and at the grade breaks of exposed slopes to comply with flow lengths referenced in the Construction General Permit; and providing effective soil cover for inactive areas, all finished slopes, and completed lots. ▪ Implement practices to control sediment by designing catchment basins per the California Stormwater Quality Association Construction BMP Guidance Handbook; installing inlet protection; stabilizing construction entrances and exits; installing and maintaining linear sediment controls along the perimeter of the construction area; and inspecting all immediate access roads daily. ▪ Implement the following measures to maintain current water quality: effective site management "housekeeping", nonstormwater management erosion control, sediment controls, and run-on and runoff controls. ▪ Where feasible, avoid areas that may have substantial erosion risk, including areas with erosive soils and steep slopes. ▪ Use diversion ditches to intercept surface runoff from off-site. ▪ Where feasible, limit construction to dry periods when flows in aquatic resources are low 							

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		<p>or absent.</p> <ul style="list-style-type: none"> Implement waste management practices to collect and provide proper off-site, commercially available disposal service of concrete wash water. Allow isolation of runoff from fresh concrete during curing to prevent it from reaching the local drainage system. Develop and implement a spill prevention and emergency response plan to manage and contain potential fuel and/or hazardous material spills. Dispose excess drilling mud and cuttings to a landfill specifically permitted to receive these materials. No on-site disposal will be allowed. Manage hazardous material waste such as asbestos concrete pipe, contaminated soil, and treated wood by accumulating wastes in closed containers and storing it within secondary containment areas. The contractor will not mix hazardous waste. All hazardous waste will be managed in compliance with federal, state, and local laws regarding storage, handling, transportation and disposal. <p>Implementation of the site-specific SWPPP will be performed by the contractor's fully trained and certified QSP. As part of the QSP's responsibility, the effectiveness of construction BMPs will be visually monitored at least once a week and before, during, and after rain events. Records of these inspections and visual monitoring results will be summarized on the project's Stormwater Multiple Application and Report Tracking System online database. The local RWQCB will have the opportunity to review the project's records on this account. Furthermore, paper or electronic records or documents required by the site-specific SWPPP will be available at the site until construction is complete.</p>							
HYD-IAMF#4	Prepare and Implement an Industrial Stormwater Pollution Prevention Plan	<p>Prior to construction of any facility classified as an industrial facility, the contractor will comply with existing industrial stormwater quality regulations. The general permit for stormwater discharges associated with industrial activities, NPDES No. CAS000001, requires preparation of an industrial SWPPP and a monitoring plan for industrial facilities that discharge stormwater from the site, including vehicle maintenance facilities associated with transportation operations. The permit includes performance standards for pollution control. The industrial SWPPP will describe the facility functions, treatment BMPs, operations BMPs, inspection and monitoring activities, and recordkeeping that will be implemented during the facility operations as they pertain specifically to stormwater. The SWPPP will be designed to:</p> <ol style="list-style-type: none"> Protect existing water quality and comply with the industrial NPDES permit. Identify activities that have the potential to cause surface water or groundwater contamination and the BMPs required to reduce, eliminate, or prevent contamination. <p>The contractor will provide a fully trained and certified Qualified Industrial Storm Water Practitioner to assist with compliance and implementation of this permit.</p>	Design/ Construction	Permit compliance	At incorporation or completion of design/during monthly operation report	Authority/ Contractor	Contractor	Prepare industrial SWPPP	Condition of construction contract
Geology, Soils, Seismicity, and Paleontological Resources									
GEO-IAMF#1	Geologic Hazards	<p>Prior to construction, the contractor will prepare a CMP addressing how the contractor will address geologic constraints and minimize or avoid impacts related to geologic hazards during construction. This geologic hazard risk minimization plan will be submitted to the Authority for review and approval. The plan will address the following geological and geotechnical constraints/resources, with reference to the specific underlying standards set forth in the guidance and other manuals detailed in GEO-IAMF#10:</p> <ol style="list-style-type: none"> Groundwater withdrawal. Controlling the amount of groundwater withdrawal from the project, by re-injecting groundwater at specific locations if necessary, or using alternate foundation designs to offset the potential for settlement. This control is important for locations with retained cuts in areas where high groundwater exists, and where existing buildings are located near the depressed track section. 	Design/ Construction	Prepare plan	At incorporation or completion of design/during monthly construction report	Authority/ Contractor	Contractor	Prepare CMP	Condition of construction contract

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		<p>b. Unstable soils. Employing various methods to mitigate for the risk of ground failure from unstable soils. If soft or loose soils are encountered at shallow depths, they can be excavated and replaced with competent soils. To limit the excavation depth, replacement materials can also be strengthened using geosynthetics. Where unsuitable soils are deeper, ground improvement methods, such as stone columns, cement deep-soil-mixing, or jet-grouting, can be used. Alternatively, if sufficient construction time is available, preloading—in combination with prefabricated vertical drains (wicks) and staged construction—can be used to gradually improve the strength of the soil without causing bearing-capacity failures.</p> <p>c. Subsidence. The Authority addresses subsidence in its design and construction processes. For the initial design, survey monuments were installed to establish a datum and set an initial track profile. In the construction phase, the design-build contractors for railbed preparation will conduct topographic surveys for preparation of final design. Because subsidence could have occurred since the original benchmarks (survey monuments) were established, the design-build contractor's topographic surveys will be used to help determine whether subsidence has occurred. The updated topographic surveys will also be used to establish the top of rail elevations for final design where the HSR system is outside established floodplain areas and above water surface elevations. Where the HSR system is in floodplain areas susceptible to flooding, consideration is being given to overbuild the height of the railbed in anticipation of future subsidence.</p> <p>d. Water and wind erosion. The contractor will implement erosion control methods as appropriate from the various erosion control methods documented in the construction SWPPP (see HYD-IAMF#3: Prepare and Implement a Construction Stormwater Pollution Prevention Plan), the Caltrans Construction Manuals, and the construction technical memorandum (see GEO-IAMF#6: Ground Rupture Early Warning Systems), and in coordination with other erosion, sediment, stormwater management and fugitive dust control efforts. Water and wind erosion control methods may include, but are not limited to, use of revegetation, stabilizers, mulches, and biodegradable geotextiles.</p> <p>e. Soils with shrink-swell potential. In locations where shrink-swell potential is marginally unacceptable, soil additives will be mixed with existing soil to reduce the shrink-swell potential. Construction specifications will be based upon the decision whether to remove or treat the soil. This decision is based on the soils, specific shrink-swell characteristics, the additional costs for treatment versus excavation and replacement, as well as the long-term performance characteristics of the treated soil.</p> <p>f. Soils with corrosive potential. In locations where soils have a potential to be corrosive to steel and concrete, the soils will be removed and buried structures will be designed for corrosive conditions, and corrosion-protected materials will be used in infrastructure.</p>							
GEO-IAMF#2	Slope Monitoring	During O&M, the Authority will incorporate slope monitoring by a registered engineering geologist into the O&M procedures. The procedures will be implemented at sites identified in the CMP where a potential for long-term instability exists from gravity or seismic loading including but not limited to at-grade sections where slope failure could result in loss of track support, or where slope failure could result in additional earth loading to foundations supporting elevated structures.	Operation	Prepare plan/ Monitoring	Monthly during operation	Authority/ Contractor	Contractor	Slope monitoring during operation	Condition of construction contract
GEO-IAMF#3	Gas Monitoring	Prior to construction, the contractor will prepare a CMP addressing how gas monitoring will be incorporated into construction BMPs. The CMP will be submitted to the Authority for review and approval. Hazards related to potential migration of hazardous gases due to the presence of known oil and gas fields, areas of active or historic landfills, or other subsurface sources can be reduced or eliminated by following strict federal and state Occupational Safety and Health Administration (OSHA/Cal-OSHA) regulatory requirements	Design/ Construction	Prepare plan/ Design	Prior to construction	Authority/ Contractor	Contractor	Preparation of a CMP	Condition of construction contract

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		for excavations, and by consulting with other agencies as appropriate, such as the California Department of Conservation's Division of Oil, Gas, and Geothermal Resources, and the California Environmental Protection Agency, DTSC, regarding known areas of concern. Practices will include using safe and explosion-proof equipment during construction, and testing for gases regularly. Installation of passive or active gas venting systems, gas collection systems, as well as active monitoring systems and alarms will be required in underground construction areas and facilities where subsurface gases are present. Installing gas-detection systems can monitor the effectiveness of these systems.							
GEO-IAMF#5	Hazardous Minerals	Prior to construction, the contractor will prepare a CMP addressing how the contractor will minimize or avoid impacts related to hazardous minerals (i.e., radon, mercury, naturally occurring asbestos) during construction. The CMP will be submitted to the Authority for review and approval. The CMP will include appropriate provisions federal and state instructions and guidelines for handling hazardous minerals including but limited to dust control, control of soil erosion and water runoff, and testing and proper disposal of excavated material.	Design/ Construction	Design/ Monitoring/ Reporting	Prior to construction	Authority/ Contractor	Contractor	Preparation of a CMP	Condition of construction contract
GEO-IAMF#6	Ground Rupture Early Warning Systems	Prior to construction, the contractor will document how the project design incorporates installation of early warning systems, triggered by strong ground motion association with ground rupture. All known nearby active faults will be monitored. Linear monitoring systems such as time domain reflectometers or similar technology will be installed along rail lines in the zone of potential ground rupture. These devices emit electronic information that is processed in a centralized location and will be used to temporarily control trains, thus reducing accidents due to fault creep. Damage to infrastructure from fault creep can be mitigated with routine maintenance including minor realignment.	Design/ Pre-construction	Design/ Monitoring	Prior to construction	Authority/ Contractor	Contractor	Preparation of a CMP	Condition of construction contract
GEO-IAMF#7	Evaluate and Design for Large Seismic Ground Shaking	Prior to construction, the contractor will document through preparation of a technical memorandum how all HSR components were evaluated and designed for large seismic ground shaking. Prior to final design, the contractor will conduct additional seismic studies to establish up-to-date estimation of levels of ground motion. The most current <i>Caltrans Seismic Design Criteria</i> at the time of design will be used in the design of any structures supported in or on the ground. These design procedures and features reduce to the greatest practical extent for potential movements, shear forces, and displacements that result from inertial response of the structure. In critical locations, pendulum base isolators may be used to reduce the levels of inertial forces. New composite materials may also be used to enhance seismic performance.	Design	Design/Studies	Prior to construction	Contractor/ Authority	Contractor/ Authority	At incorporation or completion of design	Seismic ground shaking design technical memorandum
GEO-IAMF#8	Suspension of Operations during an Earthquake	Prior to O&M activities, the contractor will document in a technical memorandum how suspension of operations during or after an earthquake was addressed in project design. Motion-sensing instruments to provide ground motion data and a control system to shut down HSR operations temporarily during or after a potentially damaging earthquake will be incorporated into final design. Monitoring equipment will be installed at select locations where high ground motions could occur. The system will then be inspected for damage due to ground motion and/or ground deformation, and then returned to service when appropriate.	Design/ Construction/ Operation	Reporting	As needed based on an earthquake event	Contractor/ Authority	Contractor/ Authority	At incorporation or completion of design/during monthly construction report	Technical memorandum prepared as needed based on an earthquake event
GEO-IAMF#9	Subsidence Monitoring	Prior to O&M, the Authority will develop a stringent track monitoring program. Once tracks are operational, a remote monitoring program will be implemented to monitor the effects of ongoing subsidence. Track inspection systems will provide early warning of reduced track integrity. HSR trainsets will be equipped with autonomous equipment for daily track surveys. This specification will be added to HSR train bid packages. If monitoring indicates that track tolerances are not met, trains will operate at reduced speeds until track tolerances are restored. In addition, the contractor responsible for wayside maintenance will be required to implement a stringent program for track maintenance.	Design/ Operation	Program development	Monthly	Authority/ Contractor	Contractor	Develop a stringent track monitoring program	Condition of construction contract

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
GEO-IAMF#10	Geology and Soils	<p>Prior to construction, the contractor will document through issuance of a technical memorandum how the following guidelines and standards have been incorporated into facility design and construction:</p> <ul style="list-style-type: none"> ▪ 2015 AASHTO Load and Resistance Factor Bridge Design Specifications and the 2015 AASHTO Guide Specifications for Load and Resistance Factor Seismic Bridge Design (AASHTO 2015a, 2015b) or their most recent versions. These documents provide guidance for characterization of soils, as well as methods to be used in the design of bridge foundations and structures, retaining walls, and buried structures. These design specifications will provide minimum specifications for evaluating the seismic response of the soil and structures will provide minimum specifications for evaluating the seismic response of the soil and structures. ▪ Federal Highway Administration Circulars and Reference Manuals. These documents provide detailed geotechnical guidance. Methods to characterize geotechnical conditions at sites is found in Chapter 6, Geotechnical, of Federal Highway Lands, PDDM (FHWA 2017). Methods for performing foundation design and recommendations on foundation construction are found in Chapter 10, Structural Design, of the PDDM. These guidance documents include methods for designing retaining walls used for retained cuts and retained fills, foundations for elevated structures, and at-grade segments. Some of the documents include guidance on methods of mitigating geologic hazards that are encountered during design. The FHWA Geotechnical Technical Guidance Manual (FHWA 2007) supports the policies, standards and standard practices presented in Chapter 6 of the PDDM. Additionally, it provides guidance for activities where standards and standard practices do not exist, and it provides access to and guidance for the use of new technologies. ▪ American Railway Engineering and Maintenance-of-Way Association Manual. These guidelines deal with rail systems. Although they cover many of the same general topics as AASHTO, they are more focused on best practices for rail systems. The manual includes principles, data, specifications, plans, and economics pertaining to the engineering, design, and construction of railways. ▪ California Building Code. The code is based on 2015 IBC. This code contains general building design and construction requirements relating to fire and life safety, structural safety, and access compliance. Geologic and soils hazards are discussed in Chapter 16, Structural Design, and Chapter 18, Soils and Foundations, of the 2019 California Building Code, Title 24, Part 2 (Volumes 1 & 2) with a January 2020 Errata (iccsafe.org). ▪ IBC and ASCE-7. These codes and standards will be used for the design of the maintenance facilities and stations. Sections in IBC and ASCE-7 provide minimum requirements for geotechnical investigations, levels of earthquake ground shaking, minimum standards for structural design, and inspection and testing requirements. ▪ Caltrans Design Standards. Caltrans has specific minimum design and construction standards for all aspects of transportation system design, ranging from geotechnical explorations to construction practices. These amendments provide specific guidance for the design of deep foundations that are used to support elevated structures (Caltrans 2021a), for design of mechanically stabilized earth walls used for retained fills (Caltrans 2021b), and for design of various types of cantilever (e.g., soldier pile, secant pile, and tangent pile) (Caltrans 2021c), and tie-back walls used for retained cuts (Caltrans 2021d). ▪ Caltrans Construction Manuals. Caltrans has a number of construction manuals that will be followed addressing geology and soils conditions. These include the: <i>Field Guide to Construction Dewatering</i> (Caltrans 2014), <i>Caltrans Construction Site Best Management Practices (BMP) Manual</i> (Caltrans 2017a), and <i>Construction Site Best Management</i> 	Design/ Construction/ Operation	Design/ Reporting	At incorporation or completion of design/during monthly construction reporting	Authority/ Contractor	Contractor	Prepare technical memorandum/ Implementation of guidelines during design, construction, and operation phases	Condition of construction contract

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		<p><i>Practice (BMP) Field Manual and Troubleshooting Guide</i> (Caltrans 2003). BMPs for dewatering options and management are discussed in Section 1.2 of the <i>Field Guide to Construction Dewatering</i>, erosion control and soil stabilization are discussed in Section 3-5 of the <i>Caltrans Construction Site Best Management Process Manual</i>, non-stormwater management is discussed in Section 7 of the <i>Caltrans Construction Site Best Management Practices Manual</i>, and waste management at construction sites is discussed in Section 8 of the <i>Caltrans Construction Site Best Management Practices</i>.</p> <ul style="list-style-type: none"> ASTM. ASTM has developed standards and guidelines for all types of material testing, from soil compaction testing to concrete-strength testing. The ASTM standards also include minimum performance requirements for materials. 							
GEO-IAMF#11	Engage a Qualified Paleontological Resources Specialist	<p>Prior to the 90 percent design milestone for each CP⁵ within the Project Section, the contractor will retain a PRS responsible for:</p> <ul style="list-style-type: none"> Reviewing the final design for the CP. Developing a detailed PRMMP for the CP. Implementing the PRMMP, including development and delivery of WEAP training, supervision of PRMs, evaluation and treatment of finds, if any, and preparation of a final paleontological mitigation report, per the PRMMP and for each CP. <p>Retention of PRS staff will occur in a timely manner, in advance of the 90 percent design milestone for each CP, such that the PRS is on board and can review the 90 percent design submittal without delay when it becomes available. If feasible, the same PRS will be responsible for all CPs within a given Project Section.</p> <p>All PRS staff will meet or exceed the qualifications for a Principal Paleontologist as defined in Caltrans' current <i>Standard Environmental Reference</i>, Chapter 8 (Caltrans 2017b) will be subject to review and approval by the Authority.</p>	Design	Contractor will retain paleontological resources specialist	Prior 90 percent design milestone for each CP	Authority/ Contractor	Contractor	Retain Paleontological Resources Specialist (PRS)	Condition of construction contract
GEO-IAMF#12	Perform Final Design Review and Triggers Evaluation	<p>For each CP within the Project Section, the responsible PRS will evaluate the 90 percent design submittal to identify the portions of the CP that will involve work in paleontologically sensitive geologic units (either at the surface or in the subsurface), based on findings of the final paleontological resources technical report prepared for the Project Section. Evaluation will consider the location, areal extent, and anticipated depth of ground disturbance, the construction techniques that are planned/proposed, and the geology (i.e., location of geologic units with high paleontological resources) of the CP and vicinity. The evaluation and resulting recommendations will be consistent with guidance in the <i>SVP Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources</i> (SVP Standard Procedures) (SVP 2010), the <i>SVP Conditions of Receivership for Paleontologic Salvage Collections</i> (SVP Conditions of Receivership) (SVP 1996), and relevant guidance from Chapter 8 of the current <i>Caltrans Standard Environmental Reference</i> (Caltrans 2017b).</p> <p>The purpose of the Final Design Review and Triggers Evaluation will be to develop specific language detailing the location and duration of paleontological monitoring and other requirements for paleontological resources applicable to each CP within the Project Section. Paleontological protection requirements identified through the Final Design Review and Triggers Evaluation will be recorded in a concise technical memorandum (Final Design Review Requirements for Paleontological Resources Protection), which will then be incorporated in full detail into the PRMMP for each CP. Those portions of the CP requiring paleontological monitoring will also be clearly delineated in the project construction documents for each CP.</p>	Design	Reporting	Each CP	Authority/ Contractor	Contractor	CP reporting	Condition of construction contract

⁵ Because of their length and complexity, most HSR project sections are expected to be designed and constructed in segments, with separate construction documents (plans and specifications) developed for each segment. *Construction package* refers to a portion (segment) of a project section for which a discrete, stand-alone construction document set will be developed.

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
GEO-IAMF#13	Prepare and Implement Paleontological Resources Monitoring and Mitigation Plan	<p>Following the Final Design Review and Triggers Evaluation for each CP, the PRS will develop a CP-specific PRMMP. For greater efficiency, PRMMPs may be written such that they cover more than one CP, as long as the specific requirements of the IAMFs are satisfied explicitly and in detail for each CP included.</p> <p>The PRMMP for each CP will incorporate the findings of the Design Review and Triggers Evaluation for that CP and will be consistent with the SVP Standard Procedures (SVP 2010), the SVP Conditions of Receivership (SVP Conformable Impact Mitigation Guidelines Committee 1996), and relevant guidance from Chapter 8 of the current <i>Caltrans Standard Environmental Reference</i> (Caltrans 2017b). As such, the PRMMP will provide for at least the following:</p> <ul style="list-style-type: none"> ▪ Implementation of the PRMMP by qualified personnel, including the following positions: <ul style="list-style-type: none"> – PRS – The PRS will be required to meet or exceed Principal Paleontologist qualifications per Chapter 8 of the current <i>Caltrans Standard Environmental Reference</i> (Caltrans 2017b). The supervising paleontologist may, but not necessarily, be the PRS who prepares the PRMMP. – PRMs – The PRS will be required to meet or exceed Paleontological Monitor qualifications per Chapter 8 of the current <i>Caltrans Standard Environmental Reference</i> (Caltrans 2017b). ▪ Development of pre-construction and construction-period coordination procedures and communications protocols. ▪ Evaluation as to whether a pre-construction survey by qualified personnel is warranted for the CP. In general, pre-construction surveys are beneficial if there is a strong possibility that significant paleontological resources (e.g., concentrations of vertebrate fossils) are exposed at the ground surface and would be destroyed during the initial clearing and grubbing phase of earthwork. Such a determination can usually be made during preparation of the paleontological resources technical report. ▪ Requirements for paleontological monitoring by qualified PRMs of all ground-disturbance activities known to affect, or potentially affect, highly sensitive geologic units and for ground-disturbance activities affecting other geologic units in any areas where the PRS considers it warranted based on the findings of the paleontological resources technical report or any pre-construction surveys. In all areas of the CP subject to monitoring, monitoring will initially be conducted full-time for all ground-disturbance activities. However, the PRMMP may provide for monitoring frequency in any given location to be reduced once approximately 50 percent of the ground-disturbance activity in completed locations, if the reduction is appropriate based on the implementing PRS's professional judgment in consideration of actual site conditions. ▪ Provisions, if recommended by the PRS for paleontological monitoring of specific construction drilling operations. In general, small diameter (i.e., <18 inches) drilling operations or drilling operations using bucket augers tend to pulverize impacted sediments and any contained fossils and are typically not monitored. The section in the PRMMP addressing monitoring for drilling operations will rely, in part, on the information supplied by the CP design and geotechnical teams, but will also take into consideration of the nature, depth, and location of drilling needed, and the anticipated equipment and staging configurations. ▪ Provisions for the content development and delivery of paleontological resources WEAP training. ▪ Provisions for in-progress documentation of monitoring (and, if applicable, salvage/recovery operations) via "construction dailies" or a similar approved means. ▪ Provisions for a "stop work, evaluate, and treat appropriately" response in the event of a known or potential paleontological discovery, including finds in highly sensitive geologic 	Design	Reporting	Each CP	Authority/ Contractor	Contractor	CP reporting	Condition of construction contract

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		<p>units as well as finds, if any, in geologic units identified as less sensitive, or non-sensitive, for paleontological resources.</p> <ul style="list-style-type: none"> Provisions for sampling and recovery of unearthed fossils consistent with SVP Standard Procedures (SVP 2010) and the SVP Conditions of Receivership (SVP 1996). Recovery procedures will provide for recovery of both macrofossils and microfossils. Provisions for acquiring a repository agreement from an approved regional repository for the curation, care, and storage of recovered materials, consistent with the SVP Conditions of Receivership (SVP 1996). If more than one repository institution is designated, separate repository agreements must be provided. Provisions for preparation of a final monitoring and mitigation report that meets the requirements of the Caltrans Standard Environmental Reference Chapter 8 provisions for the Paleontological Monitoring Report and Paleontological Stewardship Summary (Caltrans 2017b). Provisions for the preparation, identification, and analysis and curation of fossil specimens and data recovered, consistent with the SVP Conditions of Receivership (SVP 1996) and any specific requirements of the designated repository institution(s). 							
GEO-IAMF#14	Provide WEAP Training for Paleontological Resources	<p>Prior to groundbreaking for each CP within the Project Section, the contractor will provide paleontological resources WEAP training delivered by the PRS. All management and supervisory personnel and construction workers involved with ground-disturbing activities will be required to take this training before beginning work on the project. Refresher training will also be made available to management and supervisory personnel and workers as needed, based on the judgment of the PRS.</p> <p>At a minimum, paleontological resources WEAP training will include information on:</p> <ul style="list-style-type: none"> Coordination between construction staff and paleontological staff Construction and paleontological staff roles and responsibilities in implementing the PRMMP Possibility of encountering fossils during construction Types of fossils that may be seen and how to recognize them Proper procedures in the event fossils are encountered, including the requirement to halt work in the vicinity of the find and procedures for notifying responsible parties in the event of a find <p>Training materials and formats may include, but are not necessarily limited to, in-person training, prerecorded videos, posters, and informational brochures that provide contacts and summarize procedures in the event paleontological resources are encountered. WEAP training contents will be subject to review and approval by the Authority. Paleontological resources WEAP training may be provided concurrently with cultural resources WEAP training.</p> <p>Upon completion of any WEAP training, the contractor will require workers to sign a form stating that they attended the training and understand and will comply with the information presented. Verification of paleontological resources WEAP training will be provided to the Authority by the contractor.</p>	Pre-construction	Training program/ Reporting	Annual (training)/ Monthly (reporting)	Contractor/ Authority	Contractor/ Authority	WEAP training	Condition of construction contract
GEO-IAMF#15	Halt Construction, Evaluate, and Treat if Paleontological Resources Are Found	<p>Consistent with the PRMMP if fossil materials are discovered during construction, regardless of the individual making the discovery, all activity in the immediate vicinity of the discovery will halt and the find will be protected from further disturbance. If the discovery is made by someone other than the PRS or PRM(s), the person who made the discovery will immediately notify construction supervisory personnel, who will in turn notify the PRS. Notification to the PRS will take place promptly (prior to the close of work the same day as the find), and the PRS will evaluate the find and prescribe appropriate treatment as soon as feasible. Work may continue on other portions of the CP while evaluation (and, if</p>	Construction	Reporting	Daily logs during active monitoring	Authority/ Contractor	Contractor	Weekly reporting (if resource is identified during construction)	PRMMP, WEAP

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		<p>needed, treatment) takes place, as long as the find can be adequately protected in the judgment of the PRS.</p> <p>If the PRS determines that treatment (i.e., recovery and documentation of unearthed fossils) is warranted, such treatment, and any required reporting, will proceed consistent with the PRMMP. The contractor will be responsible for ensuring prompt and accurate implementation, subject to verification by the Authority.</p> <p>The stop work requirement does not apply to drilling operations since drilling typically cannot be suspended in mid-course. However, if finds are made during drilling, the same notification and other follow-up requirements will apply. The PRS will coordinate with construction supervisory and drilling staff regarding the handling of recovered fossils.</p> <p>The requirements of this IAMF will be detailed in the PRMMP and presented as part of the paleontological resources WEAP training.</p>							
Hazardous Materials and Wastes									
HMW-IAMF#1	Property Acquisition Phase I and Phase II Environmental Site Assessments	During the right-of-way acquisition phase, Phase I environmental site assessments (ESA) will be conducted in accordance with standard ASTM methodologies per ASTM E 1527-13 to characterize each parcel. The determination of parcels that require a Phase II ESA (e.g., soil, groundwater, soil vapor subsurface investigations) will be informed by a Phase I ESA and may require coordination with state and local agency officials per ASTM E 1903-19. If the Phase II ESA concludes that the site is affected, remediation or corrective action (e.g., removal of contamination, in-situ treatment, or soil capping) will be conducted with state and local agency officials (as necessary) and in full compliance with applicable state and federal laws and regulations.	Pre-construction/ Construction	Prepare plan	Monthly	Authority/ Contractor	Contractor	Prepare Phase I ESA	Condition of construction contract
HMW-IAMF#2	Landfill	Prior to construction (any ground-disturbing activities), the contractor will verify to the Authority through preparation of a technical memorandum that methane protection measures will be implemented for all work within 1,000 feet of a landfill, including gas detection systems and personnel training. This will be undertaken pursuant to State of California Title 27, Environmental Protection – Division 2, Solid Waste, and the hazardous materials best management practices plan.	Pre-construction/ Construction	Reporting	Monthly	Authority/ Contractor	Contractor	Monthly record keeping	Contract requirements and specifications
HMW-IAMF#3	Work Barriers	Prior to construction (any ground-disturbing activities), the contractor will verify to the Authority through preparation of a technical memorandum the use of work barriers. Nominal design variances, such as the addition of a plastic barrier beneath the ballast material to limit the potential release of volatile subsurface contaminants, may be implemented in conjunction with site investigation and remediation.	Pre-construction/ Construction	Prepare technical memorandum	Monthly	Authority/ Contractor	Contractor	Prepare work barrier technical memorandum	Condition of construction contract
HMW-IAMF#4	Undocumented Contamination	Prior to construction, the contractor will prepare a CMP addressing provisions for the disturbance of undocumented contamination. The plan will be submitted to the Authority for review and approval. Undocumented contamination could be encountered during construction activities. Upon discovery of undocumented contamination, the contractor will contact the local RWQCB and the DTSC. The contractor will work with the RWQCB and DTSC to provide information on the contamination and to establish requirements for investigating the extent of the contamination and remediate it as necessary. The contractor will notify the Authority of the discovery of any undocumented contamination within 24 hours, and will provide a copy of all documentation pertaining to the investigation, remediation, and disposal of the contamination to the Authority within 30 days of completion of the incident.	Pre-construction/ Construction	Prepare plan/ Reporting	As needed	Authority/ Contractor	Contractor	Prepare CMP/Reporting as needed	Condition of construction contract
HMW-IAMF#5	Demolition Plans	Prior to construction that involves demolition, the contractor will prepare demolition plans for the safe dismantling and removal of building components and debris. The demolition plans will include a plan for lead and asbestos abatement. The plans will be submitted to the project construction manager on behalf of the Authority for verification that appropriate demolition practices have been followed consistent with federal and state regulation	Pre-construction/ Construction	Prepare plan/Reporting	As needed	Authority/ Contractor	Contractor	Prepare demolition plans/Reporting as needed	Condition of construction contract

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		regarding asbestos and lead paint abatement (e.g., 8 California Code of Regulations §§ 1529, 1532.1; National Emission Standards for Hazardous Air Pollutants [40 C.F.R. Part 61, Subpart M, Section 145]; Resource Conservation and Recovery Act [40 C.F.R. Part 261]; and 40 C.F.R. Part 745).							
HMW-IAMF#6	Spill Prevention	Prior to construction (any ground-disturbing activities), the contractor will prepare a CMP addressing spill prevention. An SPCCP (or soil prevention and response plan if the total aboveground oil storage capacity is less than 1,320 gallons in storage containers greater than or equal to 55 gallons) will prescribe BMPs to prevent hazardous material releases and clean-up of any hazardous material releases that may occur. Example BMPs would be: all containers are to remain tightly covered unless removing contents/adding to them; drums and other containers are not to be stacked; all containers with liquids are to have secondary containment; a spill response/containment kit is to be available in the area where the hazardous materials are stored. The plans will be prepared and submitted to the project construction manager on behalf of the Authority and will be implemented during construction.	Pre-construction/ Construction	Prepare plan/Reporting	As needed	Authority/ Contractor	Contractor	Prepare CMP/Reporting as needed	Condition of construction contract
HMW-IAMF#7	Transport of Materials	During construction, the contractor will comply with applicable state and federal regulations, such as the RCRA (40 C.F.R. Part 263), CERCLA (42 United States Code Chapter 103), the Hazardous Materials Release Response Plans and Inventory Law (California Health and Safety Code § 6.95), and the Hazardous Waste Control Act (22 California Code of Regulations § 4.5). Prior to construction the contractor will provide the Authority with a hazardous materials and waste plan describing responsible parties and procedures for hazardous waste and hazardous materials transport.	Pre-construction/ Construction	Regulation compliance/ Reporting	Monthly	Authority/ Contractor	Contractor	Weekly record keeping/monthly reporting	Condition of construction contract
HMW-IAMF#8	Permit Conditions	During construction the contractor will comply with the SWRCB Construction CWA Section 402 General Permit conditions and requirements for transport, labeling, containment, cover, and other BMPs for storage of hazardous materials during construction. Prior to construction, the contractor will provide the Authority with a hazardous materials and waste plan describing responsible parties and procedures for hazardous waste and hazardous materials transport, containment, and storage BMPs that will be implemented during construction.	Pre-construction/ Construction	Reporting	Prior to construction	Authority/ Contractor	Contractor	Provide a hazardous materials and waste plan	Condition of construction contract
HMW-IAMF#9	Environmental Management System	The Authority is committed to identifying, avoiding, and minimizing hazardous substances in the material selection process for construction, operation, and maintenance of the HSR system. The Authority will use an Environmental Management System to describe the process that will be used to evaluate the full inventory of hazardous materials as defined by federal and state law employed on an annual basis and will replace hazardous substances with nonhazardous materials to the extent that appropriate substituting materials are available. The contractor will implement the material substitution recommendation contained in the annual inventory.	Pre-construction/ Construction	Reporting	Annual	Authority/ Contractor	Contractor	Annual reporting	Condition of construction contract/ Environmental Management System
HMW-IAMF#10	Hazardous Materials Plans	Prior to O&M activities, the Authority will prepare hazardous materials monitoring plans. These will use as a basis source, such as a hazardous materials business plan as defined in Title 19 California Code of Regulations, and an SPCCP.	Post-construction	Prepare plans	Prior to operations	Authority	Authority	Prepare hazardous materials monitoring plans	Condition of construction contract
Safety and Security									
SS-IAMF#1	Construction Safety Transportation Management Plan	Prior to construction (any ground-disturbing activity), the contractor will prepare for submittal to the Authority a construction safety transportation management plan. The plan will describe the contractor's coordination efforts with local jurisdictions for maintaining emergency vehicle access. The plan also will address duration of road and traffic lane closures, length of detour routes, and ongoing coordination during construction with local jurisdictions as well as emergency service providers. The plan will also specify the contractor's procedures for implementing temporary road closures including: access to residences and businesses during construction, lane closures, signage and flag persons, temporary detour provisions, alternative bus and delivery routes, emergency vehicle	Pre-construction/ Construction	Prepare plan	Monthly	Authority/ Contractor	Contractor	Prepare construction safety transportation management plan	Condition of construction contract

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		access, and alternative access locations. The Authority requires the design-build contractor to maintain emergency vehicle access and access for nearby residences and business throughout the duration of construction. The contractor will prepare and submit monthly reports to the Authority documenting construction transportation plan implementation activities for compliance monitoring.							
SS-IAMF#2	Safety and Security Management Plan	<p>The Authority will require the design-build contractor to prepare a safety and security management plan that complies with the below-listed requirements to protect public safety and security. Sixty days after receiving from the Authority a construction notice-to-proceed, the contractor will provide the Authority with a technical memorandum documenting how the following requirements, plan, programs and guidelines were considered in design, construction, and eventual operation to protect the safety and security of construction workers and users of the HSR. The contractor will be responsible for implementing all construction-related safety and security plans and the Authority will be responsible for implementing all safety and security plans related to HSR operation.</p> <ul style="list-style-type: none"> ▪ Workplace worker safety is generally governed by the Occupational Health and Safety Act of 1970. This Act established the OSHA, which establishes standards and oversees compliance with workplace safety and reporting of injuries and illnesses of employed workers. In California, OSHA enforcement of workplace requirements is performed by Cal-OSHA. Under Cal-OSHA regulations, as of July 1, 1991, every employer must establish, implement, and maintain an injury and illness prevention program. ▪ The Authority has adopted the California High-Speed Rail Program Safety and Security Management Plan (Authority 2018) to guide the safety and security activities, processes, and responsibilities during design, construction and implementation phases of the project to protect the safety and security of construction workers and the public. An SSP and a security and emergency preparedness plan will be implemented prior to the start of revenue service to guide the safety and security of the operation of the HSR system. ▪ Prior to construction, the contractor will provide the Authority with a safety and security management plan documenting how they will implement the Authority’s safety and security requirements within their project scope. ▪ Implement site-specific health and safety plans and site-specific security plans to establish minimum safety and security guidelines for contractors of, and visitors to, construction projects. Contractors will be required to develop and implement site-specific measures that address regulatory requirements to protect human health and property at construction sites. ▪ Preparation of a Valley fever action plan that includes: (A) information on causes, preventative measures, symptoms, and treatments for Valley fever to individuals who could potentially be exposed through construction activities (i.e., construction workers, monitors, managers, and support personnel); (B) continued outreach and coordination with California Department of Public Health; (C) coordination with county departments of public health to ensure that the above referenced information concerning Valley fever is readily available to nearby residents, schools, and businesses and to obtain area information about Valley fever outbreaks and hotspots; and (D) provide a qualified person dedicated to overseeing implementation of the Valley fever prevention measures to encourage a culture of safety of the contractors and subcontractors. The VFHS designee will coordinate with the county Public Health Officer and oversee and manage the implementation of Valley fever control measures. The VFHS designee is responsible for coordinating the implementation of measures with the county Public Health Officer. Medical information will be maintained following applicable and appropriate confidentiality protections. The VFHS in coordination with the county Public Health Officer will determine what measures will be added to the requirements for the safety and security management plan regarding preventive measures to avoid Valley fever exposure. Measures will include, but are not limited to the following: (A) train workers 	Pre-construction/ Construction	Prepare plan	60 days after receiving a construction notice to proceed	Contractor/ Authority	Contractor/ Authority	Prepare technical memorandum documenting compliance with safety requirements, plans, programs, and guidelines	Condition of construction contract

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		<p>and supervisors on how to recognize symptoms of illness and ways to minimize exposure, such as washing hands at the end of shifts; (B) provide washing facilities nearby for washing at the end of shifts; (C) provide vehicles with enclosed, air conditioned cabs and make sure workers keep the windows closed; (D) equip heavy equipment cabs with high efficiency particulate air (HEPA) filters; and (E) make National Institute for Occupational Safety and Health–approved respiratory protection with particulate filters as recommended by the California Department of Public Health available to workers who request them.</p> <ul style="list-style-type: none"> ▪ System safety program plans incorporate FRA requirements and are implemented upon FRA approval. FRA’s SSP requirements will be determined in FRA’s new System Safety Regulation (49 C.F.R. Part 270). ▪ Rail systems must comply with FRA requirements for tracks, equipment, railroad operating rules and practices, passenger safety, emergency response, and passenger equipment safety standards found in 49 C.F.R. Parts 200–299. ▪ The HSR Urban Design Guidelines (Authority 2011c) requires implementing the principles of crime prevention through environmental design. The contractor will consider four basic principles of crime prevention through environmental design during station design and site planning: territoriality (design physical elements that express ownership of the station or site); natural surveillance (arrange physical features to maximize visibility); improved sightlines (provide clear views of surrounding areas); and access control (provide physical guidance for people coming and going from a space). The HSR design includes emergency access to the rail right-of-way and elevated HSR structure design includes emergency egress points. ▪ Implement fire/life safety and security programs that promote fire and life safety and security in system design, construction, and implementation. The fire and life safety program will be coordinated with local emergency response organizations to provide them with an understanding of the rail system, facilities, and operations, and to obtain their input for modifications to emergency response operations and facilities, such as evacuation routes. The Authority will establish fire/life safety and security committees throughout the Project Section. ▪ Implement system security plans that address design features intended to maintain security at the stations within the track right-of-way, at stations, and onboard trains. A dedicated police force will ensure that the security needs of the HSR system are met. ▪ The design standards and guidelines require emergency walkways on both sides of the tracks for both elevated and at-grade sections and the provision of appropriate space as defined by fire and safety codes along at-grade sections of the alignment to allow for emergency response access. ▪ Implement standard operating procedures and emergency operating procedures, such as the FRA-mandated Roadway Worker Protection Program to address the day-to-day operation and emergency situations that will maintain the safety of employees, passengers, and the public. 							
SS-IAMF#3	Hazard Analyses	<p>The Authority’s hazard management program includes the identification of hazards, assessment of associated risk, and application of control measures (mitigation) to reduce risk to an acceptable level. Prior to project construction the Authority or its contractor will prepare a hazard assessment that includes a PHA and TVA. The Authority’s programmatic PHAs are developed in conformance with the FRA’s <i>Collision Hazard Analysis Guide: Commuter and Intercity Passenger Rail Service</i> (FRA 2007), and the U.S. Department of Defense’s System Safety Program Plan (MIL-STD-882E) to identify and determine the facility hazards and vulnerabilities so that they can be addressed by—and either eliminated or minimized—the design.</p> <ul style="list-style-type: none"> ▪ TVAs establish provisions for the deterrence and detection of, as well as the response 	Pre-construction/ Construction	Reporting	Monthly	Authority	Authority	Monthly reporting	Condition of construction contract

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		<p>to, criminal and terrorist acts for rail facilities and system operations. Provisions include right-of-way fencing, intrusion detection, security lighting, security procedures and training, and closed-circuit televisions. Intrusion-detection technology could also alert to the presence of inert objects, such as toppled tall structures or derailed freight trains, and stop HSR operations to avoid collisions.</p> <ul style="list-style-type: none"> During design and construction, the contractor will conduct site-specific PHA and TVA assessments to apply the programmatic work to specific project designs. <p>The Authority's safety and security committees will be responsible for implementing the recommendations contained in the hazard analysis during HSR operation.</p>							
Socioeconomics and Communities									
SOCIO-IAMF#1	Construction Management Plan	<p>Prior to construction, the contractor will prepare a CMP providing measures that minimize construction impacts on communities, in particular low-income households and minority populations that are more sensitive to construction-borne disruptions. The plan will be submitted to the Authority for review and approval. The plan will include actions pertaining to communications, visual protection, air quality, safety controls, noise controls, and traffic controls to minimize impacts on surrounding communities, particularly low-income households and minority populations. The plan will verify that property access is maintained for local businesses, residences, and emergency services. This plan will include maintaining customer and vendor access to local businesses throughout construction by using signs to instruct customers about access to businesses during construction. In addition, the plan will include efforts to consult with local transit providers to minimize impacts on local and regional bus routes in affected communities.</p>	Design/ Construction	Prepare plan	At incorporation or completion of design/monthly reporting (during construction)	Authority/ Contractor	Contractor	Prepare CMP	Condition of construction contract
SOCIO-IAMF#2	Compliance with Uniform Relocation Assistance and Real Property Acquisition Policies Act	<p>The Authority must comply with the Uniform Act. The provisions of the Uniform Act, a federally mandated program, will apply to all acquisitions of real property or displacements of persons resulting from this federally assisted project. It was created to provide for fair and equitable treatment of all affected persons. Additionally, the Fifth Amendment of the U.S. Constitution provides that private property may not be taken for a public use without payment of "just compensation."</p> <p>The Uniform Act requires that the owning agency provide notification to all affected property owners of the agency's intent to acquire an interest in their property. This notification includes a written offer letter of just compensation. A right-of-way specialist is assigned to each property owner to assist him or her through the acquisition process. The Uniform Act also provides benefits to displaced individuals to assist them financially and with advisory services related to relocating their residence or business operation. Benefits are available to both owner occupants and tenants of either residential or business properties.</p> <p>The Uniform Act requires provision of relocation benefits to all eligible persons regardless of race, color, religion, sex, or national origin. Benefits to which eligible owners or tenants may be entitled are determined on an individual basis and explained in detail by an assigned right-of-way specialist.</p> <p>The California Relocation Assistance Act essentially mirrors the Uniform Act and provides for consistent and fair treatment of property owners. However, because the project will receive federal funding, the Uniform Act takes precedence. Owners of private property have federal and state constitutional guarantees that their property will not be acquired or damaged for public use unless owners first receive just compensation. Just compensation is measured by the "fair market value," where the property value is considered to be the highest price that would be negotiated on the date of valuation. The value must be agreed upon by a seller who is willing, not obliged to sell but under no particular or urgent necessity, and by a buyer who is ready, willing, and able to buy but under no particular necessity. Both the owner and the buyer must deal with the other with the full knowledge of all the uses and purposes for which the property is reasonably adaptable and available</p>	Design/ Construction/ Operation	Reporting and meeting with interested parties	Monthly	Authority	Authority	Comply with Uniform Act/Monthly reporting and record keeping	Compliance with acts, creation of ombudsman office and reporting

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		<p>(Code of Civil Procedure § 1263.320a).</p> <p>More detailed information about how the Authority plans to comply with the Uniform Act and the California Relocation Assistance Act is provided in the following three detailed relocation assistance documents modeled after Caltrans versions, all of which are provided in Appendix 3.12-A, Relocation Assistance Documents:</p> <ul style="list-style-type: none"> Your Rights and Benefits as a Displacee under the Uniform Relocation Assistance Program (Residential) Your Rights and Benefits as a Displacee under the Uniform Relocation Assistance Program (Mobile Home) Your Rights and Benefits as a Displacee under the Uniform Relocation Assistance Program (Business, Farm, or Nonprofit Organization) 							
SOCIO-IAMF#3	Relocation Implementation Plan	<p>Before any acquisitions occur, the Authority will develop a relocation implementation plan, in consultation with affected cities and counties and property owners. In addition to establishing a program to minimize the economic disruption related to relocation, the relocation implementation plan will be written in a style that also enables it to be used as a public information document.</p> <p>The relocation implementation plan will be designed to meet the following objectives:</p> <ul style="list-style-type: none"> Provide affected property and business owners and tenants a high level of individualized assistance in situations when acquisition is necessary and the property owner desires to relocate the existing land use. Coordinate relocation activities with other agencies acquiring property resulting in displacements in the study area to provide for all displaced persons and businesses to receive fair and consistent relocation benefits. Make a best effort to minimize the permanent closure of businesses and nonprofit agencies as a result of property acquisition. Within the limits established by law and regulation, minimize the economic disruption caused to property owners by relocation. In individual situations, where warranted, consider the cost of obtaining the entitlement permits necessary to relocate to a suitable location and take those costs into account when establishing the fair market value of the property. Provide those business owners who require complex permitting with regulatory compliance assistance. <p>The relocation implementation plan will include the following components:</p> <ul style="list-style-type: none"> A description of the appraisal, acquisition, and relocation process as well as a description of the activities of the appraisal and relocation specialists. A means of assigning appraisal and relocation staff to affected property owners, tenants, or other residents on an individual basis. Individualized assistance to affected property owners, tenants, or other residents in applying for funding, including research to summarize loans, grants, and federal aid available, and research areas for relocation. Creation of an ombudsman's position to act as a single point of contact for property owners, residents, and tenants with questions about the relocation process. The ombudsman will also act to address concerns about the relocation process as it applies to the individual situations of property owners, tenants, and other residents. 	Design/ Construction	Prepare plan	Prior to acquisitions	Authority	Authority	Develop relocation mitigation plan	Condition of construction contract
Station Planning, Land Use, and Development									
LU-IAMF#1	HSR Station Area Development: General Principles	<p>Prior to O&M, the Authority will prepare a memorandum for each station describing how the Authority's station area development principles and guidelines are applied to achieve the anticipated benefits of station area development. Refer to <i>HST Station Area</i></p>	Post-construction	Reporting	For each station	Authority	Authority	Authority would prepare a technical memorandum for	Condition of construction contract

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
	and Guidelines	<i>Development: General Principles and Guidelines</i> (Authority 2011b).						each station	
LU-IAMF#2	Station Area Planning and Local Agency Coordination	Prior to O&M, the Authority will prepare a memorandum for each station describing the local agency coordination and station area planning conducted to prepare the station area for HSR operations. Refer to <i>HST Station Area Development: General Principles and Guidelines</i> (Authority 2011b).	Post-construction	Reporting	For each station	Authority	Authority	Authority would prepare a technical memorandum for each station	Condition of construction contract
LU-IAMF#3	Restoration of Land Used Temporarily during Construction	Prior to any ground-disturbing activities at the site of land to be used temporarily during construction, the contractor will prepare a restoration plan addressing specific actions, sequence of implementation, and parties responsible for implementation and successful achievement of restoration for temporary impacts. Before beginning construction use of land, the contractor will submit the restoration plan to the Authority for review and obtain Authority approval. The restoration plan will include time-stamped photo documentation of the pre-construction conditions of all temporary staging areas. All construction access, mobilization, material laydown, and staging areas will be returned to a condition equal to the pre-construction staging condition. This requirement is included in the design-build construction contract requirements.	Pre-construction	Prepare restoration plan	Prior to construction	Authority/ Contractor	Contractor	Contractor would prepare a restoration plan	Condition of construction contract
Parks, Recreation, and Open Space									
PK-IAMF#1	Parks, Recreation, and Open Space	<p>Prior to construction, the contractor will prepare and submit to the Authority a technical memorandum that identifies project design features to minimize construction impacts on parks, recreation, and open space. Typical design measures to avoid or minimize impacts on parks and recreation may include:</p> <ul style="list-style-type: none"> Provide safe and attractive access for present travel modes (e.g., motorists, bicyclists, pedestrians—as applicable) to existing park and recreation facilities. Design guideway, system, and station features in such a way as to enhance the surrounding local communities. Provide easy crossings of the guideway that allow for community use under the guideway or at station areas. 	Pre-construction	Reporting	At incorporation or completion of design/monthly reporting during construction	Authority/ Contractor	Contractor	Prepare technical memorandum that documents project design features that minimize impacts on parks, recreation, and open space	Condition of construction contract
Aesthetics and Visual Quality									
AVQ-IAMF#1	Aesthetic Options	For the numerous HSR non-station structures across the state, the Authority seeks to balance providing a consistent, project-wide aesthetic with the local aesthetic context. Accordingly, the Authority has created a guidance document, <i>Draft Design Opportunities for Local Jurisdictions and Aesthetic Requirements</i> (Authority 2017), to provide local jurisdictions with examples of aesthetic options that can be applied to non-station elements in the HSR system, such as integrated patterns and textures in the concrete on elevated guideway columns, parapets or retaining walls and the types of materials for sound walls. In addition, the Authority has prepared an <i>Aesthetics Manual for Non-Station Structures</i> (Authority 2014a) that establishes principles to guide designers, responding to requests for proposals for design-build services toward an appropriate level of aesthetic quality in their design. Prior to the selection of a design-build contractor, the <i>Draft Design Opportunities for Local Jurisdictions and Aesthetic Requirements</i> guidance document will be provided to local jurisdictions to inform their understanding of aesthetic options to be selected. The <i>Aesthetics Manual for Non-Station Structures</i> will be provided to proposing design-build contractors.	Pre-construction	Reporting	At incorporation or completion of design/monthly reporting during construction	Authority/ Contractor	Contractor	Prepare aesthetics technical memorandum	Condition of construction contract
AVQ-IAMF#2	Aesthetic Review Process	<p>Prior to selecting the design-build contractor, in accordance with the aesthetic review process identified for non-station structures in the Authority's <i>Draft Design Opportunities for Local Jurisdictions and Aesthetic Requirements</i> guidance document, the Authority will:</p> <ul style="list-style-type: none"> Prepare documentation that identifies elements along the HSR alignment that are recommended for aesthetic treatment and HSR system and local infrastructure elements for which design-build proposals will be expected to demonstrate aesthetic design expertise. Consult with local jurisdictions on how best to involve the community in the process to 	Pre-construction	Reporting	At incorporation or completion of design/monthly reporting during construction	Authority/ Contractor	Contractor	Prepare aesthetics review process technical memorandum	Condition of construction contract

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		<p>identify their aesthetic preferences. The Authority will present the project elements to local jurisdictions for discussion. Local jurisdictions will provide the Authority with their initial written input on local aesthetic treatment preferences.</p> <ul style="list-style-type: none"> Evaluate the identified aesthetic preferences for potential cost, schedule, and operational impacts and compatibility with project-wide aesthetic goals. Coordinate with the local jurisdiction on the aesthetic approach that will be documented in a Design Options and Aesthetics Cooperative Agreement, as shown in Appendix A of the Draft Design Opportunities for Local Jurisdictions and Aesthetic Requirements. Incorporate the agreed-upon aesthetic approaches in the construction procurement documents. Work with the selected contractor and local jurisdictions to implement the local jurisdictions' aesthetic preferences as documented in the Design Options and Aesthetics Cooperative Agreements. 							
Cultural Resources									
CUL-IAMF#1	Geospatial Data Layer and Archaeological Sensitivity Map	<p>Prior to construction (any ground-disturbing activities) and staging of materials and equipment, the contractor's archaeologist will prepare a geospatial data layer identifying the locations of all known archaeological resources and historic built resources that require avoidance or protection, and areas of archaeological sensitivity that require monitoring within the APE. The contractor's archaeologist, who meets the SOI's Professional Qualification Standards provided in 36 C.F.R. Part 61, will use, as appropriate, a combination of the following: known locations of archaeological sites and historic built resources, tribal consultation, landforms, depositional processes, distance to water, mapping provided in the ATP, or historic mapping. This mapping is to be updated as the design progresses if it results in an expansion of the APE, including temporary construction easements and new laydown and access areas. This mapping will be used to develop an archaeological monitoring plan to be prepared by the contractor's archaeologist, and upon approval by the Authority, implemented by the contractor's archaeologist. When design is sufficiently advanced, a geospatial data layer will be produced by the contractor overlaying the locations of all known archaeological resources and historic built resources within the APE, for which avoidance or protection measures are necessary, and all archaeologically sensitive areas, for which monitoring is required.</p>	Design/Pre-construction	Prepare plan	At incorporation or completion of design	Contractor's archaeologist or geoarchaeologist	Authority	Prepare geospatial data layer	Condition of construction contract
CUL-IAMF#2	WEAP Training Session	<p>Prior to construction (any ground-disturbing activity), construction contractor personnel who work on-site will attend a WEAP training session provided by the contractor. The WEAP will include cultural resources awareness training performed by the contractor's archaeologist or architectural historian who meets the SOI's Professional Qualification Standards provided in 36 C.F.R. Part 61. The contractor will develop instructional materials and a fact sheet for distribution to the construction crews, and submit the materials, as well as qualifications of the personnel providing the training, to the Authority for approval at least 15 days prior to being permitted on-site access. The training will address measures required to avoid or protect historic built resources, educate crews on artifacts and archaeological features they may encounter and the mandatory procedures to follow should potential cultural resources be exposed during construction. Translation services will be provided by the contractor for non-English-speaking participants. The training sessions will be given prior to the initiation of any ground-disturbing activities and repeated on an annual basis. Additionally, new construction crewmembers will attend an initial WEAP training session prior to working on-site.</p> <p>On completion of the WEAP training, construction crews will sign a form stating that they attended the training, understood the information presented, and will comply with the WEAP requirements. The contractor's archaeologist or architectural historian will submit the signed WEAP training forms to the mitigation manager on a monthly basis. On an annual basis, the contractor will provide the Authority with a letter indicating that regular</p>	Pre-construction	Training program/ Reporting	Annual (training)/ Monthly (reporting)	Authority/ Contractor	Contractor	WEAP training	Condition of construction contract

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		WEAP training has been implemented and will provide at least one PowerPoint annually of the WEAP training. On a monthly basis, the contractor's archaeologist or architectural historian will provide updates and synopsis of the training to workers during the daily safety ("tailgate") meeting. Construction crews will be informed during the WEAP training that, to the extent possible, travel within the marked project site will be restricted to established roadbeds.							
CUL-IAMF#3	Pre-Construction Cultural Resource Surveys	Prior to construction (any ground-disturbing activities in areas not yet surveyed) and the staging of materials and equipment, the contractor will conduct pre-construction cultural resource surveys. Resulting from lack of legal access, much of the construction footprint may not have been surveyed. Once parcels are accessible, the contractor will have archaeologists or architectural historians, as appropriate, who meet the SOI's Professional Qualification Standards survey and complete appropriate reports for archaeological or historic built resources, in accordance with the documentation requirements stipulated in the Section 106 Programmatic Agreement. Identified resources will be evaluated for listing in the NRHP and CRHR. The qualified archaeologist or architectural historian, as appropriate, will assess the project's potential to affect historic properties (NRHP) by applying the effects criteria in 36 C.F.R. Section 800.5(a)(1). The project's potential to cause significant impacts on historical resources (CRHR) will be analyzed by applying the criteria in CEQA Guidelines Section 15064.5(b). Should the Authority, in consultation with the SHPO, determine that any newly identified historic properties or historical resources will be adversely affected, the BETP or ATP will be amended to document the mitigation measures agreed upon by the MOA signatories. The schedule of these surveys will be dependent on the timing of obtaining legal access to the properties and may be driven by the need to complete construction-related activities (e.g., geotechnical borings, laydown yards). Prior to beginning surveys, updated records searches may be required by the Authority to validate that accurate information was obtained regarding previous inventory and evaluation efforts. The contractor's archaeologist or architectural historian, in consultation with the Authority, will determine if an updated records search is required. If an updated records search is necessary, the search will be performed by the contractor's archaeologist or architectural historian.	Pre-construction	Conduct pre-construction surveys; Identify historic and/or cultural resources	Surveys conducted prior to ground disturbance	Authority/ Contractor	Contractor	Cultural resource surveys conducted prior to ground disturbance	Condition of construction contract
CUL-IAMF#4	Relocation of Project Features when Possible	Changing the rail alignment to avoid newly discovered sites is likely infeasible; however, access areas and laydown sites may be relocated should their proposed location be found to be on archaeological sites or have the potential to affect historic built resources in the vicinity. The contractor will delineate all of the applicable avoidance and protection measures as identified in the final treatment plans for identified archaeological and historic built resources on construction drawings prior to the start of construction. Additionally, as the design progresses, the contractor will site project features such as communication towers or other rail infrastructure to avoid and protect identified archaeological and built historic properties and historical resources. The Authority will establish regular coordination meetings with the contractor's qualified staff of archaeologists and architectural historians to ensure that the identified resources are avoided and the project designs have taken these resources into account.	Construction	Relocation of access areas and laydown sites	As needed	Authority/ Contractor	Contractor	Relocation access areas and laydown sites as needed to avoid archaeological or historic built resources	Condition of construction contract
CUL-IAMF#5	Archaeological Monitoring Plan and Implementation	Prior to construction the contractor's professionally qualified archaeologist, as defined in the Section 106 Programmatic Agreement, will prepare a monitoring plan based on the results of geospatial data layer and archaeological sensitivity map and in accordance with the ATP to ensure that all protection measures and protocols for data recovery are followed. The plan is to be reviewed and approved by the Authority prior to any ground-disturbing activities and will adhere to the <i>Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation</i> . During construction (any ground-disturbing activities) or staging of materials or equipment, the contractor will be responsible for implementing the monitoring plan and providing archaeological and tribal monitoring of ground-disturbing construction activities with a potential to affect archaeological remains in	Pre-construction/ Construction	Prepare and implement monitoring plan	Prior to construction (prepare plan)/ During construction (implement plan)	Authority/ Contractor	Contractor	Prepare archaeological monitoring plan	Condition of construction contract

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		areas identified as archaeologically sensitive in the ATP. The contractor will obtain Authority approval of all persons providing archaeological or tribal monitoring.							
CUL-IAMF#6	Pre-Construction Conditions Assessment, Plan for Protection of Historic Built Resources, and Repair of Inadvertent Damage	<p>Prior to construction (any ground-disturbing activities that are within 1,000 feet of a historic built resource), the contractor may be required to assess the condition of historic built resources adjacent to construction and prepare a Plan for the Protection of Historic Built Resources and Repair of Inadvertent Damage. The MOA and BETP will stipulate properties for which the plan is to be prepared. MOA signatories and consulting parties may comment on the adequacy of the assessments. Protection measures will be developed in consultation with the landowner or land-owning agencies as well as the SHPO and the MOA signatories and consulting parties, as required by the Section 106 Programmatic Agreement. As the design progresses, additional properties may be identified by the Authority as requiring this plan. The plan will record existing conditions to (1) establish a baseline against which to compare the property's post-project condition, (2) identify structural deficiencies that make the property vulnerable to project construction related damage, such as vibration, and (3) identify stabilization or other measures required to avoid or minimize inadvertent adverse effects. The plan will be further described in the BETP and be prepared by an interdisciplinary team, including (but not limited to) as appropriate, an architectural historian, architect, photographer, structural engineer, and acoustical engineer. Ambient conditions will be used to identify buildings that are sensitive receptors to construction-related vibration and require vibration monitoring during construction activities. Additional protective measures may be required if the property is vacant during construction.</p> <p>The plan content will be outlined in the BETP and is to be completed and approved by the Authority, with protective measures implemented before construction begins within 1,000 feet of the subject property. The plan will describe the protocols for documenting inadvertent damage (should it occur), as well as notification, coordination, and reporting to the SHPO, MOA signatories, and the owner of the historic built resource. The plan will direct that inadvertent damage to historic built resources will be repaired in accordance with the SOI's Standards for the Treatment of Historic Properties (U.S. Department of the Interior 1995). The plan will be developed in coordination with the Authority, and it will be submitted to the SHPO for review and approval. Protective plans will be required for buildings that will be moved as part of the project mitigation, including stabilization before, during, and after relocation; protection during temporary storage; and relocation to a new site, followed by rehabilitation.</p>	Pre-construction	Conduct assessment and protection plan	Required if within 1,000 feet of historic built property	Contractor/ Authority	Contractor/ Authority	Assess the condition of construction-adjacent historic properties and prepare a Plan for the Protection of Historic Built Resources and Repair of Inadvertent Damage	MOA/PA/BETP
CUL-IAMF#7	Built Environment Monitoring Plan	<p>Prior to construction (any ground-disturbing activities within 1,000 feet of a historic built resource), the contractor will prepare a BEMP. The BEMP will be prepared describing the properties that will require monitoring, the type of activities or resources that will require full-time monitoring or spot checks, the required number of monitors for each construction activity, and the parameters that will influence the level of effort for monitoring. Maximum vibration level thresholds may be established in the Plan for Protection of Historic Resources and Repair of Inadvertent Damage. Monitoring maximum vibration thresholds will be included in the BEMP. The BETP will outline the process for corrective action should the protection measures prove ineffective. Consultation procedures will also be defined in the BETP. The contractor will develop both the draft and final plans in coordination with the Authority and will submit the BETP to the SHPO for review and approval. The plan will be implemented prior to any ground-disturbing activities within 1,000 feet of properties identified as requiring monitoring, as specified in the BETP.</p>	Pre-construction	Prepare monitoring plan	Required if within 1,000 feet of historic built property	Contractor/ Authority	Contractor/ Authority	Prepare a BEMP	BETP
CUL-IAMF#8	Implement Protection and/or Stabilization Measures	<p>The contractor will implement the measures described in the Plan for Protection of Historic Resources and Repair of Inadvertent Damage and in the BETP. Such protection measures will include, but will not be limited to, vibration monitoring of construction in the vicinity of historic built resources; cordoning off of resources from construction activities (e.g., traffic, equipment storage, personnel); shielding of resources from dust or debris; and stabilization</p>	Pre-construction	Implement protection and/or stabilization measures	Per BETP	Contractor/ Authority	Contractor	Implement historic built resource protection measures per	BETP

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		<p>of buildings and structures adjacent to construction. The monitoring measures described in the BEMP will ensure that protection measures are in place before construction begins. Additionally, monitoring during construction will verify that the protection measures are effective. For resources requiring vibration monitoring, the monitor will be responsible for setting up on-site vibration monitoring devices at the approximate location of the construction site; monitoring vibration levels, issuing a temporary work stoppage if maximum vibration level thresholds are reached; implementing the procedures outlined in a vibration monitoring and control plan if construction activities result in vibration exceedances or an unanticipated impact occurs; reporting to the Authority any concerns or issues related to the historic built resources within the APE that may require further investigation; and documenting monitoring activities in a daily log and summarizing these activities in a monthly report. The contractor will submit the monitoring logs and monthly reports to the Authority as they are completed.</p> <p>Temporary stabilization and protection measures will be removed after construction is complete, and the historic built resources will be restored to their pre-construction condition. For buildings that will be moved, treatment will include stabilization before, during, and after relocation; protection during temporary storage; and relocation to a new site, followed by rehabilitation.</p>						BETP	

AASHTO	American Association of State Highway and Transportation Officials	FRA	Federal Railroad Administration	VOC	volatile organic compound
ADA	Americans with Disabilities Act	FTA	Federal Transit Administration	WEAP	Worker Environmental Awareness Program
ASTM	American Society for Testing and Materials	HEPA	high efficiency particulate air	WCP	weed control plan
APE	area of potential effects	HSR	high-speed rail		
APLIC	Avian Power Line Interaction Committee	IAMF	impact avoidance and minimization feature		
APTA	American Public Transportation Association	IBC	International Building Code		
AREMA	American Railway Engineering and Maintenance-of-Way Association	IEEE	Institute of Electrical and Electronics Engineers		
ASCE	American Society of Civil Engineers	ISEP	Implementation Stage Electromagnetic Compatibility Program Plan		
ATP	archaeological treatment plan	MBTA	Migratory Bird Treaty Act		
Authority	California High-Speed Rail Authority	MOA	Memorandum of Agreement		
BCDC	San Francisco Bay Conservation and Development Commission	mph	miles per hour		
BEMP	built environment monitoring plan	NMFS	National Marine Fisheries Service		
BETP	built environment treatment plan	NPDES	National Pollutant Discharge Elimination System		
BGEPA	Bald and Golden Eagle Protection Act	NRHP	National Register of Historic Places		
BMP	best management practice	O&M	operations and maintenance		
BRMP	biological resources management plan	OSHA	Occupational Safety & Health Administration		
C.F.R.	Code of Federal Regulations	PDDM	Project Development and Design Manual		
Cal-OSHA	California Division of Occupational Safety and Health	PHA	preliminary hazard analysis		
Caltrans	California Department of Transportation	PM _{2.5}	particulate matter smaller than or equal to 2.5 microns in diameter		
CARB	California Air Resources Board	Porter-Cologne Act	Porter-Cologne Water Quality Control Act		
CDFW	California Department of Fish and Wildlife	PRM	paleontological resource monitor		
CDPH	California Department of Public Health	PRMMP	paleontological resources monitoring and mitigation plan		
CDSM	cement deep-soil-mixing	PRS	paleontological resources specialist		
CEQA	California Environmental Quality Act	QSP	Qualified SWPPP Practitioner		
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act	RCRA	Resource Conservation and Recovery Act		
CESA	California Endangered Species Act	RRP	restoration and revegetation plan		
CMP	compensatory mitigation plan	RWQCB	Regional Water Quality Control Board		
CMP	construction management plan	SFBAAB	San Francisco Bay Area Air Basin		
CP	construction package	SHPO	State Historic Preservation Officer		
CPUC	California Public Utilities Commission	SOI	Secretary of the Interior		
CRHR	California Register of Historical Resources	SPCCP	spill prevention, control, and countermeasure plan		
CTP	construction transportation plan	SSP	systems safety program		
CWA	Clean Water Act	SWPPP	stormwater pollution prevention plan		
DTSC	California Department of Toxic Substances Control	SVP	Society of Vertebrate Paleontology		
EMC	electromagnetic compatibility	SWRCB	State Water Resources Control Board		
EMF	electromagnetic field	TVA	threat and vulnerability assessment		
EMI	electromagnetic interference	Uniform Act	Uniform Relocation Assistance and Real Property Acquisition Policies Act, as amended		
EMMA	Environmental Mitigation Management and Assessment	USACE	U.S. Army Corps of Engineers		
ESA	environmental site assessment	USEPA	U.S. Environmental Protection Agency		
ESA	environmentally sensitive areas	USFWS	U.S. Fish and Wildlife Service		
FESA	federal Endangered Species Act	VFHS	Valley Fever Health and Safety		
FHWA	Federal Highway Administration	VMT	vehicle miles traveled		

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**APPENDIX E: STATE HISTORIC PRESERVATION OFFICER SECTION 106
CONCURRENCE LETTER, MAY 18, 2020, AND MEMORANDUM OF
AGREEMENT, JUNE 22, 2022**

**DEPARTMENT OF PARKS AND RECREATION
OFFICE OF HISTORIC PRESERVATION**

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Lisa Ann L. Mangat, Director

May 18, 2020

Reference Number: FRA100524B

Brett Rushing
Cultural Resources Program Manager
California High-Speed Rail Authority
770 L Street, Suite 620
Sacramento, CA 95814

Submitted Via Electronic Mail

Re: High Speed Rail Program, Review and Concurrence on Findings Presented in the *San Francisco to San Jose Project Section, Section 106 Finding of Effect Report*, Prepared by ICF (April 2020)

Dear Mr. Rushing:

The California State Historic Preservation Officer (SHPO) is in receipt of your April 3, 2020 submittal continuing consultation regarding the San Francisco to San Jose project section of the California High-Speed Rail Program. This consultation is undertaken in accordance with the 2011 *Programmatic Agreement Among the Federal Railroad Administration, the Advisory Council on Historic Preservation, the California State Historic Preservation Officer, and the California High-Speed Rail Authority (Authority) regarding Compliance with Section 106 of the National Historic Preservation Act, as it pertains to the California High-Speed Train Project (PA)*. The Authority is seeking comments and concurrence on the finding summarized in the following report:

- *San Francisco to San Jose Project Section, Section 106 Finding of Effect Report, April 2020 (FOE)*

The FOE analyzes the effects of the state preferred alternative for the undertaking on 21 built- environment properties and 21 archaeological resources located within the Area of Potential Effects (APE). The FOE concludes that the preferred alternative would cause no adverse effects to the 21 built-environment historic properties. All of archaeological resources are assumed eligible for listing on the National Register of Historic Places, although formal evaluation of these resources is still pending due to lack of legal access to parcels and rights-of-way.

Having reviewed the FOE, SHPO offers the following comments:

- 1) SHPO concurs that the Preferred Alternative will not have an adverse effect on the following sixteen built-environment properties:
 - ID #08: Airport Boulevard Underpass/South San Francisco Subway
 - ID #12: SPRR Depot/Milbrae Station
 - ID #13: Jules Francard Grove/Francard Tree Rows
 - ID #14: SPRR Depot/Burlingame Railroad Section
 - ID #18: SPRR Depot/San Carlos Station
 - ID #21;21a: SPRR, Dumbarton Cutoff Linear Historic District; Dumbarton Cutoff Railroad Line
 - ID #22: Willie Mays Jr. House
 - ID #24: SPRR Depot/Atherton Station
 - ID #25: Carriage House & Water Tower, Holbrook-Palmer Estate (Elmwood)
 - ID #28: SPRR Depot/Menlo Park Railroad Station
 - ID #29: SPRR San Francisquito Creek Bridge
 - ID #30: El Palo Alto
 - ID #31: Palo Alto SPRR Depot
 - ID #32: University Avenue Underpass
 - ID #35: Embarcadero Underpass
 - ID #37; 37a; 37b; 37c: Tract 795, Charleston Meadows; 4133 Park Boulevard; 4118 Park Boulevard; 4126 Park Boulevard

- 2) SHPO concurs that the Preferred Alternative will have no effect on the following five built-environment properties:
 - ID #01: San Francisco Auxiliary Water Supply System
 - ID #03; 03a; 03b: Central Waterfront Historic District; SPRR Tunnel No. 2/ Bayshore Cutoff Tunnel No.1; SPRR Tunnel No. 2/Bayshore Cutoff Tunnel No. 2
 - ID #05: SPRR Tunnel No. 3
 - ID #06: SPRR Tunnel No. 4
 - ID #07: SPRR Bayshore Roundhouse

- 3) SHPO agrees with the Authority's finding that the phased application of the criteria of adverse effect on the 21 archaeological resources identified in Table 2 of the Authority's April 3, 2020 letter is appropriate at this time, as per 36 CFR 800.5(a)(3) and PA stipulations VI.E and VIII.A.1

I look forward to continuing consultation with the Authority on this undertaking. If you have any questions, please contact Tristan Tozer, Historian, at (916) 445-7027 or Tristan.Tozer@parks.ca.gov.

Sincerely,



Julianne Polanco
State Historic Preservation Officer

**MEMORANDUM OF AGREEMENT
AMONG THE CALIFORNIA HIGH-SPEED RAIL AUTHORITY, THE SURFACE TRANSPORTATION BOARD,
AND THE CALIFORNIA STATE HISTORIC PRESERVATION OFFICER
REGARDING THE SAN FRANCISCO TO SAN JOSE PROJECT SECTION OF THE
CALIFORNIA HIGH-SPEED RAIL PROGRAM IN
SAN FRANCISCO, SAN MATEO, AND SANTA CLARA COUNTIES, CALIFORNIA**

WHEREAS, the California High-Speed Rail Authority (Authority) proposes to construct the San Francisco to San Jose Project Section (the Undertaking), an approximately 43-mile portion of the California High-Speed Rail Program in San Francisco, San Mateo, and Santa Clara Counties, which would consist of modifying existing tracks and stations and constructing a new rail alignment, stations, a maintenance facility, electrical substations, and other appurtenant facilities between Fourth and King Street Station in San Francisco and Scott Boulevard in Santa Clara; and

WHEREAS, the San Francisco to San Jose Project Section was identified as an undertaking subject to review under Section 106 of the National Historic Preservation Act (54 United States Code [U.S.C.] § 306108) (Section 106) and its implementing regulations (36 Code of Federal Regulations [CFR] Part 800) in the *Programmatic Agreement among the Federal Railroad Administration, the Advisory Council on Historic Preservation, the California State Historic Preservation Officer, and the California High-Speed Authority regarding compliance with Section 106 of the National Historic Preservation Act as it pertains to the California High-Speed Train Project* executed on July 22, 2011, which was amended with the *First Amendment to the Programmatic Agreement among the Federal Railroad Administration, the Advisory Council on Historic Preservation, the California State Historic Preservation Officer, and the California High-Speed Rail Authority regarding compliance with Section 106 of the National Historic Preservation Act as it pertains to the California High-Speed Train Project* (PA) executed on July 21, 2021 (**Attachment 1**); and

WHEREAS, the Authority has coordinated compliance with Section 106 and 36 CFR Part 800 with steps taken to meet the requirements of the National Environmental Policy Act (NEPA), Section 4(f) of the Department of Transportation Act of 1966 (49 U.S.C. § 303), and the California Environmental Quality Act (CEQA) and has planned public participation, analysis, and review in such a way to satisfy the requirements of each statute; and

WHEREAS, on July 23, 2019, the State of California and the Federal Railroad Administration (FRA) executed a memorandum of understanding under the Surface Transportation Project Delivery Program (known as NEPA Assignment), pursuant to the legal authority under 23 U.S.C. § 327; and under NEPA Assignment, the State, acting through the California State Transportation Agency and the Authority, assumed FRA's responsibilities under NEPA and other federal environmental laws, including Section 106, for the California High-Speed Rail Program, including the Undertaking; and

WHEREAS, the FRA notified the Authority that the FRA would not be participating in consultation regarding the Undertaking; and

WHEREAS, government-to-government consultation with federally recognized Native American tribes remains the FRA's responsibility under NEPA Assignment; and

WHEREAS, on April 18, 2013, the Surface Transportation Board (STB) issued a decision concluding that it has jurisdiction over the construction of the California High-Speed Rail Program, requiring the Authority to obtain STB approval for the construction of each project section, and the STB subsequently

designated FRA lead agency to act on its behalf for the purposes of compliance with Section 106 for California High-Speed Rail Program undertakings; and on June 23, 2021, the STB designated the Authority as lead Federal agency for Section 106 and the STB accepted the Authority's invitation to be an Invited Signatory to this memorandum of agreement (MOA); and

WHEREAS, on May 20, 2020, the United States Army Corps of Engineers (USACE), San Francisco, Sacramento, and Los Angeles districts, sent a letter to the Authority reaffirming their understanding regarding the Authority's role as lead agency for compliance with Section 106, and that the Authority has the responsibility to act on the USACE's behalf for their discretionary federal actions related to all project sections of the California High-Speed Rail Program; and

WHEREAS, the Undertaking would be designed and constructed using a procurement process, in which the current level of design is generally 15 percent complete and which the Authority's contractor (the Contractor) will advance to 100 percent, potentially resulting in adjustments to the project footprint; and

WHEREAS, the Authority has delineated the Area of Potential Effects (APE) for the Undertaking based on the current level of design in accordance with Stipulation VI.A of the PA to encompass the geographic areas within which the Undertaking may directly or indirectly cause alterations in the character or use of historic properties, as depicted in **Attachment 2**; and

WHEREAS, the Authority surveyed the APE for built-environment resources and, in consultation with the California State Historic Preservation Officer (SHPO) and other consulting parties, determined that the APE contains 21 built-environment historic properties listed in or considered eligible for listing in the National Register of Historic Places (**Attachment 3**); and

WHEREAS, due to access restrictions and the predominance of paved or otherwise non-visible ground surfaces, the Authority has not yet surveyed any of the project footprint for archaeological resources and, in consultation with the SHPO and other consulting parties, determined that the APE contains 22 previously identified archaeological resources (**Attachment 3**) that are presumed to be NRHP-eligible for planning purposes; and

WHEREAS, the Authority proposes to phase the identification and evaluation of archaeological historic properties as provided for in Stipulation VI.E of the PA and 36 CFR § 800.4(b)(2); and

WHEREAS, the Advisory Council on Historic Preservation (ACHP) notified the Authority that the ACHP would not be participating in consultation regarding the Undertaking by letter on June 11, 2021; and

WHEREAS, the Authority, in consultation with the SHPO, STB, and other Consulting Parties, determined that the Undertaking as currently designed may have no adverse effect on 16 built-environment historic properties and no effect on 5 built-environment historic properties, as documented in the Finding of Effect (FOE) report for the San Francisco to San Jose Project Section and as listed in **Attachment 3** of this MOA; the Authority will phase the evaluation and effects assessment for the 22 archaeological properties that have been identified in the APE; and

WHEREAS, the Authority will ensure the avoidance, minimization, or resolution of adverse effects of the Undertaking on historic properties through the execution and implementation of this MOA and the implementation of the Archaeological Treatment Plan (ATP; **Attachment 4**) and the Built Environment Treatment Plan (BETP; **Attachment 5**) (collectively referred to as the Treatment Plans); and

WHEREAS, in accordance with Stipulations V.A and V.B of the PA, the Authority has consulted with agencies with jurisdiction over portions of the APE and other parties with a demonstrated interest in the Undertaking, a legal or economic relation to an affected historic property, or concern with the Undertaking's effects on historic properties, as noted in **Attachments 6 and 7**, about the Undertaking and its effects on historic properties and has taken into account all comments received from them; and

WHEREAS, in accordance with Stipulations IV.B and IV.C of the PA, the Authority has consulted with or made a good faith effort to consult with California Native American tribes that are on the Native American Heritage Commission's consultation list and are traditionally and culturally affiliated with the APE of the Undertaking; the California Native American tribes that have chosen to participate in the consultation are identified in **Attachment 7**; and

WHEREAS, the parties listed in **Attachments 6 and 7** have accepted the Authority's invitation to be consulting parties to the Undertaking (collectively referred to as the Consulting Parties); and

WHEREAS, the Authority sought and considered the views of the public on this Undertaking through its public involvement program as part of the environmental review process and requirements of NEPA and CEQA, as described in the Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for the Undertaking, which included distributing informational materials to the public, making presentations and soliciting comments at public meetings, and circulating the draft and final EIR/EIS and supporting technical reports for public review and comment; and

WHEREAS, the Authority and SHPO are collectively referred to as the Signatories; STB is referred to as an Invited Signatory; and

WHEREAS, the Consulting Parties other than the Signatories and Invited Signatory have been invited to sign this MOA as concurring parties (collectively referred to as Concurring Parties); and

NOW, THEREFORE, the Authority and SHPO agree the Undertaking will be implemented in accordance with the following stipulations in order to take into account the effects of the Undertaking on historic properties, and further agree that these stipulations shall govern the Undertaking and all its parts until this MOA expires or is terminated.

STIPULATIONS

The Authority, with the assistance of its Contractor, shall ensure that the following stipulations of this MOA are carried out:

I. OVERSIGHT AND COORDINATION

The Authority, as the lead federal agency, will be responsible for ensuring compliance with all stipulations of this MOA, with the exception of government-to-government consultation with federally recognized Native American tribes, which remains the FRA's responsibility under NEPA Assignment.

The Authority shall ensure that the terms of this MOA, including the ATP and BETP, are incorporated in their entirety in all contracts, licenses, or other approvals for this Undertaking and shall ensure the completion of all measures specified in this MOA, including in the ATP and BETP.

The Authority shall ensure that it carries out its responsibilities under the PA (as may be amended from time to time) and any subsequent programmatic agreements regarding compliance with Section 106, to the extent such responsibilities are applicable to the Undertaking and in effect.

As an Invited Signatory, STB will receive all documentation related to this MOA and Treatment Plans, will be provided the opportunity to review and comment on such documentation during the implementation of this MOA, and will be part of the ongoing consultation process during implementation of this MOA. The Authority will consider any comments made by STB prior to finalizing all MOA-associated documentation.

II. MODIFICATIONS TO THE AREA OF POTENTIAL EFFECTS

In accordance with the PA, the APE was developed and agreed upon by the Authority and the SHPO, and accounts for potential impacts on both archaeological and built-environment resources that may result from the construction and operation of the Undertaking.

If modifications to the Undertaking, subsequent to the execution of this MOA, necessitate the revision of the APE, the Authority is responsible for informing the SHPO, Invited Signatory, and other Consulting Parties within 15 days of identification of the needed changes in accordance with PA Stipulation VI. The Authority shall document the revised APE in an appropriate supplemental identification report (e.g., APE Modification Memo, addendum Archaeological Survey Report, and/or addendum Historic Architecture Survey Report). The SHPO will have 30 days to review the modified APE. If the SHPO objects to the modified APE, the Authority will revise the APE to address SHPO comments and resubmit for review. The SHPO will have 30 days to review and comment on this revised APE.

III. COMPLETION OF HISTORIC PROPERTIES IDENTIFICATION AND EVALUATION EFFORT PRIOR TO CONSTRUCTION

The Authority will ensure that any additional historic property identification and evaluation efforts are completed as outlined below and that documentation of the identification and evaluation efforts is prepared in accordance with this MOA, including the ATP and BETP, and PA Stipulation VI. The Authority will submit documentation of these efforts to the SHPO, Invited Signatory, and other interested Consulting Parties for a 30-day review period. Prior to finalizing any inventory and evaluation documentation, the Authority shall consider the comments regarding identification efforts that are received through this consultation process.

Completion of the historic properties identification and evaluation effort will be consistent with Stipulation VI (Identification and Evaluation of Historic Properties) and Stipulation IX (Changes in Ancillary Area/Construction Right-of-Way) of the PA, including archaeological survey of areas not previously accessible/surveyed prior to construction. The Authority shall provide the SHPO, Invited Signatory, and other Consulting Parties with the information necessary to document that efforts to identify and evaluate historic properties in the Undertaking's APE are sufficient to comply with 36 CFR § 800.4(b) and (c).

The Authority will ensure that addendum FOEs (aFOE) are prepared, in accordance with PA Stipulation VII, once supplemental historic property identification efforts are completed. The Authority will submit aFOEs to the SHPO, Invited Signatory, and other Consulting Parties with an interest in the historic

property for a concurrent 30-day review period. The Authority shall take into consideration all comments regarding effects received within the review period prior to finalizing aFOEs for submission to the SHPO for review and concurrence. The SHPO shall have an additional 30 days to review final aFOE reports. If the SHPO makes no objection within the final 30-day review period, the findings for resources documented in the aFOE will become final. Should SHPO have any objections, the Authority will follow Stipulation VII.A, Dispute Resolution, in this MOA.

IV. TREATMENT OF HISTORIC PROPERTIES IDENTIFIED IN THE APE

This MOA outlines the Authority's commitments regarding the treatment of all historic properties, both currently known and yet-to-be-identified, that may be affected by the Undertaking. As allowed under Stipulation VIII.B of the PA, this MOA includes provisions for treatment plans that include use of a combined archaeological testing and data recovery program. Two detailed historic property Treatment Plans have been prepared for the Undertaking: the ATP and the BETP.

The ATP (**Attachment 4**) describes treatments for effects on archaeological properties and Native American traditional cultural properties. The BETP (**Attachment 5**) describes the treatments for effects on built environment resources. The work described in the Treatment Plans will be conducted prior to construction, during construction, and/or after construction of the Undertaking in the manner specified in the Treatment Plans. The treatments to historic properties known at the time of execution of this MOA are summarized in an impact/treatment table, organized by historic property, in **Attachment 3**. The treatment measures listed will be applied to historic properties affected in order to avoid, minimize, and/or mitigate effects of the Undertaking. The Authority shall implement and complete the treatment measures within 2 years of completion of construction of the Undertaking, or earlier if so specified. The Authority shall ensure that sufficient time and funding are provided to complete all necessary preconstruction commitments before disturbances related to the Undertaking occur.

A. Archaeological Treatment Plan

The ATP describes in detail the methods that will be employed to complete the historic properties identification effort within the Undertaking's APE as part of the phased identification of archaeological resources. More specifically, the ATP builds upon the identification efforts completed to date and specifies where and under what circumstances further efforts to identify significant archaeological deposits will take place within the Undertaking's areas of physical impact.

The ATP also describes in detail the avoidance, minimization, and/or mitigation treatment measures for all currently known and yet-to-be-identified significant archaeological resources and Native American cultural resources affected by the Undertaking. Additional measures to avoid, minimize, or mitigate adverse effects on archaeological historic properties may be developed in consultation with Consulting Parties as identification and evaluation efforts are performed in future planning and construction phases of the Undertaking. The Authority commits to implementing the terms of the ATP.

The SHPO, Invited Signatory, and other Consulting Parties with an interest in archaeological resources shall have the opportunity to review and comment on cultural resources documentation specified in the ATP in accordance with Stipulation VI of this MOA.

B. Built Environment Treatment Plan

The BETP provides detailed descriptions of treatment measures for built environment historic properties located within the APE that may be affected by the Undertaking. The treatments will be carried out by qualified professionals pursuant to Stipulation III of the PA. The treatment measures are included in the BETP and are intended to avoid, minimize, and/or mitigate adverse effects caused by the Undertaking. The Authority commits to implementing the terms of the BETP.

The Authority shall provide documentation produced under the BETP to the SHPO, Invited Signatory, and other Consulting Parties with an interest in historic properties included in the BETP for review and comment in accordance with Stipulation VI of this MOA.

C. Avoidance and Minimization Measures

The Authority has identified property-specific and programmatic Impact Avoidance and Minimization Features (IAMF) to ensure the Undertaking would result in no adverse effect to 16 built historic properties, as outlined in the BETP (**Attachment 5**).

- a. The Authority will ensure that the IAMFs are incorporated into project design and construction contracts for the Undertaking.
- b. In consultation with SHPO, Invited Signatory, and other Consulting Parties, the Authority will ensure that the IAMFs are implemented during the appropriate design and construction phases of the Undertaking.
- c. The Authority may revise the IAMFs or develop additional IAMFs to ensure the Undertaking would result in no adverse effects in accordance with Stipulation VII.B below, should project design changes result in new potential effects to previously identified historic properties or to additional historic properties within revised APEs.

V. POST-REVIEW DISCOVERIES

If properties are discovered that may be historically significant or unanticipated effects on historic properties are found, the Authority shall follow the processes detailed in the ATP and BETP.

VI. PREPARATION AND REVIEW OF DOCUMENTS

A. Professional Qualifications

The Authority shall ensure that all cultural resources studies carried out pursuant to this MOA are performed by or under the direct supervision of personnel meeting *The Secretary of the Interior's Professional Qualifications Standards* (48 Federal Register 44738–39) in the disciplines of history, architectural history, historic architecture, and/or archaeology, as appropriate.

B. Confidentiality

The Signatories and Invited Signatory acknowledge that the handling of documentation regarding historic properties covered by this MOA are subject to the provisions of Section 304 of the National Historic Preservation Act of 1966 (54 U.S.C. § 307103) and Section 6254.10 of the California Government Code (Public Records Act).

C. Review

Unless otherwise specified, parties to this MOA will have 30 calendar days from receipt to provide the Authority comments on all technical materials, findings, and other documentation arising from this MOA. If no comments are received from a party within the 30-calendar-day review period, the Authority may assume that the non-responsive party has no comment. The Authority shall take into consideration all comments received in writing within the 30-calendar-day review period and may make revisions before finalizing the documentation.

For documentation that is amended or revised, the Authority will prepare a comment and response summary or matrix and provide it to the SHPO, Invited Signatory, and other Consulting Parties.

If a party to this MOA objects to documentation provided for review within 30 calendar days of the receipt of any submissions, the Authority shall resolve the objection in accordance with Stipulation VII.A of this MOA.

D. Electronic Submittals

Unless otherwise requested, documentation produced under this MOA will be distributed electronically. Additionally, electronic mail may serve as an official method of communication regarding this MOA.

VII. ADMINISTRATIVE STIPULATIONS

A. Dispute Resolution

In accordance with Stipulation XVII of the PA, should any Signatory, Invited Signatory, or other Consulting Party to this MOA object at any time to any actions proposed or the manner in which the terms of this MOA are implemented, the Authority shall consult with such party to resolve the objection. If the Authority determines that such objection cannot be resolved, the Authority will:

1. Forward all documentation relevant to the dispute, including the Authority's proposed resolution, to the ACHP. The Authority will also provide a copy to the SHPO, Invited Signatory, and other Consulting Parties with a demonstrated interest in the affected property or subject of the dispute. Pursuant to Stipulation XVII.A.1 of the PA, the ACHP shall provide the Authority with its advice on the resolution of the objection within 30 days of receiving adequate documentation. Prior to reaching a final decision on the dispute, the Authority shall prepare a written response that takes into account any advice or comments regarding the dispute from the ACHP, Signatories, Invited

Signatory, and interested Consulting Parties, and provide them with a copy of this written response. The Authority will then proceed according to its final decision.

2. If the ACHP does not provide its advice regarding the dispute within the 30-day time period, the Authority may make a final decision on the dispute and proceed accordingly. Prior to reaching such a final decision, the Authority shall prepare a written response that takes into account any comments regarding the dispute from the Signatories, Invited Signatory, and other Consulting Parties with a demonstrated interest in the affected property or subject of the dispute and provide them and the ACHP with a copy of such written response.
3. The Authority's responsibility to carry out all other actions subject to the terms of this MOA that are not the subject of the dispute remains unchanged.

B. Amendment and Revisions to Attachments

This MOA may be amended by written request from any Signatory or Invited Signatory. Consulting Parties shall be afforded 30 days to review and comment on any proposed amendments to this MOA. The Signatories and Invited Signatory shall take into consideration all comments received prior to executing an amendment. The amendment will be effective when a copy of the amendment is signed by all Signatories and the Invited Signatory that signed this MOA. The Authority will file a copy of any executed amendment with the ACHP pursuant to 36 CFR § 800.6(c)(7).

Notwithstanding the prior paragraph, to address changes in the Undertaking or the treatment of historic properties affected by the Undertaking, the Authority, may revise the ATP, the BETP, or other attachments to this MOA in consultation with the SHPO, Invited Signatory, and other Consulting Parties, without executing a formal amendment to this MOA. The Authority shall provide proposed ATP or BETP revisions to the SHPO, Invited Signatory, and other Consulting Parties with an interest in historic properties that may be affected by the proposed revisions for a 30-day review. The Signatories shall take into consideration all timely comments received prior to agreeing to the revisions. Upon the written concurrence of all the Signatories, such revisions to the ATP, the BETP, or other attachments shall take effect and be considered a part of this MOA.

C. Termination

If any Signatory or Invited Signatory determines that its terms will not or cannot be carried out, that party shall immediately consult with the other Signatories and Invited Signatory to attempt to resolve the issue under Stipulation VII.A, above, or to develop an amendment under Stipulation VII.B, above. If within 30 days (or another time period agreed to by all Signatories and Invited Signatory) an amendment cannot be reached, any Signatory or Invited Signatory may terminate this MOA upon written notification to the other Signatories and Invited Signatory. Termination hereunder shall render this MOA without further force or effect.

If this MOA is terminated, and the Authority determines that the Undertaking will proceed, the Authority must either execute a new MOA pursuant to 36 CFR § 800.6 prior to proceeding further with the Undertaking or follow the procedures for termination of consultation pursuant to 36 CFR § 800.7. The Authority shall notify the SHPO, Invited Signatory, and other Consulting Parties as to the course of action it will pursue.

D. Duration

If the Authority determines that construction of the Undertaking has not been completed within 10 years following execution of this MOA, the Signatories and Invited Signatory shall consult to reconsider its terms. Reconsideration may include continuation of the MOA as originally executed, amendment, or termination.

This MOA will be in effect through the Authority's implementation of the Undertaking and will terminate and have no further force or effect when the Authority, in consultation with the SHPO and Invited Signatory, determines that the terms of this MOA have been fulfilled in a satisfactory manner. The Authority shall provide the SHPO and Invited Signatory with written notice of its determination and of termination of this MOA.

E. Annual Reporting and Meetings

The Authority shall prepare an annual report documenting the implementation of the actions taken under this MOA as stipulated in PA Stipulation XVII.C. The annual report shall include specific lists of studies, reports, actions, evaluations, and consultation and outreach efforts related to implementation of this MOA. The Authority will provide the annual report to the SHPO, Invited Signatory, and other Consulting Parties. If requested by the SHPO, Invited Signatory, and other Consulting Parties, the Authority will coordinate a meeting or call to discuss the annual report.

VIII. EFFECTIVE DATE AND EXECUTION

This MOA may be executed in counterparts, with a separate page for each Signatory, and will take effect on the latest date of execution by the Authority and SHPO. STB's signature is not required to execute this MOA or for its effectiveness. Separate concurrence pages may also be provided for each Concurring Party. The Authority shall ensure that each Signatory, Invited Signatory, and Concurring Party is provided with a copy of the fully executed MOA. The refusal of any Invited Signatory or Concurring Party to sign this MOA shall not invalidate this MOA or prevent this MOA from taking effect.

Execution of this MOA by the Authority and SHPO and implementation of its terms evidence that the Authority has taken into account the effects of this Undertaking on historic properties and afforded the ACHP an opportunity to comment.

**MEMORANDUM OF AGREEMENT
AMONG THE CALIFORNIA HIGH-SPEED RAIL AUTHORITY, THE SURFACE TRANSPORTATION BOARD,
AND THE CALIFORNIA STATE HISTORIC PRESERVATION OFFICER
REGARDING THE SAN FRANCISCO TO SAN JOSE PROJECT SECTION OF THE
CALIFORNIA HIGH-SPEED RAIL PROGRAM
SAN FRANCISCO, SAN MATEO, AND SANTA CLARA COUNTIES, CALIFORNIA**

SIGNATORIES:

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

By: 
Brian P. Kelly
Chief Executive Officer

Date: 6/03/2022

CALIFORNIA STATE HISTORIC PRESERVATION OFFICER

By: 
Julianna Polanco
State Historic Preservation Officer

Date: 6/22/2022

INVITED SIGNATORY:

SURFACE TRANSPORTATION BOARD

By: _____
Danielle Gosselin
Director, Office of Environmental Analysis

Date: _____

**MEMORANDUM OF AGREEMENT
AMONG THE CALIFORNIA HIGH-SPEED RAIL AUTHORITY, THE SURFACE TRANSPORTATION BOARD,
AND THE CALIFORNIA STATE HISTORIC PRESERVATION OFFICER
REGARDING THE SAN FRANCISCO TO SAN JOSE PROJECT SECTION OF THE
CALIFORNIA HIGH-SPEED RAIL PROGRAM
SAN FRANCISCO, SAN MATEO, AND SANTA CLARA COUNTIES, CALIFORNIA**

SIGNATORIES:

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

By: _____ Date: _____
Brian P. Kelly
Chief Executive Officer

CALIFORNIA STATE HISTORIC PRESERVATION OFFICER

By: _____ Date: _____
Julianne Polanco
State Historic Preservation Officer

INVITED SIGNATORY:

SURFACE TRANSPORTATION BOARD


By:  Date: __June 7, 2022__

Danielle Gosselin
Director, Office of Environmental Analysis

**MEMORANDUM OF AGREEMENT
AMONG THE CALIFORNIA HIGH-SPEED RAIL AUTHORITY, THE SURFACE TRANSPORTATION BOARD,
AND THE CALIFORNIA STATE HISTORIC PRESERVATION OFFICER
REGARDING THE SAN FRANCISCO TO SAN JOSE PROJECT SECTION OF THE
CALIFORNIA HIGH-SPEED RAIL PROGRAM
SAN FRANCISCO, SAN MATEO, AND SANTA CLARA COUNTIES, CALIFORNIA**

CONCURRING PARTIES:

CITY AND COUNTY OF SAN FRANCISCO PLANNING DEPARTMENT

By:  _____ Date: June 21, 2022
Rich Hillis
Planning Director

CITY OF BRISBANE

By: _____ Date: _____
Name
Title

BURLINGAME HISTORICAL SOCIETY

By: _____ Date: _____
Name
Title


REDWOOD CITY HISTORIC RESOURCES ADVISORY COMMITTEE

By: _____ Date: _____
Name
Title

AMAH MUTSUN TRIBAL BAND OF MISSION SAN JUAN BAUTISTA

By: _____ Date: _____
Irenne Zwierlein
Chairperson

INDIAN CANYON MUTSUN BAND OF COSTANOAN


By: _____ Date: 7/8/2022
Kanyon Sayers-Roods
Chairperson

NORTH VALLEY YOKUTS TRIBE

By: _____ Date: _____
Katherine Perez
Chairperson

OHLONE TRIBE

By: _____ Date: _____
Andrew Galvan
Chairperson

TAMIEN NATION

By: _____ Date: _____
Quirina Geary
Chairperson

AMAH MUTSUN TRIBAL BAND OF MISSION SAN JUAN BAUTISTA

By: _____ Date: _____
Irenne Zwierlein
Chairperson

INDIAN CANYON MUTSUN BAND OF COSTANOAN

By: _____ Date: _____
Ann-Marie Sayers
Chairperson


NORTH VALLEY YOKUTS TRIBE

By: _____ Date: _____
Katherine Perez
Chairperson

OHLONE TRIBE

By: _____ Date: _____
Andrew Galvan
Chairperson

TAMIEN NATION

By:  _____ Date: 06/06/2022
Quirina Geary
Chairperson

ATTACHMENT 1: PROGRAMMATIC AGREEMENT FOR CALIFORNIA HIGH-SPEED RAIL

ATTACHMENT 2: AREA OF POTENTIAL EFFECTS

**ATTACHMENT 3: HISTORIC PROPERTIES WITHIN THE AREA OF POTENTIAL EFFECTS AS LISTED IN THE
FINDING OF EFFECT REPORT**

Built Environment Historic Properties within the San Francisco to San Jose Project Section Area of Potential Effects

Property Name and Address	City, County	Effects Finding	Treatment Measures ¹
San Francisco Auxiliary Water Supply System underground pipeline system	San Francisco, San Francisco	No Effect	CUL-IAMF #1—Geospatial Data Layer and Mapping CUL-IAMF #6—Plan for Protection & Stabilization and Response Plan for Unanticipated Effects & Inadvertent Damage (PPSRP) only CUL-MM #8—Implement Procedures for Unanticipated Effects and Inadvertent Damage
Central Waterfront Historic District; SPRR Tunnel No. 2—Bayshore Cutoff Tunnel No. 1 (contributor) located south of Mariposa St. SPRR Tunnel No. 2—Bayshore Cutoff Tunnel No. 2 (contributor) Located south of 2 nd St.	San Francisco, San Francisco	No Effect	CUL-IAMF #1—Geospatial Data Layer and Mapping CUL-IAMF #6—PPSRP only CUL-MM #8—Implement Procedures for Unanticipated Effects and Inadvertent Damage
SPRR Tunnel No. 3 Located south of Oakdale Ave.	San Francisco, San Francisco	No Effect	CUL-IAMF #1—Geospatial Data Layer and Mapping CUL-IAMF #6—PPSRP only CUL-MM #8—Implement Procedures for Unanticipated Effects and Inadvertent Damage
SPRR Tunnel No. 4 Located south of Paul Ave.	San Francisco, San Francisco	No Effect	CUL-IAMF #1—Geospatial Data Layer and Mapping CUL-IAMF #6—PPSRP only CUL-MM #8—Implement Procedures for Unanticipated Effects and Inadvertent Damage
SPRR Bayshore Roundhouse Located on Industrial Way	Brisbane, San Mateo	No Effect	CUL-IAMF #1—Geospatial Data Layer and Mapping CUL-IAMF #6—PPSRP only CUL-MM #8—Implement Procedures for Unanticipated Effects and Inadvertent Damage
Airport Boulevard Underpass/South San Francisco Subway	South San Francisco, San Mateo	No Adverse Effect	CUL-IAMF #1—Geospatial Data Layer and Mapping CUL-IAMF #2—WEAP Training CUL-IAMF #6—Pre-CCAR, PPSRP, Post-CCAR CUL-IAMF #7—Built Environment Monitoring Plan CUL-IAMF #8—Implement Protection and/or Stabilization Measures CUL-MM #8—Implement Procedures for Unanticipated Effects and Inadvertent Damage
SPRR Depot/Millbrae Station 108 California Drive	Millbrae, San Mateo	No Adverse Effect	CUL-IAMF #1—Geospatial Data Layer and Mapping CUL-IAMF #2—WEAP Training CUL-IAMF #6—Pre-CCAR, PPSRP, Post-CCAR CUL-IAMF #7—Built Environment Monitoring Plan CUL-IAMF #8—Implement Protection and/or Stabilization Measures CUL-MM #8—Implement Procedures for Unanticipated Effects and Inadvertent Damage

¹ The full text of these measures can be found in the EIR/EIS and will be attached to any NEPA Record of Decision as a part of the Mitigation Monitoring and Enforcement Plan (MMEP)

Property Name and Address	City, County	Effects Finding	Treatment Measures ¹
Jules Francard Grove/ Francard Tree Rows East of California Avenue, between Larkspur Drive and Burlingame Avenue	Burlingame, San Mateo	No Adverse Effect	CUL-IAMF #1—Geospatial Data Layer and Mapping CUL-IAMF #6—PPSRP only CUL-MM #8—Implement Procedures for Unanticipated Effects and Inadvertent Damage
SPRR Depot/Burlingame Railroad Station 290 California Drive	Burlingame, San Mateo	No Adverse Effect	CUL-IAMF #1—Geospatial Data Layer and Mapping CUL-IAMF #6—PPSRP only CUL-MM #8—Implement Procedures for Unanticipated Effects and Inadvertent Damage
SPRR Depot/San Carlos Station 599 Sate Highway 82	San Carlos, San Mateo	No Adverse Effect	CUL-IAMF #1—Geospatial Data Layer and Mapping CUL-IAMF #2—WEAP Training CUL-IAMF #6—Pre-CCAR, PPSRP, Post-CCAR CUL-IAMF #7—Built Environment Monitoring Plan CUL-IAMF #8—Implement Protection and/or Stabilization Measures CUL-MM #8—Implement Procedures for Unanticipated Effects and Inadvertent Damage
SPRR, Dumbarton Cutoff Linear Historic District; Dumbarton Cutoff Railroad Line (contributor) N/A	Redwood City, San Mateo	No Adverse Effect	CUL-IAMF #1—Geospatial Data Layer and Mapping CUL-IAMF #6—PPSRP only CUL-MM #8—Implement Procedures for Unanticipated Effects and Inadvertent Damage
Willie Mays Jr. House 51 Mount Vernon Lane	Atherton, San Mateo	No Adverse Effect	CUL-IAMF #1—Geospatial Data Layer and Mapping CUL-IAMF #6—PPSRP only CUL-MM #8—Implement Procedures for Unanticipated Effects and Inadvertent Damage
SPRR Depot/Atherton Station 1 Dinkelspiel Station	Atherton, San Mateo	No Adverse Effect	CUL-IAMF #1—Geospatial Data Layer and Mapping CUL-IAMF #2—WEAP Training CUL-IAMF #6—Pre-CCAR, PPSRP, Post-CCAR CUL-IAMF #7—Built Environment Monitoring Plan CUL-IAMF #8—Implement Protection and/or Stabilization Measures CUL-MM #8—Implement Procedures for Unanticipated Effects and Inadvertent Damage
Carriage House & Water Tower, Holbrook-Palmer Estate (Elmwood) 150 Watkins Avenue	Atherton, San Mateo	No Adverse Effect	CUL-IAMF #1—Geospatial Data Layer and Mapping CUL-IAMF #6—PPSRP only CUL-MM #8—Implement Procedures for Unanticipated Effects and Inadvertent Damage
SPRR Depot/Menlo Park Railroad Station 1100 Merrill Street	Menlo Park, San Mateo	No Adverse Effect	CUL-IAMF #1—Geospatial Data Layer and Mapping CUL-IAMF #2—WEAP Training CUL-IAMF #6—Pre-CCAR, PPSRP, Post-CCAR CUL-IAMF #7—Built Environment Monitoring Plan CUL-IAMF #8—Implement Protection and/or Stabilization Measures CUL-MM #8—Implement Procedures for Unanticipated Effects and Inadvertent Damage

Property Name and Address	City, County	Effects Finding	Treatment Measures ¹
SPRR San Francisquito Creek Bridge Located north of Palo Alto Avenue	Palo Alto, Santa Clara	No Adverse Effect	CUL-IAMF #1—Geospatial Data Layer and Mapping CUL-IAMF #2—WEAP Training CUL-IAMF #6—Pre-CCAR, PPSRP, Post-CCAR CUL-IAMF #7—Built Environment Monitoring Plan CUL-IAMF #8—Implement Protection and/or Stabilization Measures CUL-MM #8—Implement Procedures for Unanticipated Effects and Inadvertent Damage
El Palo Alto Living tree located north of Palo Alto Avenue	Palo Alto, Santa Clara	No Adverse Effect	CUL-IAMF #1—Geospatial Data Layer and Mapping CUL-IAMF #6—PPSRP only CUL-MM #8—Implement Procedures for Unanticipated Effects and Inadvertent Damage
Palo Alto SPRR Depot 95 University Avenue	Palo Alto, Santa Clara	No Adverse Effect	CUL-IAMF #1—Geospatial Data Layer and Mapping CUL-IAMF #2—WEAP Training CUL-IAMF #6—Pre-CCAR, PPSRP, Post-CCAR CUL-IAMF #7—Built Environment Monitoring Plan CUL-IAMF #8—Implement Protection and/or Stabilization Measures CUL-MM #8—Implement Procedures for Unanticipated Effects and Inadvertent Damage
University Avenue Underpass Bridge No. 37C0005	Palo Alto, Santa Clara	No Adverse Effect	CUL-IAMF #1—Geospatial Data Layer and Mapping CUL-IAMF #2—WEAP Training CUL-IAMF #6—PPSRP only CUL-MM #8—Implement Procedures for Unanticipated Effects and Inadvertent Damage
Embarcadero Underpass Bridge No. 37C0001	Palo Alto, Santa Clara	No Adverse Effect	CUL-IAMF #1—Geospatial Data Layer and Mapping CUL-IAMF #6—PPSRP only CUL-MM #8—Implement Procedures for Unanticipated Effects and Inadvertent Damage
Tract 795, Charleston Meadows; 4133 Park Boulevard (contributor) 4133 Park Boulevard; 4118 Park Boulevard (contributor) 4118 Park Boulevard; 4126 Park Boulevard (contributor) 4126 Park Boulevard	Palo Alto, Santa Clara	No Adverse Effect	CUL-IAMF #1—Geospatial Data Layer and Mapping CUL-IAMF #6—PPSRP only CUL-MM #8—Implement Procedures for Unanticipated Effects and Inadvertent Damage

Archaeological Historic Properties within the San Francisco to San Jose Project Section Area of Potential Effects

Trinomial (Resource Number)	Resource Type	Attributes	Effect Finding	Treatment Measures
San Francisco to South San Francisco Subsection				
CA-SFR-171 (P-38-004638)	Pre-contact	Pre-contact midden buried below artificial fill; appears intact. Previously determined NRHP-eligible.	Phased	<u>Applies to all archaeological historic properties:</u>
CA-SFR-191/H (P-38-005131)	Multicomponent	Multi-Component Site/Pre-contact shell midden with burial/Historic Site. Previously determined NRHP-eligible.	Phased	Inventory (Addenda ASRs)
CA-SMA-378H (P-41-002160)	Historical	Refuse scatter	Phased	Evaluation (AEPs/AERs)
CA-SMA-418H (P-41-002395)	Historical	Refuse scatter	Phased	Data Recovery (Archaeological Data Recovery Reports)
CA-SMA-47 (P-41-000051)	Pre-contact	Pre-contact shell midden; Nelson Shellmound #386	Phased	Archaeological Monitoring Plan
San Bruno to San Mateo Subsection				
CA-SMA-422 (P-41-002400)	Pre-contact	Pre-contact midden with surface and buried component	Phased	Avoidance/Protection Measures/Best Management Practices
CA-SMA-423H/HST-94H (P-41-002401)	Historical	Refuse scatter	Phased	Cultural Resources Awareness Training
CA-SMA-6 (P-41-000498)	Pre-contact	Midden; buried	Phased	Archaeological/Native American Monitoring
CA-SMA-102 (P-41-000105)	Pre-contact	Midden	Phased	Observation of Protocols for Unanticipated Discoveries
CA-SMA-316 (P-41-000310)	Pre-contact	Shell midden	Phased	Additional measures to avoid, minimize, or mitigate effects on archaeological historic properties may be developed in consultation with signatories and consulting parties as
CA-SMA-317 (P-41-000311)	Pre-contact	Shell midden; Hamilton Shellmound	Phased	
CA-SMA-4 (P-41-000009)	Pre-contact	Shell midden with human burials; Nelson mound	Phased	
CA-SMA-232 (P-41-000230)	Pre-contact	Shell midden; Hamilton Shellmound #9	Phased	
CA-SMA-233 (P-41-000231)	Pre-contact	Shell midden; Hamilton Shellmound #12	Phased	
CA-SMA-419 (P-41-002396)	Pre-contact	Midden	Phased	
San Mateo to Palo Alto Subsection				
CA-SMA-420 (P-41-002397)	Pre-contact	Midden	Phased	

Trinomial (Resource Number)	Resource Type	Attributes	Effect Finding	Treatment Measures	
CA-SMA-421 (P-41-002398)	Pre-contact	Midden in disturbed context	Phased	identification and evaluation efforts are performed in future planning and construction phases of the Undertaking.	
CA-SMA-358/H (P-41-000506)	Multicomponent	Pre-contact, protohistoric, and historic site on surface and buried	Phased		
CA-SMA-424/ CA-SCL-939 (P-41-002402/ P-43-003137)	Pre-contact	Buried midden along San Francisquito Creek	Phased		
CA-SCL-600 (P-43-000595)	Pre-contact	Midden	Phased		
Mountain View to Santa Clara Subsection					
CA-SCL-1 (P-43-003172)	Pre-contact	Shellmound	Phased		
CA-SCL-22 (P-43-000042)	Pre-contact	Midden	Phased		

APE = area of potential effects
AEP = Archaeological Evaluation Plan
AER = Archaeological Evaluation Report

ATTACHMENT 4: ARCHAEOLOGICAL TREATMENT PLAN

ATTACHMENT 5: BUILT ENVIRONMENT TREATMENT PLAN

ATTACHMENT 6: AGENCIES AND OTHER INTERESTED PARTIES CONSULTED

California State Historic Preservation Officer
Surface Transportation Board
City and County of San Francisco, Planning Department
City of Brisbane
Burlingame Historical Society
Redwood City Historic Resources Advisory Committee

ATTACHMENT 7: NATIVE AMERICAN TRIBAL GOVERNMENTS CONSULTED

Amah Mutsun Tribal Band of Mission San Juan Bautista
Indian Canyon Mutsun Band of Costanoan
North Valley Yokuts Tribe
Ohlone Tribe
Tamien Nation

**APPENDIX F: U.S. ARMY CORPS OF ENGINEERS LEDPA
CONCURRENCE LETTER, JUNE 29, 2020, AND U.S. ENVIRONMENTAL
PROTECTION AGENCY LEDPA CONCURRENCE LETTER, JUNE 26,
2020**



DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, U.S. ARMY CORPS OF ENGINEERS
450 GOLDEN GATE AVENUE
SAN FRANCISCO, CALIFORNIA 94102

June 29, 2020

Regulatory Division

SUBJECT: File Number SPN-2010-00158

Mr. Mark McLoughlin
Director of Environmental Services
California High-Speed Rail Authority
770 L Street, Suite 800
Sacramento, California 95814
Mark.McLoughlin@hsr.ca.gov

Dear Mr. McLoughlin:

I am writing in response to your May 13, 2020, Checkpoint C Package for the proposed San Francisco to San Jose Project Section of the California High-Speed Rail (CAHSR) Project, in accordance with our *National Environmental Policy Act/Clean Water Act Section 404/Rivers and Harbors Act Section 14 Integration Process for the California High-Speed Train Program Memorandum of Understanding*, dated December 2010 (NEPA/404/408 MOU). This letter serves as the U.S. Army Corps of Engineers' (Corps) formal response.

As an official cooperating agency for preparation of the San Francisco to San Jose Project Section Environmental Impact Report/Environmental Impact Statement (EIR/EIS) and in fulfillment of our responsibilities under the NEPA/404/408 MOU, the Corps offered feedback to the California High-Speed Rail Authority (Authority) on the preliminary Least Environmentally Damaging Practicable Alternative (LEDPA) determination and Preliminary Compensatory Mitigation Plan for the San Francisco to San Jose Project Section of the CAHSR Project. The Authority submitted the San Francisco to San Jose Project Section Checkpoint C Package to our office electronically using the CAHSR SharePoint site on May 13, 2020. We attended the May 26, 2020, Checkpoint C Meeting and provided comments on the Checkpoint C documents via email on June 24, 2020.

After reviewing the data provided, we concur that Alternative A, which in summary would modify approximately 14.5 miles of existing Caltrain track, predominantly within the existing Caltrain right-of-way, build the East Brisbane light maintenance facility, modify seven existing stations or platforms to accommodate high-speed rail, and install safety improvements and communication radio towers, appears to be the preliminary LEDPA.

Please be aware that this determination is being made prior to the circulation of the public draft EIS and will be revisited if additional substantive information becomes available after public comments are received.

In addition, we concur that the Preliminary Compensatory Mitigation Plan may provide a sufficient framework for mitigation to meet the needs of the project under Section 404 of the Clean Water Act. However, the Corps cannot make a permit decision until we receive a final mitigation plan in accordance with 33 CFR Part 332, *Compensatory Mitigation for Losses of Aquatic Resources*, and regional guidance. We will continue to work with the Authority towards development of a final mitigation plan that satisfies the requirements of 33 CFR Part 332, and regional guidance.

You may refer any questions on this matter to Bryan Matsumoto of my Regulatory staff by telephone at 415-503-6786 or by e-mail at Bryan.T.Matsumoto@usace.army.mil. All correspondence should be addressed to the Regulatory Division, North Branch, referencing the file number at the head of this letter.

Sincerely,

James C. Mazza
Chief, Regulatory Division

Copies Furnished:

Federal Railroad Administration, Stephanie Perez, stephanie.perez@dot.gov
US EPA, Carolyn Mulvihill, Mulvihill.Carolyn@epa.gov
CA HSRA, Sue Meyer, Sue.Meyer@hsr.ca.gov



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

June 26, 2020

Mark McLoughlin
California High-Speed Rail Authority
770 L Street, Suite 800
Sacramento, California 95814

Subject: Checkpoint C Package for the San Francisco to San Jose Section - Request for Agreement on Preliminary Least Environmentally Damaging Practicable Alternative and Preliminary Compensatory Mitigation Plan

Dear Mr. McLoughlin:

Thank you for the opportunity to review the Checkpoint C Package for the San Francisco to San Jose section of California High Speed Rail. This letter responds to your May 13, 2020 request for agreement on the Preliminary Least Environmentally Damaging Practicable Alternative determination for the proposed Alternative A, which would modify approximately 14.5 miles of existing Caltrain track, predominantly within the existing Caltrain right-of-way, build the East Brisbane Light Maintenance Facility, modify seven existing stations or platforms to accommodate the HSR, and install safety improvements and communication radio towers.

Feedback from the EPA is aimed at integrating permitting requirements of Clean Water Act Section 404 with NEPA requirements. The purpose of this letter is to provide the EPA's "agreement" with "Checkpoint C," a step in the integration process described in the *NEPA/CWA Section 404/Rivers and Harbors Act Section 14 (33 U.S.C. 408) Integration Process for the California High-Speed Train Program Memorandum of Understanding* dated December 2010. To facilitate effective integration of the CWA Section 404 and NEPA for this project, the EPA continues to coordinate closely with your agency and the U.S. Army Corps of Engineers.

Least Environmentally Damaging Practicable Alternative

After reviewing the information provided in the Checkpoint C package, and per the NEPA/404 MOU, the EPA provides agreement with CHSRA's determination that Alternative A is the preliminary LEDPA for the San Francisco to San Jose section of the HSR. As this determination has been made prior to public circulation of the DEIS, it will be revisited if necessary should additional information become available after public comments are received.

Preliminary Compensatory Mitigation Plan

The Preliminary Compensatory Mitigation Plan (pCMP) is a conceptual strategy specifying resources available for the establishment and/or rehabilitation of aquatic resources. The submitted Checkpoint C Package provides a general overview of mitigation needs, opportunities, and plausible implementation scenarios. According to the submittal, Alternative A would result in the discharge of fill into 11.8 acres of aquatic resources, including 6.1 acres of wetlands and 5.7 acres of nonwetlands. The pCMP proposes that a combination of mitigation bank credit purchase, on-site restoration, and off-site restoration would be used to satisfy mitigation requirements

under Section 404. On-site compensatory mitigation is the planned mitigation for temporary impacts relating to all aquatic resources. The pCMP discussed the Visitacion Creek/Bay resiliency mitigation concept, which proposes rerouting Visitacion Creek. The pCMP also proposes the use of in-lieu fee programs and mitigation banks as available.

Per the NEPA/404 MOU, the EPA provides agreement that the pCMP may provide sufficient mitigation to meet the needs of the project under Section 404 of the Clean Water Act. The EPA expects that more site-specific information will be made available prior to Clean Water Act Section 404 permitting. Specifically, the Final Mitigation Plan should include information on all key elements of the mitigation rule (Subpart J of the 404(b)(1) Guidelines at 40 CFR Part 230) in order to ensure compliance. The EPA looks forward to collaborating with your agency and Corps staff in the use of the program technical procedures to implement a watershed approach to mitigation. Required compensatory mitigation will be determined through completion of the Corps SPD Mitigation Ratio Setting Checklist. Permitted discharges to waters of the U.S. will be confirmed during project construction. If discharges to waters of the U.S. are reduced or increased as a result of changes in project design, adjustments to the amount of compensatory mitigation will be made accordingly.

Thank you for requesting the EPA's agreement on the LEDPA and pCMP. We look forward to further participation in the development of environmental documents for this project. The EPA will ultimately review EISs for each section of the California HSR system pursuant to NEPA, Council on Environmental Quality regulations (40 CFR Parts 1500-1508), and Section 309 of the Clean Air Act. The EPA will also review CWA Section 404 permit applications for each HSR section for compliance with the EPA's CWA Section 404(b)(1) Guidelines (40 CFR 230.10). We appreciate this opportunity to address potential environmental issues as early as possible. If you have any questions regarding our comments please contact the NEPA lead for this project, Carolyn Mulvihill, at (415) 947-3554 or by email at mulvihill.carolyn@epa.gov.

Sincerely,

For Jean Prijatel
Manager, Environmental Review Branch

cc via email:
Sue Meyer, California High Speed Rail Authority
Bryan Matsumoto, U.S. Army Corps of Engineers

APPENDIX G: COMMENTS RECEIVED AFTER PUBLICATION OF THE FINAL EIR/EIS

APPENDIX G: COMMENTS RECEIVED AFTER PUBLICATION OF THE FINAL EIR/EIS

When a comment letter is received after the close of the public comment period, neither a California Environmental Quality Act nor a National Environmental Policy Act lead agency has an obligation to respond (California Public Resources Code [Cal. Public Res. Code] § 21091, subd. (d)(1); Cal. Public Res. Code § 21092.5, subd. (c); 40 Code of Federal Regulations § 1503.4). However, a lead agency may, in its discretion, choose to respond. Consistent with that discretion, this appendix summarizes written comments received outside the comment period and the California High-Speed Rail Authority's (Authority) response.

This summary may be updated after Authority Board consideration of the San Francisco to San Jose Project Section Final Environmental Impact Report/Environmental Impact Statement (Final EIR/EIS), if the document and the project section are approved. Any such update will be posted alongside final decision documents on the Authority's website.

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#	First Name	Last Name	Business/Organization	Summary of Stakeholder Comments/Issues	Response/Status Update
01	Greg	Greenway	Peninsula Freight Rail Users	Commenter requested a single PDF for the entire Final EIR/EIS as well as specific Technical Reports.	The Authority explained that due to file size the Final EIR/EIS is not available as a single PDF. Regarding the feasibility of providing a single PDF document of the entire Final EIR/EIS, please refer to the response to submission 1211, comment 2692 in Volume 4, Chapter 24 of the Final EIR/EIS. The Authority provided the Final EIR/EIS and Technical Reports to the commenter via Dropbox links on June 13, 2022.
02	Robert	Ovadia	Town of Atherton	Commenter requested an electronic copy of the Final EIR/EIS.	The Authority provided the Final EIR/EIS to the commenter via a Dropbox link on June 20, 2022.
03	Tyrone	Moore-Perez	Individual	Commenter suggested including a station in Oakland because it is a growing city and is more accessible and less expensive than San Francisco.	The Authority acknowledges the commenter's recommendation. Please refer to Standard Response FJ-Response-ALT-1: Alternatives Selection and Evaluation Process in Volume 4, Chapter 17 of the Final EIR/EIS, which describes the tiered environmental review process conducted for the HSR system. The Authority analyzed a wide range of alternatives in the Tier 1 programmatic environmental documents, including alternatives going to Oakland. Those alternatives were found to be inferior to the preferred route to San Francisco via the San Francisco Peninsula. In addition, Proposition 1A mandates that the Northern California terminus of the HSR system must be in San Francisco. Accordingly, the San Francisco to San Jose Project Section Final EIR/EIS appropriately focuses its analysis of alternatives on the existing Caltrain corridor between San Francisco and San Jose with stations in downtown San Francisco, Millbrae, and San Jose.
04	Peggy	Nutz	Individual	Commenter requested a copy of the Final EIR/EIS.	The Authority provided the Final EIR/EIS to the commenter via a Dropbox link on June 20, 2022.
05	Adrianna	Galletta	Individual	Commenter requested a copy of the Final EIR/EIS.	The Authority provided the Final EIR/EIS to the commenter via a Dropbox link on June 20, 2022.

#	First Name	Last Name	Business/ Organization	Summary of Stakeholder Comments/Issues	Response/Status Update
06	Jay	Smith	San Carlos Library	Commenter from the San Carlos Library Repository Location requested a smaller version of the NOA Poster, which was 12"x18", due to limited space to display it.	The Authority provided a smaller 8.5"x11" version of the NOA Poster on June 15, 2022, for the commenter to print and display at the Repository Location.
07	Yvonne	Arroyo	Santa Clara Valley Water District	Commenter requested a copy of the San Francisco to San Jose Final EIR/EIS and the San Jose to Merced Final EIR/EIS.	The Authority provided both of the Final EIR/EISs to the commenter via a Dropbox link on June 21, 2022.
08	Carlin	Otto	Individual	<p>Commenter recognized the value of a statewide HSR system but suggested that the San Francisco to San Jose Project Section not be built because:</p> <ol style="list-style-type: none"> 1. There are already fully functional transportation systems here 2. Construction in a densely populated area will be very expensive 3. It will be additional noise for millions of residents in an already noisy transportation corridor 4. The Oakland Airport could accommodate more traffic <p>Commenter suggested a station in Oakland instead.</p>	<p>The Authority acknowledges the commenter's opposition to the San Francisco to San Jose Project Section of the California HSR System. Please refer to Standard Response FJ-Response-GEN-1: General Opposition to the Project and the California High-Speed Rail System in Volume 4, Chapter 17 of the Final EIR/EIS.</p> <p>With respect to the commenter's suggestion for the Authority to consider a station in Oakland, please refer to Standard Response FJ-Response-ALT-1: Alternatives Selection and Evaluation Process in Volume 4, Chapter 17 of the Final EIR/EIS, which describes the tiered environmental review process conducted for the HSR system. The Authority analyzed a wide range of alternatives in the Tier 1 programmatic environmental documents, including alternatives going to Oakland. Those alternatives were found to be inferior to the preferred route to San Francisco via the San Francisco Peninsula. In addition, Proposition 1A mandates that the Northern California terminus of the HSR system must be in San Francisco. Accordingly, the San Francisco to San Jose Project Section Final EIR/EIS appropriately focuses its analysis of alternatives on the existing Caltrain corridor between San Francisco and San Jose with stations in downtown San Francisco, Millbrae, and San Jose.</p> <p>Construction and operational noise impacts of the project have been fully analyzed in the EIR/EIS. Refer to Section 3.4, Noise and Vibration, in the Final EIR/EIS.</p>

#	First Name	Last Name	Business/ Organization	Summary of Stakeholder Comments/Issues	Response/Status Update
09	Ben	Woosley	Individual	Commenter requested to be removed from the mailing list.	Commenter removed from the mailing list on June 21, 2022.
10	Marty	Medina	San Bruno Councilmember	Commenter asked if there was a summary of impacts for each city and stations available, specifically requesting a summary for the impacts on San Bruno.	The Authority scheduled a follow-up meeting with Councilmember Medina on July 7, 2022, which included a presentation summarizing impacts in the City of San Bruno.
11	Herschell	Larrick	Transbay Joint Powers Authority	Commenter expressed appreciation for the collaborative approach taken by the Authority related to the Downtown Rail Extension. The commenter also acknowledged the changes made by the Authority in response to their comments on the Draft EIR/EIS and they look forward to continued collaboration.	The Authority acknowledges the comment and appreciates Transbay Joint Powers Authority's efforts and ongoing collaboration throughout the environmental review process for this project.

#	First Name	Last Name	Business/ Organization	Summary of Stakeholder Comments/Issues	Response/Status Update
12	Jennifer	Shader	San Francisco County Transportation Authority; San Francisco Municipal Transportation Agency; San Francisco Planning Department	<p>Commenter expressed support for the San Francisco to San Jose Project Section and the California HSR program as a whole, especially the transportation, economic, and climate change benefits.</p> <p>The commenter disagrees with the Authority's conclusion that there is no feasible mitigation available for the impact on MUNI Route 22 as described in Impact TR#11 in Section 3.2, Transportation, of the Final EIR/EIS, and suggests that a grade separation accommodating blended service at the 16th Street and Mission Bay Drive crossings would reduce the impact to less than significant under CEQA. The commenter also asserts that gate-down time at the 16th Street grade crossing will delay emergency vehicles serving UCSF medical facilities in Mission Bay. The commenter hopes to work closely with the Authority on this grade separation and suggests a fair share contribution toward the 16th Street grade separation be incorporated into the project decisions in August 2022 or as part of any future set of project modifications and supplemental environmental review.</p> <p>The commenter also looks forward to future work with the Authority regarding the proposed light maintenance facility, which would support long-term needs of rail operations in the Bay Area.</p>	<p>The Authority acknowledges the comment and appreciates the City and County of San Francisco's support.</p> <p>With respect to project impacts and mitigation at 16th Street, please refer to the Authority's responses to submissions 1139-894, 1139-895, and 1139-921 in Volume 4, Chapter 20 of the Final EIR/EIS. With respect to project impacts on emergency vehicle access to UCSF medical facilities in Mission Bay, please refer to the Authority's responses to submissions 1103-364 and 1103-365 in Volume 4, Chapter 23 of the Final EIR/EIS. The Authority supports the efforts of the City to advance grade separations in its jurisdiction and is committed to consultation with the City of San Francisco, PCJPB, and other relevant parties throughout final design of the HSR system.</p> <p>With respect to the proposed LMF, the Authority is committed to continued consultation with agencies and local jurisdictions throughout final design.</p>

#	First Name	Last Name	Business/Organization	Summary of Stakeholder Comments/Issues	Response/Status Update
13	Jean	Prijatel	U.S. Environmental Protection Agency	Commenter expressed appreciation for the collaborative approach taken by the Authority throughout the EIR/EIS process. The commenter also acknowledged the changes made by the Authority in response to their comments on the Draft EIR/EIS and Revised/Supplemental Draft EIR/EIS and noted no further comments on the Final EIR/EIS.	The Authority acknowledges the comment and appreciates the U.S. Environmental Protection Agency's efforts throughout the environmental review to provide input as part of the consultation process for this project.
14	Jennifer	Hernandez	Baylands Development, Inc.	Commenter expressed concerns about the project's potential environmental impacts on planned development at the Brisbane Baylands and its future residents and visitors. The commenter also noted that they anticipate submitting a more detailed comment letter on the Final EIR/EIS in advance of the Authority's August Board meeting.	The Authority acknowledges the comment, which does not raise any new issues not previously raised on the Draft EIR/EIS. The Final EIR/EIS includes responses to prior comments from Baylands Development, Inc. (Submission 1115 in Volume 4) and fully analyzes impacts to planned development in the Brisbane Baylands area.

Authority = California High-Speed Rail Authority

CEQA = California Environmental Quality Act

Draft EIR/EIS = San Francisco to San Jose Project Section Draft Environmental Impact Report/Environmental Impact Statement

Final EIR/EIS = San Francisco to San Jose Project Section Final Environmental Impact Report/Environmental Impact Statement

HSR = high-speed rail

LMF = light maintenance facility

NOA = Notice of Availability

PCJPB = Peninsula Corridor Joint Powers Board

PDF = portable document format

Revised/Supplemental Draft EIR/EIS = San Francisco to San Jose Project Section Revised Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement

UCSF = University of California, San Francisco

APPENDIX H: ERRATA

This errata may be revised on an ad-hoc basis, and such revisions will be posted on the Authority website, prior to the Authority's consideration of certification of the San Francisco to San Jose Project Section Final EIR/EIS.

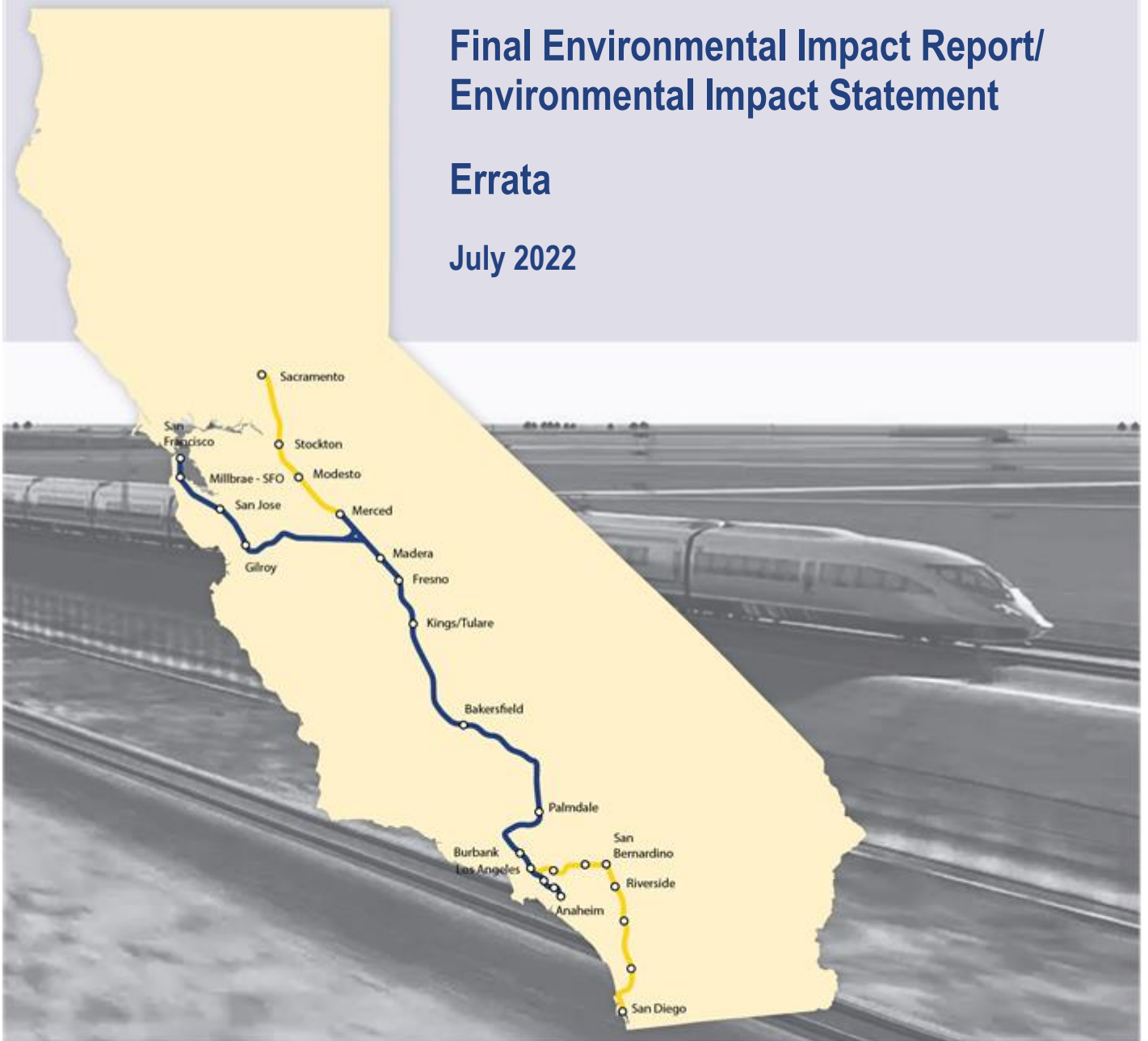
California High-Speed Rail Authority

San Francisco to San Jose Project Section

**Final Environmental Impact Report/
Environmental Impact Statement**

Errata

July 2022



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.

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TABLE OF CONTENTS

Table 1 Errata in the Final EIR/EIS 1

ATTACHMENT A, TABLE 9-2 AND APPENDIX 9-A UPDATES

ACRONYMS AND ABBREVIATIONS

EIR	environmental impact report
EIS	environmental impact statement
LMF	light maintenance facility
MOA	memorandum of agreement
NRHP	National Register of Historic Places
SFO	San Francisco International Airport
STC	Salesforce Transit Center
VTA	Santa Clara Valley Transportation Authority

ERRATA SHEET

The following items are clarified and corrected (note revised text in underline and strikethrough). Clarifications and corrections requiring underline and strikethrough text are indicated with a vertical line in the margin of this errata document. The Authority has determined these clarifications/corrections do not require preparation of a Supplemental Environmental Impact Statement under the National Environmental Policy Act or recirculation under the California Environmental Quality Act because they do not reflect significant new information or circumstances and they do not change the analysis or conclusions of the Final Environmental Impact Report (EIR)/Environmental Impact Statement (EIS).

Italics: Italics are used in the table below to describe text in the Final EIR/EIS that is not able to be included as verbatim language; such as content within tables.

Table 1 Errata in the Final EIR/EIS

Number	Reference	Published Final EIR/EIS Text	Revisions to Final EIR/EIS	Reason for Revisions
1	Global	Salesforce Transit Center (SFTC)	Correction: Salesforce Transit Center (SFTC)	Text correction. Salesforce Transit Center is abbreviated STC.
2	Chapter 2, Alternatives Page 2-82	HSR passengers desiring to drive and park would be able to use available long-term commercial parking off-site or at SFO and reach the station by shuttle.	Clarification: HSR passengers desiring to drive and park would be able to use available long-term commercial parking off-site or at SFO and reach the station by shuttle.	Clarification that HSR passengers would use available commercial parking off-site.
3	Section 3.16, Cultural Resources Page 3.16-15	Four tribes have elected to be consulting parties and are included in the list of consulting parties. Consulting Parties Of the interested parties contacted, four Native American groups and seven local government agencies or organizations requested to be a Section 106 consulting party for the cultural resources investigation and the preparation of the MOA. The consulting parties are: <ul style="list-style-type: none"> • Amah Mutsun Tribal Band of Mission San Juan Bautista • Indian Canyon Mutsun Band of Costanoan (Costanoan Indian Research, Inc.) • The Ohlone Tribe • Northern Valley Yokuts Tribe • Burlingame Historical Society • Redwood City Historic Resources Advisory Committee 	Correction: Four <u>Five</u> tribes have elected to be consulting parties and are included in the list of consulting parties. Consulting Parties Of the interested parties contacted, four <u>five</u> Native American groups and seven local government agencies or organizations requested to be a Section 106 consulting party for the cultural resources investigation and the preparation of the MOAs. The consulting parties are: <ul style="list-style-type: none"> • Amah Mutsun Tribal Band of Mission San Juan Bautista • Indian Canyon Mutsun Band of Costanoan (Costanoan Indian Research, Inc.) • The Ohlone Tribe • Northern Valley Yokuts Tribe • <u>Tamien Nation</u> • Burlingame Historical Society 	Clarification that the list of consulting parties includes relevant parties to the San Francisco to San Jose and San Jose to Merced Project Section MOAs. Correction to the name of the North Valley Yokuts Tribe and to include Tamien Nation in the list of Section 106 Consulting Parties.

Number	Reference	Published Final EIR/EIS Text	Revisions to Final EIR/EIS	Reason for Revisions
		<ul style="list-style-type: none"> • City and County of San Francisco • City of Brisbane, Planning Department • City of San Jose, Planning Division, Department of Planning, Building, and Code Enforcement • Santa Clara Valley Transportation Authority (VTA) • City of San Jose Historic Landmarks Commission 	<ul style="list-style-type: none"> • Redwood City Historic Resources Advisory Committee • City and County of San Francisco • City of Brisbane, Planning Department • City of San Jose, Planning Division, Department of Planning, Building, and Code Enforcement • Santa Clara Valley Transportation Authority (VTA) • City of San Jose Historic Landmarks Commission 	
4	Chapter 9, Public and Agency Involvement Page 9-13	Table 9-2 Public and Agency Meetings Summary, July 2016–March 2022	Revisions and Additions: Table 9-2 Public and Agency Meetings Summary, July 2016– March 2022 <u>July 2022</u> <i>*Please see Attachment A for corrections to Table 9-2.</i>	Table 9-2 has been updated to add meetings that occurred between March 2022 and July 2022.
5	Appendix 9-A, Public and Agency Meeting List		Additions: <i>*Please see Attachment A for additions.</i>	The meeting list has been updated to add meetings that occurred between March 2022 and July 2022.
6	Appendix 2-K, Light Maintenance Facility Site Evaluation Section VI.F: Hayward Yard Pages 15, 16, and 17	F. Hayward Yard Section 4(f): This site would impact Sunbrae Park, a public park. Land Use: Placement of the LMF at the Hayward Park site would require relocating existing dense residential and commercial neighborhoods as well as public facilities in the City of Hayward. Conclusion: The Hayward Park site would have a Section 4(f) impact and pose an unreasonable cost. It would also have unacceptable impacts to dense urban neighborhoods, aquatic impacts, and cultural resources. Consequently, the Hayward Park site is not a feasible location for	Correction: F. Hayward <u>Park</u> Yard Section 4(f): This site would impact Sunbrae Park, a public park. Land Use: Placement of the LMF at the Hayward <u>Park</u> site would require relocating existing dense residential and commercial neighborhoods as well as public facilities, <u>including the Sunnybrae Elementary School</u> in the City of Hayward <u>San Mateo</u> . Conclusion: The Hayward <u>Park</u> site would have a Section 4(f) impact and pose an unreasonable cost. It would also have unacceptable impacts (<u>displacements and relocations</u>) on to dense urban neighborhoods and public facilities, aquatic impacts, and <u>impacts on cultural</u>	Correction to site's name as Hayward Park Yard. Correction to Section 4(f) discussion of the Hayward Park Yard site, as Sunnybrae Playground is outside the Hayward Park Yard site's project footprint. Clarification and correction that impacts would occur to Sunnybrae Elementary School in the City of San Mateo.

Number	Reference	Published Final EIR/EIS Text	Revisions to Final EIR/EIS	Reason for Revisions
		development of the LMF and was not advanced for consideration in the DEIR/S.	resources. Consequently, the Hayward <u>Haywood</u> Park <u>Yard</u> site is not a feasible location for development of the LMF and was not advanced for consideration in the DEIR/S.	

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ATTACHMENT A: TABLE 9-2 AND APPENDIX 9-A UPDATES

Table 1 Additions to Table 9-2, Public and Agency Meeting Summary, March to July 2022

Organization/Individual	New Additions (Number of Meetings Held)	Meeting Dates
ACEC	1	5/25/2022
Assemblymember Kevin Mullin staff	1	6/23/2022
Assemblymember Marc Berman staff	1	6/7/2022
Assemblymember Matt Haney staff	1	6/22/2022
BART	1	5/26/2022
Baylands Development Inc	1	6/23/2022
BBCAG	1	6/24/2022
Caltrain	1	6/6/2022
City/County San Francisco staff	2	5/13/2022, 7/8/2022
College of San Mateo Farmers Market	1	4/30/2022
CSCG	2	3/16/2022, 6/15/2022
CWG: San Francisco	1	6/29/2022
CWG: San Mateo/Peninsula	1	6/22/2022
Los Altos Chamber - Government Affairs Committee	1	5/4/2022
LPMG	2	3/24/2022, 6/23/2022
LPMG Vice-Chair Briefing: Michael Salazar	1	3/16/2022
Menlo Park Mayor Betsy Nash	1	6/29/2022
MTC	1	5/24/2022
Northern California Quarter 2 Legislative Briefing	1	5/25/2022
NorCal Resource Agency	4	3/23/2022, 4/20/2022, 5/25/2022, 6/22/2022
Peninsula for Everyone	1	4/6/2022
PFRUG	1	6/21/2022
Redwood City Councilmember Jeff Gee	1	6/28/2022
San Bruno Councilmember Marty Medina	1	7/7/2022
San Francisco Sunday Streets	1	5/22/2022
San Mateo County Executive Mike Callagy	1	5/16/2022
San Mateo County staff	1	5/4/2022
San Mateo County Supervisor Carole Groom	1	5/20/2022
State Senator Josh Becker's Office	1	5/11/2022
United States Senator Dianne Feinstein staff	2	5/10/2022, 6/29/22
San Francisco Supervisor Rafael Mandelman	1	6/22/2022

Organization/Individual	New Additions (Number of Meetings Held)	Meeting Dates
SFO	1	5/23/2022
San Mateo County Supervisor Canepa	1	6/15/2022
SMCTA/SamTrans Executive Director Carter Mau	1	6/24/2022
Speaker Nancy Pelosi staff	1	6/28/2022
State Senator Scott Wiener staff	1	5/24/2022
TJPA	1	5/19/2022
UCSF	1	6/17/2022
Totals	45	

ACEC = American Council of Engineering Companies
 BART = Bay Area Rapid Transit
 BBCAG = Brisbane Baylands Community Advisory Group
 CSCG = City/County Staff Coordinating Group
 CWG = community working group
 LPMG = local policy maker group
 MTC = Metropolitan Transportation Commission
 PFRUG = Peninsula Freight Rail Users' Group
 SFO = San Francisco International Airport
 SMCTA = San Mateo County Transportation Authority
 SamTrans = San Mateo County Transit District
 TJPA = Transbay Joint Powers Authority
 UCSF = University of California, San Francisco

Table 2 Additions to Appendix 9-2, Public and Agency Meeting List

Date	Organization/Individual	Topic
3/16/2022	CSCG Meeting	2022 Business Plan and Northern California Project Updates
3/16/2022	LPMG Vice-Chair Briefing: Michael Salazar	Northern California Project Updates
3/23/2022	NorCal Resource Agency Coordination Meeting	Project Updates
3/24/2022	LPMG	2022 Business Plan and Northern California Project Updates
4/6/2022	Peninsula for Everyone	Project Updates
4/20/2022	NorCal Resource Agency Coordination Meeting	Project Updates
4/30/2022	College of San Mateo Farmers Market	Outreach event in the San Mateo Community
5/4/2022	Los Altos Chamber - Government Affairs Committee	Project Overview
5/4/2022	San Mateo County staff	Presented updates related to the Final EIR/EIS for the San Francisco to San Jose Project Section.
5/10/2022	United States Senator Dianne Feinstein staff	Introductions and Project Briefings
5/11/2022	State Senator Josh Becker's Office	Quarterly Meeting
5/13/2022	City and County of San Francisco staff	Presented updates related to the Final EIR/EIS for the San Francisco to San Jose Project Section.

Date	Organization/Individual	Topic
5/16/2022	San Mateo County Executive Mike Callagy	Presented updates related to the Final EIR/EIS for the San Francisco to San Jose Project Section.
5/19/2022	TJPA	Presented updates related to the Final EIR/EIS for the San Francisco to San Jose Project Section.
5/20/2022	San Mateo County Supervisor Carole Groom	Presented updates related to the Final EIR/EIS for the San Francisco to San Jose Project Section.
5/22/2022	San Francisco Sunday Streets	Outreach event in the San Francisco Community
5/23/2022	SFO	Presented updates related to the Final EIR/EIS for the San Francisco to San Jose Project Section.
5/24/2022	MTC	Presented updates related to the Final EIR/EIS for the San Francisco to San Jose Project Section.
5/24/2022	State Senator Scott Wiener staff	Presented updates related to the Final EIR/EIS for the San Francisco to San Jose Project Section.
5/25/2022	Northern California Quarter 2 Legislative Briefing	Statewide and Northern California project update.
5/25/2022	NorCal Resource Agency Coordination Meeting	Project Updates
5/25/2022	ACEC East Bay Chapter	Statewide and Northern California project update.
5/26/2022	BART	Presented updates related to the Final EIR/EIS for the San Francisco to San Jose Project Section.
6/6/2022	Caltrain	Presented updates related to the Final EIR/EIS for the San Francisco to San Jose Project Section.
6/7/2022	Assemblymember Marc Berman staff	Presented updates related to the Final EIR/EIS for the San Francisco to San Jose Project Section.
6/15/2022	CSCG	Presented updates related to the Final EIR/EIS for the San Francisco to San Jose Project Section.
6/15/2022	San Mateo County Supervisor David Canepa	Presented updates related to the Final EIR/EIS for the San Francisco to San Jose Project Section.
6/17/2022	UCSF	Presented updates related to the Final EIR/EIS for the San Francisco to San Jose Project Section.
6/21/2022	PFRUG	Presented updates related to the Final EIR/EIS for the San Francisco to San Jose Project Section.
6/22/2022	Assemblymember Matt Haney staff	Presented updates related to the Final EIR/EIS for the San Francisco to San Jose Project Section.
6/22/2022	CWG: San Mateo/Peninsula	Presented updates related to the Final EIR/EIS for the San Francisco to San Jose Project Section.
6/22/2022	NorCal Resource Agency Coordination Meeting	Project Updates
6/22/2022	San Francisco Supervisor Rafael Mandelman	Presented updates related to the Final EIR/EIS for the San Francisco to San Jose Project Section.
6/23/2022	Assemblymember Kevin Mullin staff	Project updates
6/23/2022	Baylands Development Inc	Presented updates related to the Final EIR/EIS for the San Francisco to San Jose Project Section.

Date	Organization/Individual	Topic
6/23/2022	LPMG	Project Updates
6/24/2022	BBCAG	Presented updates related to the Final EIR/EIS for the San Francisco to San Jose Project Section.
6/24/2022	SMCTA/SamTrans Executive Director Carter Mau	Presented updates related to the Final EIR/EIS for the San Francisco to San Jose Project Section.
6/28/2022	Redwood City Councilmember Jeff Gee	Presented updates related to the Final EIR/EIS for the San Francisco to San Jose Project Section.
6/28/2022	Speaker Nancy Pelosi staff	Presented updates related to the Final EIR/EIS for the San Francisco to San Jose Project Section.
6/29/2022	United States Senator Dianne Feinstein staff	Joint Northern and Southern California project update.
6/29/2022	CWG: San Francisco	Presented updates related to the Final EIR/EIS for the San Francisco to San Jose Project Section.
6/29/2022	Menlo Park Mayor Betsy Nash	Presented updates related to the Final EIR/EIS for the San Francisco to San Jose Project Section.
7/7/2022	San Bruno Councilmember Marty Medina	Presented updates related to the Final EIR/EIS for the San Francisco to San Jose Project Section.
7/8/2022	City and County of San Francisco staff	Follow-up discussion with San Francisco agency staff.

ACEC = American Council of Engineering Companies
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 CWG = community working group
 EIR = environmental impact report
 EIS = environmental impact statement
 LPMG = local policy maker group
 MTC = Metropolitan Transportation Commission
 PFRUG = Peninsula Freight Rail Users' Group
 SFO = San Francisco International Airport
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