EXHIBIT B: DRAFT CEQA FINDINGS OF FACT AND STATEMENT OF OVERRIDING CONSIDERATIONS

California High-Speed Rail Authority

San Francisco to San Jose Project Section

Final Environmental Impact Report/ Environmental Impact Statement

Draft CEQA Findings of Fact and Statement of Overriding Considerations

August 2022

CALIFORNIA High-Speed Rail Authority

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

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ACRONYMS AND ABBREVIATIONS

Acronym	Definition
AB	Assembly Bill
ATP	archaeological treatment plan
Authority	California High-Speed Rail Authority
BAAQMD	Bay Area Air Quality Management District
BART	Bay Area Rapid Transit
Bay Area	San Francisco Bay Area
BCDC	San Francisco Bay Conservation and Development Commission
BMP	best management practice
BRMP	biological resources management plan
C.F.R.	Code of Federal Regulations
CAAQS	California ambient air quality standards
Cal. Fish and Game Code	California Fish and Game Code
Cal. Public Res. Code	California Public Resources Code
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CCC	central California coast
CGP	Construction General Permit
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CMP	compensatory mitigation plan (in biological and aquatic resources discussion)
CMP	construction management plan (in transportation discussion)
CRHR	California Register of Historical Resources
CO	carbon monoxide
CO_2e	carbon dioxide equivalent
CPUC	California Public Utilities Commission
CTP	construction transportation plan
CWA	Clean Water Act
dB	decibel
dBA	A-weighted decibel
DDV	Diridon Design Variant
Draft EIR/EIS	*San Francisco to San Jose Project Section Draft EIR/EIS*
DTX	Downtown Rail Extension
EFH	essential fish habitat
EIR	environmental impact report

Acronym	Definition
EIS	environmental impact statement
ESA	environmentally sensitive area
FESA	federal Endangered Species Act
Final EIR/EIS	*San Francisco to San Jose Project Section Final EIR/EIS*
FRA	Federal Railroad Administration
GHG	greenhouse gas
HMBP	hazardous materials business plan
HSR	high-speed rail
I-	Interstate
IAMF	impact avoidance and minimization feature
LEDPA	least environmentally damaging practicable alternative
LMF	light maintenance facility
LOS	level of service
MBARD	Monterey Bay Air Resources District
MBTA	Migratory Bird Treaty Act
MMBtu	million British thermal units
MOA	memorandum of agreement
mph	miles per hour
MSASP	Millbrae Station Area Specific Plan
MUNI	San Francisco Municipal Railway
NAAQS	national ambient air quality standards
NCCAB	North Central Coast Air Basin
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NO_X	nitrogen oxides
NRHP	National Register of Historic Places
NZE	near-zero emission
O_3	ozone
OCS	overhead contact system
O&M	operations and maintenance
PCEP	Peninsula Corridor Electrification Project
PCJPB	Peninsula Corridor Joint Powers Board
PM	particulate matter
$PM_{2.5}$	particulate matter 2.5 microns or less in diameter
PM_{10}	particulate matter 10 microns or less in diameter
Porter-Cologne Act	Porter-Cologne Water Quality Control Act
Project Section or project	San Francisco to San Jose Project Section

Acronym	Definition
Prop 1A	Proposition 1A, The Safe, Reliable, High-Speed Passenger Train Bond Act
Revised/Supplemental Draft EIR/EIS	*San Francisco to San Jose Project Section: Revised Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement*
RHA	Rivers and Harbors Act
RRP	restoration and revegetation plan
RSA	resource study area
RSP Design Variant	Millbrae Station Reduced Site Plan Design Variant
SamTrans	San Mateo County Transit District
SCVHP	Santa Clara Valley Habitat Plan
SFBAAB	San Francisco Bay Area Air Basin
SFO	San Francisco International Airport
SHPO	State Historic Preservation Officer
SIL	significant impact level
SJC	Norman Y. Mineta San Jose International Airport
SJVAB	San Joaquin Valley Air Basin
SJVAPCD	San Joaquin Valley Air Pollution Control District
SLCP	short-lived climate pollutant
SPRR	Southern Pacific Railroad
SR	State Route
STC	Salesforce Transit Center
TCE	temporary construction easement
TPF	traction power facility
TPSS	traction power substation
U.S.C.	United States Code
UPRR	Union Pacific Railroad
US	U.S. Highway
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VdB	vibration decibel
VMT	vehicle miles traveled
VOC	volatile organic compound
VTA	Santa Clara Valley Transportation Authority
WCP	weed control plan
WEAP	worker environmental awareness program
WEF	wildlife exclusion fencing
ZE	zero emission

1 INTRODUCTION

The California Environmental Quality Act (CEQA) Findings of Fact and Statement of Overriding Considerations are intended to fulfill the responsibilities of the California High-Speed Rail Authority (Authority) under CEQA for its approval for the San Francisco to San Jose Project Section (Project Section, or project) of the California High-Speed Rail (HSR) System. CEQA provides that no public agency shall approve a project or program, as proposed, if it would result in significant environmental effects, as identified in an environmental impact report (EIR), unless it adopts and incorporates feasible mitigation to avoid and reduce such effects and adopts appropriate findings.

Section 15091 of the CEQA Guidelines provides as follows:

a) No public agency shall approve or carry out a project for which an EIR has been certified which identifies one or more significant environmental effects of the project unless the public agency makes one or more written findings for each of those significant effects, accompanied by a brief explanation of the rationale for each finding. The possible findings are:

    1) Changes or alterations have been required in, or incorporated into, the project, which avoid or substantially lessen the significant environmental effect as identified in the Final EIR.

    2) Such changes or alterations are within the responsibility and jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by such other agency or can and should be adopted by such other agency.

    3) Specific economic, legal, social, technological, or other considerations, including provision of employment opportunities for highly trained workers, make infeasible the mitigation measures or project alternatives identified in the Final EIR.

CEQA Guidelines Section 15093 further provides:

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

This document includes a description of Alternative A (the Preferred Alternative/CEQA Proposed Project), findings of fact concerning potentially significant environmental impacts and mitigation measures to address such impacts, a discussion of cumulative and growth-inducing impacts, and a Statement of Overriding Considerations.

The custodian of the documents and other materials that constitute the record of proceedings upon which these CEQA Findings of Fact and Statement of Overriding Considerations are based is the Authority, Director of Environmental Services, 770 L Street, Suite 620 MS-1, Sacramento, CA 95814, (916) 324-1541.

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2 PROJECT DESCRIPTION

2.1 Background—Description of Statewide High-Speed Rail System

The Authority, a state governing board formed in 1996, is responsible for planning, designing, constructing, and operating the California High-Speed Rail (HSR) System. Its 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 tracks throughout California, connecting the major population centers of Sacramento, the San Francisco Bay Area (Bay Area), the southern Central Valley, Los Angeles, the Inland Empire, Orange County, and San Diego. The Authority and the Federal Railroad Administration (FRA) prepared two first-tier EIR/environmental impact statement (EIS) documents to select preferred alignments and station locations to advance for more detailed study in second-tier EIRs/EISs. Figure 1 shows the general corridors and station locations of the statewide HSR system that the Authority and FRA selected following the first-tier EIRs/EISs. The California 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, with trains capable of operating up to 220 miles per hour (mph) in HSR project sections that are fully grade separated and on a dedicated track alignment. Following completion of the first-tier programmatic environmental review and decisions, the Authority and FRA divided the statewide HSR system into individual project sections for second-tier environmental review (Authority 2009). One of these sections is the San Francisco to San Jose Project Section.[1]

2.1.1 Description of the Preferred Alternative

The portion of the San Francisco to San Jose Project Section Preferred Alternative/CEQA Proposed Project being considered for approval (hereafter, Preferred Alternative) extends 43 miles from 4th and King Street Station in San Francisco to the centerline of Scott Boulevard in Santa Clara. The San Jose Diridon Station (including the portion of the alignment from Scott Boulevard in Santa Clara to West Alma Avenue in San Jose) was approved by the Authority Board of Directors as part of the San Jose to Merced Project Section in April 2022, and accordingly, is not part of this Board action or these findings. As depicted on Figure 2 and described in further detail within the *San Francisco to San Jose Project Section Final Environmental Impact Report/Environmental Impact Statement* (Final EIR/EIS) (Authority 2022a) in Chapter 2, Alternatives, the Preferred Alternative would modify approximately 14.5 miles of existing Caltrain track predominantly within the existing Caltrain right-of-way, construct the East Brisbane light maintenance facility (LMF), modify six existing stations or platforms to accommodate HSR, and install safety improvements and communication radio towers. The Preferred Alternative would modify Caltrain stations for HSR at the 4th and King Street and Millbrae Stations and would include an LMF in Brisbane. Caltrain has several locations of four-track segments where trains can pass; no additional passing tracks would be constructed under the Preferred Alternative. Table 1 summarizes the design features for the Preferred Alternative.

[1] Second-tier planning and environmental review for the HSR system has resulted in some sections being blended with conventional passenger rail, rather than having dedicated track. The San Francisco to San Jose Project Section discussed in these findings is a predominately a two-track blended system using existing Caltrain tracks.

Table 1 Summary of Design Features for the Preferred Alternative

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

Sources: Authority 2019a, 2019b
I- = Interstate
LMF = light maintenance facility
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.

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 (DTX) Project provides HSR access to the Salesforce Transit Center (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.

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 relocating 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 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 Bay Area Rapid Transit (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.

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

Figure 1 California High-Speed Rail Statewide System

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Figure 2 Preferred Alternative for the San Francisco to San Jose Project Section

2.1.2 Impact Avoidance and Minimization Features

The Authority has committed to implementing programmatic impact avoidance and minimization features (IAMF) consistent with the (1) *2005 Statewide Program Environmental Impact Report/ Environmental Impact Statement (EIR/EIS)* (Authority and FRA 2005), (2) *2008 Bay Area to Central Valley Program EIR/EIS* (Authority and FRA 2008), and (3) *2012 Partially Revised Final Program EIR* (Authority 2012a) into the HSR project. The Authority, in consultation with federal and state agencies, has developed a set of standardized IAMFs that it is applying to the statewide HSR system, including the San Francisco to San Jose Project Section. The IAMFs represent practices that are standard or best practices in the construction industry and are incorporated into the project definition. The Authority will implement these IAMFs during project design, construction, operation, and maintenance of the San Francisco to San Jose Project Section.

The Preferred Alternative incorporates IAMFs as identified and discussed in the Final EIR/EIS (Authority 2022a) and described in detail in Appendix 2-E, Project Impact Avoidance and Minimization Features, of the Final EIR/EIS. The Preferred Alternative's compliance with regulatory requirements, including permitting and coordination with regulatory agencies for many project-related activities, provide additional assurance that certain potential adverse environmental impacts will be avoided, or at least minimized.

The applicable regulatory requirements and IAMFs that are part of the Preferred Alternative are described for the following issue areas in more detail in the corresponding chapters of the Final EIR/EIS and are also listed in Table S-3 of the Final EIR/EIS.

- Transportation – Sections 3.2.2 and 3.2.5.2
- Air Quality and Greenhouse Gases – Sections 3.3.2 and 3.3.4.2
- Noise and Vibration – Sections 3.4.2 and 3.4.4.2
- Electromagnetic Fields and Electromagnetic Interference – Sections 3.5.2 and 3.5.4.2
- Public Utilities and Energy – Sections 3.6.2 and 3.6.4.2
- Biological and Aquatic Resources – Sections 3.7.2 and 3.7.6.2
- Hydrology and Water Resources – Sections 3.8.2 and 3.8.4.2
- Geology, Soils, Seismicity, and Paleontological Resources – Sections 3.9.2 and 3.9.4.1
- Hazardous Materials and Waste – Sections 3.10.2 and 3.10.4.2
- Safety and Security – Sections 3.11.2 and 3.11.4.2
- Socioeconomics and Communities – Sections 3.12.2 and 3.12.4.2
- Station Planning, Land Use, and Development – Sections 3.13.2 and 3.13.4.2
- Parks, Recreation, and Open Space – Sections 3.14.2 and 3.14.4.2
- Aesthetics and Visual Quality – Sections 3.15.2 and 3.15.4.2
- Cultural Resources – Sections 3.16.2 and 3.16.5.2
- Regional Growth – Sections 3.17.2 and 3.17.4.2
- Cumulative Impacts – Section 3.18.2

These IAMFs are enforceable components of the Preferred Alternative and are identified in the Mitigation Monitoring and Enforcement Plan (MMEP). Their implementation will be monitored and reported on in conjunction with project monitoring included in the MMEP.

3 FINDINGS REGARDING THE NEED FOR FURTHER RECIRCULATION

Public Resources Code Section 21092.1 and CEQA Guidelines Section 15088.5 provide that a lead agency is required to recirculate an EIR when "significant new information" is added to the EIR after circulation of a Draft EIR for comment, and prior to certification. As used in CEQA Guidelines Section 15088.5, "information" can include changes to a proposed project or its environmental setting as well as the addition of data or other information. Section 15088.5 also provides that new information added to an EIR is not "significant" unless the EIR is changed in a way that deprives the public of a meaningful opportunity to comment upon a substantial adverse environmental effect of the project or a feasible way to mitigate or avoid such an effect that the project's proponent has declined to implement.

The Authority, on July 23, 2021, announced the availability of a limited revision to its previously published Draft EIR/EIS entitled *San Francisco to San Jose Project Section Revised Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement* (Revised/Supplemental Draft EIR/EIS). The Revised/Supplemental Draft EIR/EIS was made available pursuant to both CEQA and National Environmental Policy Act (NEPA) and presented a new biological resources analysis for monarch butterfly and an analysis of a design variant for the Millbrae Station, neither of which were included in the *San Francisco to San Jose Project Section Draft Environmental Impact Report/Environmental Impact Statement* (Draft EIR/EIS).

The Authority makes the following findings of fact related to the need for further recirculation:

- The Final EIR/EIS includes changes to the proposed project in the form of engineering and design refinements, which were included in the Final EIR/EIS in response to stakeholder comments on the Draft EIR/EIS and to reduce environmental impacts.
- The Final EIR/EIS includes changes to the environmental impacts analysis in Chapters 3 through 5 resulting from the engineering and design refinements, and/or or in response to the public comments on the Draft EIR/EIS and Revised/Supplemental Draft EIR/EIS.
- The Final EIR/EIS also includes new and revised mitigation measures in Chapter 3, Affected Environment, Environmental Consequences, and Mitigation Measures, in response to public comments on the Draft EIR/EIS and on the Revised/Supplemental Draft EIR/EIS. The Final EIR/EIS analyzes the secondary effects of these measures and concludes that there would be no new significant impacts resulting from these measures that have not already been evaluated and addressed in other sections of the Final EIR/EIS.
- The new information included in the Final EIR/EIS is adequately and transparently summarized in the Summary and described in more detail in each individual section or chapter of the Final EIR/EIS.
- The engineering and design refinements refine certain features of the alternatives evaluated in the Draft EIR/EIS, but they do not change the fundamental project description of the construction, operation, and maintenance of an electrified high-speed train between San Francisco and San Jose as presented in Chapter 2 of the Draft EIR/EIS.
- Although the Final EIR/EIS includes updates to impact data and calculations, the overall analysis, conclusions, and CEQA significance determinations have not changed and did not result in any new significant environmental impacts or a substantial increase in the severity of an environmental impact from those presented in the Draft EIR/EIS and the Revised/Supplemental Draft EIR/EIS, and therefore, the updates are not "significant" new information within the meaning of CEQA Guidelines Section 15088.5.
- The engineering and design refinements do not result in new significant environmental impacts or a substantial increase in the severity of a previously identified impact.

Based on these facts, the Authority finds that the new information included in the Final EIR/EIS related to the engineering and design refinements, and changes to impact analysis based on the engineering and design refinements and public comments, does not require further recirculation for additional public review and comment.

4 FINDINGS ON SPECIFIC IMPACTS AND MITIGATION MEASURES

The environmental impacts of the Preferred Alternative that would be potentially significant are described in Chapter 3 of Volume 1, Report, of the Final EIR/EIS. These impacts are set forth and summarized in this chapter for the Preferred Alternative, along with mitigation measures the Authority adopts that will avoid or substantially lessen those potentially significant or significant impacts. Due to length of the text, mitigation measures are presented in full separately in Attachment A, Mitigation Monitoring and Enforcement Plan. The impact and mitigation measure findings in this chapter depend upon, and therefore incorporate by reference, the full analysis and conclusions in the Final EIR/EIS.

These findings also set forth those impacts that the Authority finds cannot with certainty be avoided or reduced to a less-than-significant level even with the adoption of all feasible mitigation measures identified in the Final EIR/EIS. In adopting these findings and mitigation measures, the Authority also adopts a Statement of Overriding Considerations. Chapter 8, Statement of Overriding Considerations, describes the economic, social, and other benefits of the Preferred Alternative that would render these significant unavoidable environmental impacts acceptable.

The Authority is not required to make findings or adopt mitigation measures or policies as part of this decision for impacts that are less than significant and require no mitigation or are beneficial.

All resource areas include one or more less-than-significant impact without mitigation or beneficial impacts, as listed below:

- Transportation
- Air Quality and Greenhouse Gases
- Noise and Vibration
- Electromagnetic Fields and Electromagnetic Interference*
- Public Utilities and Energy*
- Biological and Aquatic Resources
- Hydrology and Water Resources
- Geology, Soils, Seismicity, and Paleontological Resources*
- Hazardous Materials and Waste
- Safety and Security
- Socioeconomics and Communities*
- Station Planning, Land Use, and Development
- Parks, Recreation, and Open Space*
- Aesthetics and Visual Quality*
- Cultural Resources
- Regional Growth*

Resource areas for which all impacts in the Final EIR/EIS were identified as less than significant without mitigation measures or beneficial are designated by an asterisk (*) in the list above and are not discussed further in this document. Impacts within a resource area which were identified as less than significant without mitigation measures are also generally not discussed further in this document.

4.1 Transportation (Section 3.2 of the Final EIR/EIS)

Construction of the Preferred Alternative would result in potentially significant temporary impacts on bus transit, passenger rail operations, and freight rail operations and permanent impacts on pedestrian and bicycle access. Operation of the Preferred Alternative would result in continuous permanent impacts on bus services. While most of these potentially significant impacts under the Preferred Alternative would be mitigated to a less-than-significant level, the temporary and permanent impacts on bus transit would remain significant and unavoidable even with implementation of mitigation.

These findings address impacts associated with the Preferred Alternative. Because of length, the full mitigation measure text is presented separately in the MMEP.

4.1.1 Impact TR#8: Temporary Impacts on Bus Transit

Project-related construction staging and traffic for the Preferred Alternative would interfere with bus transit along roadways and at the existing 4th and King Street and Millbrae Stations. The construction of the HSR stations, Brisbane LMF, Caltrain station improvements, at-grade crossing gate improvements, platforms, and track modifications would require temporary construction easements (TCE). The TCEs would require the temporary closure of parking areas, bus stops, or roadway travel lanes. Roadway closures would only occur periodically at night or on weekends, as necessary, which would reduce the potential effect on transit service when it is heaviest during the day on weekdays. Bus stops would be temporarily relocated to nearby locations so that service would not be disrupted. Any closure of roadways, sections of platforms, or transit lines during construction would be temporary.

The contractor will attempt to minimize disruption or shorten the length of time that transit facilities are inoperable and will provide signage to alternate facilities. Upon completion of construction, the contractor will restore parking areas, bus stops, and roadway travel lanes. In accordance with a specific construction management plan (CMP) (TR-IAMF#11) and construction transportation plan (CTP) (TR-IAMF#2), the contractor will attempt to provide temporary bus stops, parking areas, and access with the same features and amenities of the relocated facility, such as lighting, seating, shelters, and signage. To minimize conflicts with transit during construction, the contractor will prepare a specific CMP (TR-IAMF#11) to maintain safe and adequate access for transit users during construction. In addition, the CTP will include methods to minimize construction traffic. A CTP traffic control plan will include provisions to maintain transit flows and access, minimize operations hazards through alternative access and bus route detour provisions, minimize transit schedule disruptions, identify temporary bus stops away from construction locations, and separate transit users from construction locations. Standard construction practices will establish construction truck routes, restrictions on construction hours, and construction vehicle parking (TR-IAMF#3, TR-IAMF#6, TR-IAMF#7).

However, even with these IAMFs, there is a potential for the Preferred Alternative to materially decrease the performance of certain bus transit routes. This impact is significant under CEQA (Authority 2022a: page 3.2-82).

The Authority finds that there are no feasible mitigation measures or alternatives that could be adopted to reduce the impact of construction on bus transit to less-than-significant levels.[2] The Authority finds that despite this otherwise significant and unavoidable impact, specific economic, social, and other considerations identified in the Statement of Overriding Considerations (Chapter 8 of this document) support certification of the Final EIR/EIS and approval of the project.

4.1.2 Impact TR#10: Temporary Impacts on Passenger Rail Operations

Project-related construction, staging, and traffic would contribute to temporary interference with passenger rail transit. The construction of the HSR stations, platforms, and track alignment would require TCEs. The TCE may require the temporary closure of transit stations, passenger rail platforms, and passenger rail track for other operators where the systems interface. Any closure of passenger rail stations, platforms, and track during construction would be temporary (on the scale of hours or days). Where passenger rail stations are closed, temporary stations would be established to avoid cessation of service at that station.

[2] A mitigation measure (TR-MM#2: Install Transit Signal Priority Treatments) is applicable to impacts of Alternative A within the San Jose Diridon Station Approach Subsection. This mitigation measure is included for Impact TR#8 in the Final EIR/EIS but is not included in these findings because the San Jose Diridon Station Approach Subsection was approved by the Authority Board of Directors as part of the San Jose to Merced Project Section in April 2022.

The contractor will to degree feasible minimize disruption to passenger rail facilities or shorten the length of time that these facilities would be inoperable (TR-IAMF#2). Where feasible, the contractor will schedule cessation of passenger rail service during the night or on weekends to minimize disruption of passenger rail service. To minimize conflicts with passenger rail transit caused by construction, the contractor will repair any damaged sections to the equivalent of their original structural condition or better and the use of existing alternative tracks where available (TR-IAMF#9). If necessary and feasible, a shoofly track may be built to allow existing train lines to bypass areas closed for construction activities. Upon completion, HSR contractors will open and repair tracks or build a new mainline track and remove the shoofly track.

The contractor will identify specific measures in the CMP (TR-IAMF#11) to maintain transit access and safe and adequate access for transit users during construction activities. In addition, the CTP will include methods to minimize construction traffic (TR-IAMF#2). A traffic control plan developed as part of the CTP will include provisions for maintaining traffic flow and access and minimizing operations hazards through alternative access and detour provisions, routes for construction traffic, and scheduled transit access. The contractor will establish construction truck routes, restrictions on construction hours, and construction parking as part of the CTP. While the CMP will control passenger rail operations and minimize disruption, there would still be residual disruptions to passenger rail operation at times.

However, even with these IAMFs, there is a potential for the Preferred Alternative to result in the temporary disruption of passenger rail operations. This impact is significant under CEQA (Authority 2022a: page 3.2-85).

The following measure mitigates this impact: TR-MM#3: Implement Railway Disruption Control Plan.

The Authority will implement mitigation measures to reduce temporary impacts on passenger rail operations. TR-MM#3 will minimize the duration of construction in areas that would require temporary closures, limit construction hours, and plan for coordination between the construction contractor and passenger rail service providers so that disruptions will be limited to a maximum of several hours or several days. The goal of the railway disruption control plan will be to minimize the overall duration of disruption of passenger and freight operations and maintain reasonable levels of service (LOS), while allowing expeditious completion of construction. The construction contractor will coordinate with Caltrain and with Union Pacific Railroad (UPRR) in advance and during any potential disruption to passenger or freight operations or Caltrain or UPRR facilities. The construction contractor will maintain passenger rail and UPRR's emergency access throughout construction. The Authority will require consultation with respect to coordination between the Authority and freight operators and shippers. These provisions include the establishment of a freight stakeholder committee with quarterly coordination meetings throughout the construction duration; consultation with Caltrain, UPRR, and freight operators and shippers during preparation of the construction disruption plan, including provision of a draft plan for review and comment prior to finalization; and notification of planned closures at least 3 months in advance.

This mitigation measure will be effective in minimizing the temporary disruption of passenger rail operations.

The Authority finds that TR-MM#3 is required under the Preferred Alternative and that this mitigation measure will reduce impacts on passenger rail to a less-than-significant level.

4.1.3 Impact TR#11: Continuous Permanent Impacts on Bus Services

Vehicle trips around the stations would increase when the project becomes fully operational because of the addition of HSR passengers and workers traveling to and from station areas. Many of these trips would occur during peak hours. This added traffic would lead to increased volumes, congestion, and delays around the 4th and King Street Station and Millbrae Station. In addition, the increased gate-down time at at-grade crossings from added HSR trains would result in increased congestion and delays at the at-grade rail crossings and adjacent intersections.

The increased congestion and delay would occur along high-frequency San Francisco Municipal Railway (MUNI) and San Mateo County Transit District (SamTrans) bus routes (i.e., routes with service every 15 minutes or less), contributing to bus performance delay. The addition of project-related vehicle trips would affect bus on-time performance and operating speeds. The Preferred Alternative would add project-related trips affecting seven high-frequency bus routes near the 4th and King Street Station and the Millbrae Station. It would also add gate-down time, further affecting one high-frequency bus route in the San Francisco to South San Francisco Subsection and one high-frequency bus route in the San Mateo to Palo Alto Subsection.

The Preferred Alternative would have a permanent impact on bus transit. This impact is significant under CEQA (Authority 2022a: page 3.2-88).

The following measure mitigates this impact for the one high-frequency route affected near the Millbrae Station and the one high-frequency route affected in the San Mateo to Palo Alto Subsection: TR-MM#2: Install Transit Priority Treatments.

The Authority will implement TR-MM#2 to reduce permanent impacts on bus services. TR-MM#2 will improve bus transit operations in the 4th and King Street Station and the Millbrae Station areas as well as in the San Mateo to Palo Alto Subsection by installing transit priority treatments that prioritize bus transit in the following key locations:

- 4th and King Street Station Area
  - Fifth Street and Townsend Street along MUNI Routes 30 and 45
- Millbrae Station Area
  - El Camino Real between Hillcrest Boulevard and Trousdale Drive
- San Mateo to Palo Alto Subsection
  - Ravenswood Avenue between El Camino Real and Middlefield Road
  - Middlefield Road between Marsh Road and Willow Road

This mitigation measure will be effective in improving the speed and reliability of bus routes affected by project-related trips by identifying targeted improvements to enhance operations for the one high-frequency route affected near the Millbrae Station and the one high-frequency route affected in the San Mateo to Palo Alto Subsection.

The Authority finds that TR-MM-#2 is required under the Preferred Alternative and that it will lessen the project's impact on bus services; however, the CEQA impact would remain significant and unavoidable. The Authority finds that there are no other feasible mitigation measures or alternatives that could be adopted to reduce this remaining impact to less-than-significant levels for the two affected high-frequency bus routes near the 4th and King Street Station and the one affected high-frequency bus route at an at-grade crossing in the San Francisco to South San Francisco Subsection. MUNI Routes 30 and 45 would be affected by increased congestion around the 4th and King Street Station, and while the transit priority treatments in TR-MM#2 will improve conditions, they will not reduce transit delays to a less-than-significant level and no additional feasible mitigations are available. MUNI Route 55 would also be affected by increased gate-down time at the 16th Street at-grade-crossing, but MUNI already plans to implement bus transit signal priority for 16th Street, and no other feasible mitigations are available to address impacts on MUNI Route 55. The Authority finds that despite this otherwise significant and unavoidable impact, specific economic, social, and other considerations identified in the Statement of Overriding Considerations (Chapter 8) support certification of the Final EIR/EIS and approval of the project.

4.1.4 Impact TR#17: Continuous Permanent Impacts on Pedestrian and Bicycle Access

Pedestrian and bicycle trips around the stations would increase when the project becomes fully operational because of the addition of HSR passengers and workers traveling to and from station

areas. This added traffic would lead to increased pedestrian volumes in an already congested pedestrian environment around the 4th and King Street Station. The increase in pedestrian traffic caused by the project would exacerbate pedestrian crowding concerns around limited sidewalk capacity along the Fourth Street station frontage between Townsend Street and King Street.

The Preferred Alternative would have a permanent impact on pedestrian access at the 4th and King Street Station. This impact is significant under CEQA (Authority 2022a: page 3.2-97).

The following measure mitigates this impact: TR-MM#5: Contribute to 4th and King Street Station Pedestrian Improvements.

The Authority will implement TR-MM#5 to reduce permanent impacts on pedestrian and bicycle access. TR-MM#5 will increase sidewalk capacity on Fourth Street along the station frontage between Townsend Street and King Street through a collaborative development of an improvement plan with Caltrain and the City and County of San Francisco, and the subsequent construction of pedestrian improvements based on the approved pedestrian improvement plan. This mitigation measure will be effective in reducing pedestrian impacts associated with new pedestrian trips generated by HSR at the 4th and King Street Station while it serves as the interim northern terminus station prior to completion of the DTX project and subsequent extension of rail service to the STC.

The Authority finds that TR-MM#5 is required under the Preferred Alternative and that this mitigation measure will reduce permanent impacts on pedestrian access to a less-than-significant level.

4.1.5 Impact TR#18: Temporary Impacts on Freight Rail Operations

The construction of the HSR stations, platforms, and track modifications would require construction in certain areas presently used for freight service. Construction would require the temporary closure of tracks presently used by freight in certain areas for limited durations. With the exception of work related to the Brisbane flyover, freight rail would be able to have at least single track access, except during limited periods when connecting new/realigned tracks to existing tracks. Any closure or removal of freight track during construction associated with track connections would be temporary (ranging from a few hours to a few days), but would disrupt freight rail operations. This would result in inconvenience to freight operators and customers and could result in additional truck traffic if necessary to meet freight delivery requirements.

The project 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 (TR-IAMF#9). If there is room within the existing Caltrain right-of-way and if it is necessary during construction, a shoofly track will be built to allow existing train lines to bypass any areas closed for construction activities where feasible. Upon completion, tracks will be opened and repaired or new mainline track will be built, and the temporary shoofly track will be removed. Shoofly tracks are only feasible in areas with unconstrained right-of-way with adequate space and may not be feasible in constrained areas.

Where shoofly tracks are not feasible, there could be temporary delays on the order of hours or at most a few days, and the closures would usually occur at nights and on weekends and holidays to minimize disruption. However, the Authority and the freight railroads would work together to build the project in a manner consistent with the agreements negotiated by the Authority's contractor during the final design process. This would enable each entity to conduct its relevant activities in a manner that would reduce impacts on freight railroad operations.

However, even with this IAMF, there is a potential for the Preferred Alternative to affect freight rail operations. This impact is significant under CEQA (Authority 2022a: page 3.2-105).

The following measure mitigates this impact: TR-MM#3.

The Authority will implement TR-MM#3 to reduce temporary impacts on freight rail operations. TR-MM#3 will minimize the duration of construction in areas that would require temporary closures, limit construction hours, and plan for coordination between the construction contractor

and passenger rail service providers so that disruptions will be limited to a maximum of several hours or several days. The goal of the railway disruption control plan will be to minimize the overall duration of disruption of passenger and freight operations and maintain reasonable LOS, while allowing expeditious completion of construction. The construction contractor will coordinate UPRR, freight operators, and freighter users in advance and during any potential disruption to freight operations or facilities. The construction contractor will maintain freight rail access throughout construction with the exception of the limited closures noted in the Final EIR/EIS.

This mitigation measure will be effective in minimizing the disruption of passenger rail operations.

The Authority finds that TR-MM#3 is required under the Preferred Alternative and that this mitigation measure will reduce impacts on freight rail operations to a less-than-significant level.

4.2 Air Quality and Greenhouse Gases (Section 3.3 of the Final EIR/EIS)

Construction of the Preferred Alternative would result in potentially significant temporary impacts on air quality within the San Francisco Bay Area Air Basin (SFBAAB), on implementation of an applicable air quality plan, and on localized air quality within the SFBAAB. While most of these potentially significant impacts under the Preferred Alternative would be mitigated to a less-than-significant level, impacts on localized air quality within the SFBAAB would remain significant and unavoidable even with mitigation.

These findings address impacts associated with the Preferred Alternative. Because of length, the full mitigation measure text is presented separately in the MMEP.

4.2.1 Impact AQ#1: Temporary Direct and Indirect Impacts on Air Quality within the SFBAAB

The predominant pollutants associated with project construction are fugitive dust (particulate matter 10 microns or less in diameter [PM_{10}] and particulate matter 2.5 microns or less in diameter [$PM_{2.5}$]) from earthmoving activities and combustion pollutants, particularly ozone (O_3) precursors (nitrogen oxides [NO_X] and volatile organic compounds [VOC]) and carbon monoxide (CO) from heavy equipment and trucks. VOCs would also be generated from paints and other coatings used during construction activities. Final EIR/EIS Table 3.3-12 presents construction emissions from the Preferred Alternative in the SFBAAB in tons per year and pounds per day.[3] The table reflects the impact of the Safer Affordable Fuel-Efficient Vehicles Rule (California Air Resources Board [CARB] 2019).

The following IAMFs are incorporated in the Preferred Alternative:

- AQ-IAMF#1 will minimize fugitive dust emissions through a dust control plan. The fugitive dust control plan will outline measures such as washing vehicles before exiting the construction site, watering unpaved surfaces, limiting vehicle travel speed, and suspending dust-generating activities during high wind events.
- AQ-IAMF#2 will minimize off-gassing emissions of VOCs that would occur from paints and other coatings by requiring the use of low-VOC paint and super-compliant or Clean Air paint that has a lower VOC content than that required by Bay Area Air Quality Management District (BAAQMD) rules.
- AQ-IAMF#3 will minimize exhaust emissions from off-road equipment with renewable diesel fuel. Renewable diesel is produced from non-petroleum renewable resources and waste

[3] The construction-related criteria pollutant emissions in the SFBAAB presented in Table 3.3-12 include those within the San Jose Diridon Station Approach Subsection, which was approved by the Authority Board of Directors as part of the San Jose to Merced Project Section in April 2022. Accordingly, for the Preferred Alternative to Scott Boulevard, the criteria pollutant emissions in the SFBAAB would be less than disclosed in Table 3.3-12.

products and generates substantially fewer emissions than traditional diesel per gallon combusted.

- AQ-IAMF#4 will minimize exhaust emissions from off-road equipment by requiring all heavy-duty equipment used during the construction phase to meet Tier 4 engine requirements. Tier 4 engine requirements are currently the strictest emissions standards adopted by the CARB and U.S. Environmental Protection Agency (USEPA).
- AQ-IAMF#5 will minimize exhaust emissions from on-road trucks by requiring all trucks used to haul construction materials to operate a model year 2010 engine or newer.
- AQ-IAMF#6 will minimize fugitive dust emissions from concrete batch plants through typical control measures, such as water sprays, enclosures, hoods, and other suitable technology.

However, even with incorporation of these IAMFs, the project would result in a temporary impact on regional air quality during construction because increased NO_X emissions would exceed BAAQMD's CEQA thresholds. This impact is significant under CEQA (Authority 2022a: page 3.3-58).

The following measures mitigate this impact: AQ-MM#1: Construction Emissions Reductions—Requirements for use of Zero Emission and/or Near Zero Emission Vehicles and Off-Road Equipment; and AQ-MM#2: Offset Project Construction Emissions in the SFBAAB.

The Authority will implement mitigation measures to reduce temporary direct and indirect effects on air quality within the SFBAAB. AQ-MM#1 requires that a minimum of 25 percent of all light-duty on-road vehicles use zero-emission (ZE) or near-zero-emission (NZE) technology. The measure also includes ZE and NZE goals for heavy-duty on-road trucks and off-road equipment. This mitigation measure will reduce the impact of construction emissions from project-related on-road vehicles and off-road equipment.

AQ-MM#2 requires that prior to issuance of construction contracts, the Authority enter into an agreement with BAAQMD to offset remaining NO_X emissions to below BAAQMD's CEQA threshold levels. This mitigation measure will be effective in offsetting emissions generated during project construction through the funding of emission-reduction projects. Offsets will be consistent with BAAQMD protocol and requirements and their effectiveness will be verified by BAAQMD. It is BAAQMD's experience that emissions offsets are feasible mitigation that effectively achieve actual emission reductions. The Authority has executed similar memorandums of understanding with other air districts to offset emissions for other project sections and this has proven to be effective mitigation to reduce impacts below the threshold of significance.

These mitigation measures will be effective in minimizing temporary direct and indirect impacts on air quality within the SFBAAB during construction.

The Authority finds that AQ-MM#1 and AQ-MM#2 are required under the Preferred Alternative and that these mitigation measures will reduce impacts on regional air quality in the SFBAAB to a less-than-significant level.

4.2.2 Impact AQ#4: Temporary Direct Impacts on Implementation of an Applicable Air Quality Plan

Emissions from construction of the Preferred Alternative would be temporary, occurring for approximately 6 years from 2021 through 2026. Emissions from project construction in the North Central Coast Air Basin (NCCAB) and San Joaquin Valley Air Basin (SJVAB) would be temporary, occurring for approximately 2 years from 2022 through 2023. Once construction is complete, air quality in the SFBAAB, NCCAB, and SJVAB is expected to improve. However, during the construction period, construction activities could cause air quality impacts that exceed BAAQMD thresholds and federal General Conformity thresholds, which support implementation of air quality plans.

The BAAQMD, Monterey Bay Air Resources District (MBARD), and San Joaquin Valley Air Pollution Control District (SJVAPCD) have also developed project-level thresholds. These

thresholds prevent new projects from contributing to California ambient air quality standards (CAAQS) or national ambient air quality standards (NAAQS) violations, which supports implementation of regional air quality plans to attain NAAQS and CAAQS. Construction emissions from the Preferred Alternative would exceed the BAAQMD's CEQA thresholds for NO_X. Construction emissions would not exceed the MBARD or SJVAPCD thresholds for any criteria pollutant. Exceedances of adopted thresholds could conflict with applicable air quality plans.

The Preferred Alternative incorporates stringent on-site emissions controls, including fugitive dust control practices (AQ-IAMF#1), use of low-VOC paints (AQ-IAMF#2), use of renewable diesel (AQ-IAMF#3), use of Tier 4 off-road engines (AQ-IAMF#4), and use of model year 2010 or newer on-road engines (AQ-IAMF#5). However, even with these IAMFs, exceedances of adopted thresholds would still occur and would be considered a significant impact under CEQA (Authority 2022a: page 3.3-58).

The following measures mitigate this impact: AQ-MM#1 and AQ-MM#2.

The Authority will implement mitigation measures to reduce temporary direct impacts on applicable air quality plan. AQ-MM#1 will reduce on-site emissions from project-related on-road vehicles and off-road equipment. AQ-MM#2 requires the offset of remaining NO_X emissions to below BAAQMD's CEQA thresholds. Because BAAQMD's thresholds were established to prevent emissions from new projects in the SFBAAB from contributing to CAAQS or NAAQS violations, offsetting emissions below the threshold levels will avoid potential conflicts with the ambient air quality plans and project construction will not contribute a significant level of air pollution such that regional air quality within the SFBAAB will be degraded.

These mitigation measures will be effective in minimizing the project's impact on applicable air quality plans.

The Authority finds that AQ-MM#1 and AQ-MM#2 are required under the Preferred Alternative and that these mitigation measures will reduce impacts on applicable air quality plans to a less-than-significant level.

4.2.3 Impact AQ#5: Temporary Direct Impacts on Localized Air Quality in the SFBAAB—Criteria Pollutants

Construction of the Preferred Alternative would lead to localized concentrations that would exceed the 24-hour PM_{10} CAAQS and significant impact level (SIL), indicating that the Preferred Alternative would contribute to existing exceedances of the CAAQS for PM_{10} where background concentrations already exceed the CAAQS.

AQ-IAMF#1 through AQ-IAMF#6 minimize construction emissions and air quality impacts through the best available on-site controls. These best available on-site controls include fugitive dust control practices (AQ-IAMF#1), use of low-VOC paints (AQ-IAMF#2), use of renewable diesel (AQ-IAMF#3), use of Tier 4 off-road engines (AQ-IAMF#4), use of model year 2010 or newer on-road engines (AQ-IAMF#5), and reduction of emissions from concrete batch plants (AQ-IAMF#6). However, even with these IAMFs, exceedances of the CAAQS would still occur, which would be considered a significant impact under CEQA (Authority 2022a: page 3.3-83).

The following measure would lessen these impacts: AQ-MM#1: Construction Emissions Reductions – Requirements for Use of Zero Emission and/or Near Zero Emission Vehicles and Off-Road Equipment. AQ-MM#1 is a commitment to prioritize the use of electric-powered equipment and vehicles as they become available.

The Authority will implement the mitigation measure to reduce temporary direct impacts on localized air quality in the SFBAAB for criteria pollutants. AQ-MM#1 will reduce on-site emissions from project-related on-road vehicles and off-road equipment.

The Authority finds that AQ-MM#1 is required under the Preferred Alternative and that it will lessen the project's impact on localized air quality during construction; however, the CEQA impact would remain significant and unavoidable. The Authority finds that there are no other feasible mitigation measures or alternatives that could be adopted to reduce this remaining

impact to less-than-significant levels. Use of electrical-powered equipment is limited by lack of availability (i.e., contractor cannot secure an electric model within 200 miles of the construction site), limited commercialization (i.e., electric models have not been developed), or prohibitive costs (i.e., electric models are more than 100 percent the cost of diesel counterparts). The Authority finds that despite this otherwise significant and unavoidable impact, specific economic, social, and other considerations identified in the Statement of Overriding Considerations (Chapter 8) support certification of the Final EIR/EIS and approval of the project.

4.3 Noise and Vibration (Section 3.4 of the Final EIR/EIS)

The Preferred Alternative would result in potentially significant impacts related to temporary exposure of sensitive receptors to construction noise. In addition, the Preferred Alternative would result in intermittent permanent exposure of sensitive receptors to noise from train operations, and permanent exposure of sensitive receptors to vehicular traffic noise increases and traction power facility (TPF) noise. The Preferred Alternative would also result in potentially significant impacts related to temporary exposure of sensitive receptors and buildings to construction vibration and intermittent permanent exposure of sensitive receptors to vibration from operations.

The potentially significant impact from permanent exposure of sensitive receptors to TPF noise and temporary exposure of sensitive receptors and buildings to construction vibration would be mitigated to less than significant. However, the potentially significant impact from temporary exposure of sensitive receptors to construction noise, intermittent permanent exposure of sensitive receptors to noise from train operations, permanent exposure of sensitive receptors to vehicular traffic noise increases, and intermittent permanent exposure of sensitive receptors to vibration from operations would remain significant and unavoidable even with mitigation.

These findings address impacts associated with the Preferred Alternative. Because of length, the full mitigation measure text is presented separately in the MMEP.

As explained in the Final EIR/EIS, noise barriers under MM-NV#3, could have secondary impacts on visual aesthetics and require tree or vegetation removal. Depending on their design, height, and location, noise barriers can become visually intrusive, blocking views or creating places for unwanted graffiti. Noise barriers will be installed within the fenced areas of the existing Caltrain right-of-way, which is often shielded from view by fencing or landscaping (described in Section 3.15, Aesthetics and Visual Quality of the Final EIR/EIS). In accordance with AVQ-MM#6: Provide Noise Barrier Treatment, as part of the final design and construction management plan, the Authority will work with local jurisdictions to develop the appropriate noise barrier style and treatments for visually sensitive areas, to reduce the visual effect of barriers on adjacent land uses.

4.3.1 Impact NV#1: Temporary Exposure of Sensitive Receptors to Construction Noise

Construction activities associated with the Preferred Alternative would affect sensitive receptors by temporarily and periodically substantially increasing ambient noise levels in the project vicinity in exceedance of FRA noise impact criteria. Temporary noise impacts would result from activities associated with construction, modification, and relocation of existing tracks, stations, and platforms; modification of existing roadways and structures; construction of the 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 Preferred Alternative incorporates NV-IAMF#1 to minimize noise impacts by requiring compliance with FRA and Federal Transit Administration guidelines for minimizing construction noise and vibration impacts when work is conducted within 1,000 feet of sensitive receptors. However, even with NV-IAMF#1, some sensitive receptors would be exposed to construction noise that exceeds FRA noise impact criteria. This is considered a significant impact under CEQA (Authority 2022a: page 3.4-48).

The following measure mitigates this impact: NV-MM#1: Construction Noise Mitigation Measures.

The Authority will implement NV-MM#1 to reduce the potential for construction noise impacts. This mitigation measure requires the contractor to prepare a noise monitoring program prior to construction to meet the construction noise limits wherever feasible. The monitoring program will describe the actions the contractor will use to reduce noise, such as installing temporary noise barriers, avoiding nighttime construction near residential areas, using low-noise emission equipment, and other actions as necessary and feasible. This mitigation measure will reduce construction noise levels but not always below the FRA noise impact criteria, particularly at night and during pile driving.

The Authority finds that NV-MM#1 is required under the Preferred Alternative and that it will lessen the project's construction noise impact; however, the CEQA impact would remain significant and unavoidable. The Authority finds that there are no other feasible mitigation measures or alternatives that could be adopted to reduce this remaining impact to less-than-significant levels. The Authority finds that despite this otherwise significant and unavoidable impact, specific economic, social, and other considerations identified in the Statement of Overriding Considerations (Chapter 8) support certification of the Final EIR/EIS and approval of the project.

4.3.2 Impact NV#2: Intermittent Permanent Exposure of Sensitive Receptors to Noise from Operations

Operations of the Preferred Alternative would increase train services in the Caltrain corridor between stations and to and from the Brisbane LMF and would increase the frequency of train horn sounding at at-grade crossings and Caltrain passenger station platforms, which would result in increases in noise levels. Operations of the Preferred Alternative would increase noise levels above existing ambient levels and in exceedance of FRA criteria, causing severe noise impacts at sensitive receptors. The Preferred Alternative would result in 1,634 severe noise impacts prior to mitigation, as shown in Final EIR/EIS Table 3.4-16.[4] This is considered a significant impact under CEQA (Authority 2022a: page 3.4-62). Some of these impacts may be reduced with mitigation.

The following measures mitigate this impact: NV-MM#3: Implement Proposed California High-Speed Rail Project Noise Mitigation Guidelines; NV-MM#4: Support Potential Implementation of Quiet Zones by Local Jurisdictions; NV-MM#5: Vehicle Noise Specification; NV-MM#6: Special Trackwork at Crossovers, Turnouts, and Insulated Joints; and NV-MM#7: Additional Noise Analysis during Final Design.

The Authority will implement mitigation measures to reduce noise impacts at sensitive receptors from operations. As part of NV-MM#3, the Authority will consider constructing noise barriers, installing sound insulation, or acquiring easements on properties severely affected by noise, based on criteria in the Authority's Noise and Vibration Mitigation Guidelines (Authority 2022a: Appendix 3.4-B). As part of NV-MM#4, the Authority will assist local communities in establishing quiet zones to reduce noise impacts from train warning horns where cities decide to implement them. NV-MM#5 requires HSR vehicles to meet federal regulations for noise (40 Code of Federal Regulations [C.F.R.] § 201.12) at the time of procurement. NV-MM#6 requires the contractor to document how they minimized or eliminated rail gaps related to special trackwork, which can be a major source of noise during operations. As part of NV-MM#7, if any changes to final design or vehicle specifications change any assumptions underlying the noise analysis, the Authority will prepare the necessary environmental documentation as required by CEQA to reassess potential impacts and mitigation.

These mitigation measures will be effective at reducing the number of severe noise impacts in the resource study area (RSA); however, they will not mitigate all noise impacts because noise

[4] The noise impacts in Table 3.4-16 include those within the San Jose Diridon Station Approach Subsection, which was approved by the Authority Board of Directors as part of the San Jose to Merced Project Section in April 2022. Accordingly, for the portion of the Preferred Alternative to Scott Boulevard, the impacts would be less than disclosed in Table 3.4-16.

barriers are not cost-effective or acoustically feasible in all areas with predicted noise impacts. Table 3.4-27 of the Final EIR/EIS summarizes the residual noise impacts with noise barriers alone, and with a combination of noise barriers and quiet zones.[5] As specified in the noise mitigation guidelines (Authority 2022a: Appendix 3.4-B), noise barriers should be approved by 75 percent of affected parties in a community; if they do not approve, then noise barriers may not be installed at certain locations. Quiet zones cannot be implemented by the Authority or any rail operators (like the California Department of Transportation [Caltrans]); they can only be established at the initiative of a local jurisdiction. Thus, quiet zones may not be adopted where local jurisdictions do not want them to be established.

Because severe noise impacts would remain following mitigation and/or noise barriers or quiet zones would not be implemented due to the constraints noted above, the impact would be significant and unavoidable under CEQA.

The Authority finds that NV-MM#3, NV-MM#4, NV-MM#5, NV-MM#6, and NV-MM#7 are required under the Preferred Alternative and that they will lessen the project's operational noise impacts; however, the CEQA impact would remain significant and unavoidable. The Authority finds that there are no other feasible mitigation measures or alternatives that could be adopted to reduce this remaining impact to less-than-significant levels. The Authority finds that despite this otherwise significant and unavoidable impact, specific economic, social, and other considerations identified in the Statement of Overriding Considerations (Chapter 8) support certification of the Final EIR/EIS and approval of the project.

4.3.3 Impact NV#6: Permanent Exposure of Sensitive Receptors to Vehicular Traffic Noise Increases

Two roadway segments would have the potential for noise level increases greater than or equal to 3 decibels (dB) compared to existing noise conditions in 2029 under the Preferred Alternative. By 2040, four roadway segments would have the potential for noise level increases greater than or equal to 3 A-weighted decibels (dBA). This is considered a significant impact under CEQA (Authority 2022a: page 3.4-65).

The following measures mitigate this impact: NV-MM#3 and NV-MM#7.

The Authority will implement mitigation measures to reduce the noise impacts from vehicular traffic noise. Under NV-MM#3, the Authority will investigate the traffic noise impacts and ways to mitigate them by means such as noise barriers. Pursuant to NV-MM#7, if any changes to final design or vehicle specifications change any assumptions underlying the noise analysis, the Authority will prepare the necessary environmental documentation as required by CEQA to reassess impacts and mitigation.

The Authority finds that NV-MM#3 and NV-MM#7 are required under the Preferred Alternative and that they will lessen the project's vehicular traffic noise impacts; however, the CEQA impact would remain significant and unavoidable. The Authority finds that there are no other feasible mitigation measures or alternatives that could be adopted to reduce this remaining impact to less-than-significant levels. The Authority finds that despite this otherwise significant and unavoidable impact, specific economic, social, and other considerations identified in the Statement of Overriding Considerations (Chapter 8) support certification of the Final EIR/EIS and approval of the project.

4.3.4 Impact NV#7: Traction Power Facility Noise

Project operations under the Preferred Alternative would permanently expose sensitive receptors to severe noise increase from PS5 Option 2 in Palo Alto. One residential building would be

[5] The residual noise impacts in Table 3.4-27 include those within the San Jose Diridon Station Approach Subsection, which was approved by the Authority Board of Directors as part of the San Jose to Merced Project Section in April 2022. Accordingly, for the Preferred Alternative to Scott Boulevard, the residual impacts would be less than disclosed in Table 3.4-27.

exposed to a noise increase that exceeds the 3-dB severe impact threshold for the TPF and the HSR trains. This is considered a significant impact under CEQA (Authority 2022a: page 3.4-66).

The following measures mitigate this impact: NV-MM#3 and NV-MM#7.

The Authority will implement mitigation measures to reduce the noise impacts from TPF. As part of NV-MM#3, the Authority will investigate the TPF noise impacts and implement mitigation such as installation of noise barriers around the facility. As part of NV-MM#7, additional design considerations such as equipment selection and siting will be evaluated during final design if needed to mitigate the noise. These mitigation measures, including noise barrier mitigation, will mitigate all severe noise impacts from the TPF.

These mitigation measures will be effective in minimizing the project's TPF severe noise impacts.

The Authority finds that NV-MM#3 and NV-MM#7 are required under the Preferred Alternative and that these mitigation measures will reduce impacts on exposure of sensitive receptors to TPF noise to a less-than-significant level.

4.3.5 Impact NV#8: Temporary Exposure of Sensitive Receptors and Buildings to Construction Vibration

Construction activities would expose persons and could expose buildings to excessive ground-borne vibration from pile driving for the LMF foundation and foundations for bridge structures, and possibly other construction activities such as vibratory compaction and demolition. NV-IAMF#1 minimizes construction vibration and its potential to cause damage to buildings and human annoyance. However, even with NV-IAMF#1, some sensitive receptors would be exposed to ground-borne vibration that would result in annoyance, and buildings could be exposed to vibration that exceeds the FRA vibration damage criteria. This is considered a significant impact under CEQA (Authority 2022a: page 3.4-69).

The following measure mitigates this impact: NV-MM#2: Construction Vibration Mitigation Measures.

The Authority will implement NV-MM#2 to minimize vibration impacts from construction. As part of this mitigation measure, the contractor will develop and implement vibration reduction methods when impact pile driving or other high-vibration-producing activity would occur within 55 feet of any building to meet FRA vibration impact criteria. Prior to starting pile driving and other high-vibration activity, the contractor will conduct pre-construction surveys within 55 feet of the activity 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.

This mitigation measure will be effective in minimizing the project's temporary construction vibration impacts.

The Authority finds that NV-MM#2 is required under the Preferred Alternative and that this mitigation measure will reduce the project's temporary construction vibration impacts to a less-than-significant level.

4.3.6 Impact NV#9: Intermittent Permanent Exposure of Sensitive Receptors to Vibration from Operations

Operation of the Preferred Alternative would generate excessive ground-borne vibration impacts at sensitive receptors in all five subsections. The Preferred Alternative would result in 2,290 vibration impacts as well as 18 ground-borne noise impacts. This is considered a significant impact under CEQA (Authority 2022a: page 3.4-83).

The following measure mitigates this impact: NV-MM#8: Project Vibration Mitigation Measures.

The Authority will implement NV-MM#8 to minimize vibration impacts from operations. While the precise evaluation of the effectiveness of NV-MM#8 requires detailed designs and consideration

of site-specific conditions, vibration mitigation has the potential to reduce the vibration levels by up to 10 dB.

The Authority finds that NV-MM#8 is required under the Preferred Alternative and that it will lessen the project's operational vibration impacts; however, the CEQA impact would remain significant and unavoidable. The Authority finds that there are no other feasible mitigation measures or alternatives that could be adopted to reduce this remaining impact to less-than-significant levels. The Authority finds that despite this otherwise significant and unavoidable impact, specific economic, social, and other considerations identified in the Statement of Overriding Considerations (Chapter 8) support certification of the Final EIR/EIS and approval of the project.

4.4 Biological and Aquatic Resources (Section 3.7 of the Final EIR/EIS)

The Preferred Alternative would result in potentially significant impacts on special-status plant habitat and special-status plant communities; permanent conversion or degradation of habitat for and mortality of multiple wildlife, bird, and fish species; permanent conversion or degradation of aquatic resources; and removal or mortality of protected trees.[6] All potentially significant impacts would be mitigated to less than significant with mitigation measures.

These findings address impacts associated with the Preferred Alternative. Because of length, the full mitigation measure text is presented separately in the MMEP. As explained in the Final EIR/EIS, mitigation measures requiring compensatory mitigation could potentially result in secondary effects related to air quality and cultural resources. Any potential secondary effects are speculative and cannot be quantified. Construction equipment and vehicles during management activities would contribute to emissions of criteria pollutants, toxic air contaminants, diesel particulate matter, and greenhouse gases (GHG). Earthmoving, grading, and vegetation removal activities during construction could result in fugitive dust. Vehicle trips and the use of mowers and other machinery associated with the establishment and management of the mitigation sites would be temporary and short-term during construction, and intermittent afterward. Ground-disturbing activities associated with the restoration of mitigation sites could result in impacts on known and previously unknown archaeological or historic resources. Existing project features and legal requirements would prevent the destruction or unauthorized alteration of such resources.

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

Construction of the Preferred Alternative in the San Francisco to South San Francisco and San Bruno to San Mateo Subsections would take place in habitat that could support special-status plant species, including California seablite (listed under the federal Endangered Species Act [FESA]). Such activities could convert and disturb habitat and could result in the removal of special-status plant occurrences. This impact would also occur inside the San Francisco Bay Conservation and Development Commission's (BCDC) Bay and shoreline band jurisdiction.

Prior to ground-disturbing activity, the Authority will submit to the appropriate wildlife agencies the names and qualifications of project biologists, designated biologists, species-specific biological monitors, and general biological monitors retained to conduct biological resource monitoring activities and implement avoidance and minimization measures (BIO-IAMF#1). The project biologist will prepare a biological resources management plan (BRMP) consolidating permit

[6] The Final EIR/EIS includes additional significant impacts (Impact BIO#8: Permanent Conversion or 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) that would occur under Alternative A only within the San Jose Diridon Station Approach Subsection. These impacts are not included in these findings because the San Jose Diridon Station Approach Subsection was approved by the Authority Board of Directors as part of the San Jose to Merced Project Section in April 2022.

conditions and an array of other requirements relevant to protection of sensitive biological resources (BIO-IAMF#5), including special-status plant habitat. Workers will be provided with environmental awareness training to help them understand their responsibilities in following procedures to reduce impacts and to increase their capability to identify and avoid special-status species present in the work area (BIO-IAMF#3). Staging areas will be sited away from sensitive resources (BIO-IAMF#8). Construction equipment will be cleaned before entering work areas to minimize opportunities for weeds and invasive species to enter the project footprint (BIO-IAMF#10). The Authority will develop and implement a best management practices (BMP) field manual addressing proper waste management and storage, nonstormwater management, and other general site cleanliness measures (BIO-IAMF#11).

While pre-construction and construction actions to protect special-status species are part of the project, these actions would not prevent the conversion of habitat and temporary disturbance of other habitat in the project footprint. Ground disturbance associated with construction activities could result in the removal of special-status plant occurrences if any are present in the project footprint. Ground disturbance could indirectly affect special-status species habitat by creating new areas of bare soil that are easily colonized by nonnative invasive plants. Such plants could spread into adjacent natural areas and outcompete native plants, including special-status species.

Therefore, even with the IAMFs that reduce the potential for direct impacts on special-status plants and minimize the loss of habitat, the project would result in loss and degradation of habitat and could result in in the loss of special-status plant occurrences, which is considered a significant impact under CEQA (Authority 2022a: page 3.7-57).

The following measures mitigate this impact: BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan; BIO-MM#2: Prepare and Implement a Weed Control Plan; BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones; BIO-MM#4: Conduct Monitoring of Construction Activities; BIO-MM#5: Establish and Implement a Compliance Reporting Program; BIO-MM#6: Conduct Presence/Absence Pre-Construction Surveys for Special-Status Plant Species and Special-Status Plant Communities; BIO-MM#7: Prepare and Implement Plan for Salvage, Relocation, or Propagation of Special-Status Plant Species; BIO-MM#8: Prepare a Compensatory Mitigation Plan for Species and Species Habitat; BIO-MM#9: Implement Measures to Minimize Impacts During Off-Site Habitat Restoration, or Enhancement, or Creation on Mitigation Sites; and BIO-MM#10: Compensate for Impacts on Listed Plant Species.

The Authority will implement mitigation measures to reduce the impacts on special-status plants. BIO-MM#1 involves preparation of a restoration and revegetation plan (RRP) that will identify and describe procedures for restoring temporarily disturbed habitat to its former state. BIO-MM#2 requires the project biologist to develop a weed control plan (WCP) prior to ground-disturbing activity to minimize and avoid the spread of invasive weeds into the project footprint and adjacent areas. BIO-MM#3 requires the project biologist to establish environmentally sensitive areas (ESA) and nondisturbance zones (including wildlife exclusion fencing [WEF], where applicable) that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#4 and BIO-MM#5 require the project biologist to monitor construction activities for compliance with avoidance and minimization measures and established ESAs and nondisturbance zones and to document such monitoring through a compliance reporting program, respectively. BIO-MM#6 requires the project biologist to conduct presence/absence surveys for special-status plant species and special-status plant communities within the project footprint to be avoided during construction prior to any ground-disturbing activity. BIO-MM#7 requires preparation of a plan for the salvage and relocation of any special-status plant species found during presence/absence surveys prior to ground-disturbing activity. BIO-MM#8 will involve preparation and implementation of a compensatory mitigation plan (CMP) that will require creating, preserving, restoring, or enhancing habitat for special-status species in the regional RSA to compensate for permanent and temporary impacts on species habitat. BIO-MM#9 will minimize impacts associated with mitigation efforts. BIO-MM#10 requires compensatory mitigation for special-status plants at a 1:1

ratio. These measures will minimize direct and indirect impacts on habitat for special-status plants, provide for the avoidance or salvage and relocation of special-status plant occurrences in the project footprint, and compensate for impacts on habitat and any relocated plants. Therefore, these mitigation measures will be effective in minimizing the project's impacts associated with habitat conversion on special-status plants.

The Authority finds that BIO-MM#1, BIO-MM#2, BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#6, BIO-MM#7, BIO-MM#8, BIO-MM#9, and BIO-MM#10 are required under the Preferred Alternative and that these mitigation measures will reduce the project's impacts on habitat conversion or degradation to special-status plants to a less-than-significant level.

4.4.2 Impact BIO#2b: Permanent Conversion or Degradation of Habitat for and Mortality of Monarch Butterfly

Construction of the Preferred Alternative would primarily affect suitable breeding and foraging habitat for monarch butterfly in the San Francisco to South San Francisco Subsection (near the Brisbane LMF) and the San Mateo to San Bruno Subsection (San Francisco International Airport [SFO] West-of-Bayshore property). Construction activities would convert and destroy suitable habitat and could result in individual fatalities of monarch butterfly larvae and adults if they are present in suitable habitat at the time of construction. Additionally, fugitive dust could temporarily affect host or nectar plants by covering leaves and reducing the vigor of plants. Similarly, fugitive dust during construction could also reduce the health and vigor of any monarch butterfly larvae present on host plants affected by fugitive dust, and could also affect the ability of adult monarch butterflies to lay eggs or feed on host and nectar plants covered in fugitive dust.

To avoid and minimize impacts on wildlife and plants from construction, the Authority has incorporated BIO-IAMF#1, BIO-IAMF#3, BIO-IAMF#5, BIO-IAMF#8, BIO-IAMF#9, BIO-IAMF#10, and BIO-IAMF#11 into the project. As these IAMFs are widely applicable to all species, they will also avoid and minimize impacts on monarch butterfly. These IAMFs and how they will avoid and minimize potential effects are described in Section 4.4.1, Impact BIO#1: Permanent Conversion or Degradation of Habitat for Special-Status Plant Species.

While actions taken before and during construction reduce the potential for harm to individuals and minimize the loss of habitat, the project would result in loss of habitat for monarch butterfly and could cause direct impacts on individuals (injury and mortality) if any are present in affected habitat. In the absence of measures to avoid, minimize, and offset impacts, such impacts would reduce the breeding habitat for the species and potentially numbers of individuals, which although only constituting a small portion of the range, would contribute to the decline of this species. Accordingly, this is considered a significant impact under CEQA (Authority 2022a: page 3.7-60).

The following measures mitigate this impact: BIO-MM#1; BIO-MM#5; BIO-MM#8; BIO-MM#9; BIO-MM#40: Avoid Direct Impacts on Listed Butterfly Host Plants; and BIO-MM#41: Provide Compensatory Mitigation for Impacts on Monarch Butterfly Habitat.

The Authority will implement mitigation measures to reduce the impacts on monarch butterfly, including BIO-MM#1, which requires the Authority to include host and nectar plants for butterflies in its RRP for temporarily affected areas, and BIO-MM#5, which outlines procedures for reporting compliance with all mitigation measures and regulatory agency authorizations. BIO-MM#8 and BIO-MM#41 entail preparation and implementation of a CMP that will require creating, preserving, restoring, or enhancing biological resources (including habitat for special-status species) to compensate for permanent impacts on such resources. BIO-MM#41 includes the details for monarch butterfly that will be incorporated into the CMP. BIO-MM#9 will minimize impacts on any special-status species occurring on lands proposed for off-site habitat restoration, enhancement, or creation. BIO-MM#40 requires pre-construction surveys for listed butterfly host plants in suitable habitat in work areas. If host plants are found, surveys for adult butterflies will occur to determine if the habitat is occupied, or presence will be assumed. Where adult butterflies are determined to be present or assumed to be present, host plants will be avoided in temporary impact areas. These measures will minimize direct and indirect impacts on monarch butterfly

habitat and individuals and permanently protect habitat to compensate for the permanent loss of habitat.

The Authority finds that BIO-MM#1, BIO-MM#5, BIO-MM#8, BIO-MM#9, BIO-MM#40, and BIO-MM#41 are required under the Preferred Alternative and that these mitigation measures will reduce the project's impacts on habitat loss or mortality to monarch butterfly to a less-than-significant level.

4.4.3 Impact BIO#3: Permanent Conversion or Degradation of Habitat for and Mortality of Central California Coast Steelhead, Pacific Lamprey, and Green Sturgeon, and Permanent Conversion or Degradation of Essential Fish Habitat

Construction of the Preferred Alternative would take place within or adjacent to habitat for special-status fish species, critical habitat, and designated essential fish habitat (EFH). Visitacion Creek and Guadalupe Valley Creek are tidally influenced and connected to San Francisco Bay and therefore may provide estuarine rearing habitat for central California coast (CCC) steelhead and foraging habitat for green sturgeon. Construction of the East Brisbane LMF under the Preferred Alternative would require the fill of a portion of Visitacion Creek to build the foundation of the LMF, resulting in the permanent conversion of fish habitat. Track modifications associated with LMF construction would require work in Guadalupe Valley Creek to accommodate widening of the existing bridge and a culvert extension. Four watercourses that cross the project footprint—Mills Creek, San Mateo Creek, San Francisquito Creek, and Stevens Creek—provide freshwater migration habitat for CCC steelhead and Pacific lamprey. Cordilleras Creek also provides freshwater migration habitat for Pacific lamprey.[7] San Francisquito Creek and Stevens Creek are designated critical habitat for CCC steelhead. Construction-period vegetation management at these locations may involve removal or trimming of riparian trees that provide stream shading, moderating water temperatures conducive for fish movement, and providing food sources (e.g., leaves and arboreal invertebrates that fall into the water), resulting in habitat degradation. All of the above watercourses and Sanchez Creek are designated Pacific salmon EFH because they historically supported Chinook and coho salmon; Sanchez Creek is also designated Pacific Coast groundfish EFH. Because the above activities, as well as in-water work at Sanchez Creek to extend the existing box culvert, could adversely affect EFH for Pacific Coast salmon and Pacific Coast groundfish by altering the physical, chemical, or biological conditions of affected steams, consultation with the National Marine Fisheries Service (NMFS) would be required and impacts would be described in the biological assessment. This impact would also occur inside BCDC's Bay jurisdiction (Section 3.7.8.10, BCDC Jurisdictional Areas, of the Final EIR/EIS).

Prior to construction in areas with habitat for special-status fish, designated EFH, or both, the Authority will submit to the appropriate wildlife agencies the names and qualifications of project biologists, designated biologists, species-specific biological monitors, and general biological monitors retained to conduct biological resource monitoring activities and implement avoidance and minimization measures (BIO-IAMF#1). The project biologist will prepare a BRMP consolidating permit conditions and an array of other requirements relevant to protection of sensitive biological resources (BIO-IAMF#5). Workers will be provided with environmental awareness training to help them understand their responsibilities in following procedures to reduce impacts and to increase their capability to identify and sensitive resources present in the work area (BIO-IAMF#3). Staging areas will be sited away from sensitive resources (BIO-IAMF#8). The Authority will develop and implement a BMP field manual addressing proper waste

[7] Two additional watercourses (Los Gatos Creek and Guadalupe River) that provide freshwater migration habitat for CCC steelhead and Pacific lamprey cross the project footprint in the San Jose Diridon Station Approach Subsection. Impacts on these watercourses are included in the Final EIR/EIS but are not included in these findings because the San Jose Diridon Station Approach Subsection was approved by the Authority Board of Directors as part of the San Jose to Merced Project Section in April 2022.

management and storage, nonstormwater management, and other general site cleanliness measures (BIO-IAMF#11).

While pre-construction actions to protect special-status species habitat are part of the project, these actions may not prevent the loss or temporary degradation of habitat for special-status fish in the project footprint or injury or mortality to individual fish in Guadalupe Valley Creek. Any riparian vegetation management activities would result in the degradation of aquatic habitat during construction and reduced value for some period of time after construction is completed and until riparian vegetation is restored.

Therefore, even with these IAMFs, the project could result in habitat conversion or degradation, or individual fatalities, for CCC steelhead, Pacific lamprey, and green sturgeon or permanent conversion of EFH, which is considered a significant impact under CEQA (Authority 2022a: page 3.7-61).

The following measures mitigate this impact: BIO-MM#1; BIO-MM#3; BIO-MM#4; BIO-MM#5; BIO-MM#8; BIO-MM#9; BIO-MM#12: Work Stoppage; BIO-MM#13: Restore Temporary Riparian Habitat Impacts; BIO-MM#14: Prepare Plan for Dewatering and Water Diversions; BIO-MM#15: Prepare and Implement a Cofferdam Fish Rescue Plan; BIO-MM#16: Prepare and Implement an Underwater Sound Control Plan; and BIO-MM#17: Provide Compensatory Mitigation for Permanent Impacts on Steelhead Habitat, Green Sturgeon Habitat, and Essential Fish Habitat.

The Authority will implement mitigation measures to reduce the impacts on CCC steelhead, Pacific lamprey, green sturgeon, and EFH. BIO-MM#1 involves preparation of an RRP that will identify and describe procedures for restoring temporarily disturbed habitat to its former state. BIO-MM#3 requires the project biologist to establish ESAs and nondisturbance zones that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#4 and BIO-MM#5 require the project biologist to monitor construction activities for compliance with avoidance and minimization measures and established ESAs and nondisturbance zones and to document such monitoring through a compliance reporting program, respectively. BIO-MM#8 involves preparation and implementation of a CMP that will require creating, preserving, restoring, or enhancing habitat for special-status species in the regional RSA to compensate for permanent and temporary impacts on species habitat. BIO-MM#9 will minimize impacts associated with mitigation efforts. BIO-MM#12 gives the project biologist authority to halt any construction activities that could injure or kill individuals belonging to special-status species. BIO-MM#13 requires that the project biologist direct the revegetation of any riparian areas temporarily disturbed as a result of the construction activities, using appropriate native plants and seed mixes. BIO-MM#14 requires the Authority to prepare and implement a dewatering plan, which will incorporate measures to minimize turbidity and siltation, including pre-activity surveys by the project biologist. BIO-MM#15 requires the Authority to prepare and implement a fish rescue plan, which will outline the methods for removing and relocating fish to adjacent waterways and will also include methods for minimizing the risk of stress and mortality from capture and handling and adverse impacts on listed fish species associated with fish stranding. BIO-MM#16 requires the Authority to prepare and 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. BIO-MM#17 requires the Authority to compensate for impacts on steelhead habitat, green sturgeon habitat, and EFH at a 2:1 ratio within critical habitat and at a 1:1 ratio or as specified in authorizations issued under the FESA outside of critical habitat. These measures are expected to minimize direct and indirect impacts on federally listed steelhead habitat, green sturgeon habitat, and EFH and individuals and to offset the loss of habitat. Therefore, these mitigation measures will be effective in minimizing the project's impacts associated with habitat conversion or degradation, or individual fatalities, for CCC steelhead, Pacific lamprey, and green sturgeon, or permanent conversion of EFH.

The Authority finds that BIO-MM#1, BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#8, BIO-MM#9, BIO-MM#12, BIO-MM#13, BIO-MM#14, BIO-MM#15, BIO-MM#16, and BIO-MM#17 are required under the Preferred Alternative and that these mitigation measures will reduce the project's

impacts on CCC steelhead, Pacific lamprey, and green sturgeon, and EFH to a less-than-significant level.

4.4.4 Impact BIO#4: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Red-Legged Frog and Western Pond Turtle

Construction of the Preferred Alternative in all subsections except the San Francisco to South San Francisco Subsection would take place in or over habitat for the California red-legged frog, a species listed as threatened under the FESA and a California Department of Fish and Wildlife (CDFW) species of special concern, and western pond turtle, a CDFW species of special concern. Such activities would convert or disturb a small amount of habitat, and such activities in the San Bruno to San Mateo Subsection (i.e., next to the SFO West-of-Bayshore property) could result in the injury or mortality of individual red-legged frogs or pond turtles. Specifically, relocation of overhead contact system (OCS) poles associated with lateral track displacements next to the SFO West-of-Bayshore property may require ground disturbance in habitat for California red-legged frog and western pond turtle. This impact would also occur inside BCDC's shoreline band jurisdiction.[8]

Prior to construction in areas with habitat for California red-legged frog and western pond turtle, the Authority will submit to the appropriate wildlife agencies the names and qualifications of project biologists, designated biologists, species-specific biological monitors, and general biological monitors retained to conduct biological resource monitoring activities and implement avoidance and minimization measures (BIO-IAMF#1). The project biologist will prepare a BRMP consolidating permit conditions and an array of other requirements relevant to protection of sensitive biological resources (BIO-IAMF#5). Workers will be provided with environmental awareness training to help them understand their responsibilities in following procedures to reduce impacts and to increase their capability to identify and avoid red-legged frogs and western pond turtles potentially present in the work area (BIO-IAMF#3). Staging areas will be sited away from sensitive resources (BIO-IAMF#8). The Authority will develop and implement a BMP field manual addressing proper waste management and storage, nonstormwater management, and other general site cleanliness measures (BIO-IAMF#11).

During construction, several actions will be undertaken to protect red-legged frogs, western pond turtles, and other special-status wildlife. Erosion control materials that could entrap red-legged frogs and other terrestrial wildlife will be prohibited (BIO-IAMF#6) to prevent mortality and harm associated with inadvertent entrapment. Covering trenches, pits, and other excavations when not in use and inspecting them regularly (BIO-IAMF#7) will prevent frogs, turtles, and other terrestrial wildlife from falling into these areas and being trapped there.

While pre-construction and construction actions to protect special-status species are part of the project, these actions would not prevent the conversion of habitat and temporary disturbance of other habitat in the project footprint. Because frogs can be distributed throughout suitable habitats, their absence from construction areas cannot be guaranteed. Earthmoving, excavation, and vehicle operation during construction could crush, entomb, or physically disturb individual frogs. Ground disturbance, noise, and vibration associated with these activities could disrupt the activities of individual frogs and may impair normal life cycle behaviors. The use of chemicals and hazardous substances during construction (e.g., oils, gasoline) may cause mortality if individuals enter aquatic habitat that has been contaminated by spills or other vehicle and equipment leaks. While many protections will be implemented, the potential for physical harm and mortality of individuals would not be eliminated.

[8] An additional watercourse (Guadalupe River) that provides habitat for California red-legged frog and western pond turtle crosses the project footprint in the San Jose Diridon Station Approach Subsection. Impacts with this watercourse are included in the Final EIR/EIS but are not included in these findings because the San Jose Diridon Station Approach Subsection was approved by the Authority Board of Directors as part of the San Jose to Merced Project Section in April 2022.

Therefore, even with these IAMFs, the project could result in habitat conversion or degradation, or individual fatalities, for California red-legged frog and western pond turtle, which is considered a significant impact under CEQA (Authority 2022a: page 3.7-63).

Implementation of the following measures mitigate this impact: BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#8, BIO-MM#9, BIO-MM#12, BIO-MM#18: Conduct Pre-Construction Surveys for Special-Status Reptile and Amphibian Species, BIO-MM#19: Implement Avoidance and Minimization Measures for Special-Status Reptile and Amphibian Species, BIO-MM#20: Install San Francisco Garter Snake and California Red-Legged Frog Exclusion Fencing at SFO West-of-Bayshore Property, and BIO-MM#21: Compensate for Impacts on San Francisco Garter Snake and California Red-Legged Frog Habitat.

The Authority will implement mitigation measures to reduce the impacts on California red-legged frog and western pond turtle. BIO-MM#3 requires the project biologist to establish ESAs and nondisturbance zones (including WEF, where applicable) that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#4 and BIO-MM#5 require the project biologist to monitor construction activities for compliance with avoidance and minimization measures and established ESAs and nondisturbance zones and to document such monitoring through a compliance reporting program, respectively. BIO-MM#8 involves preparation and implementation of a CMP that will require creating, preserving, restoring, or enhancing habitat for special-status species in the regional RSA to compensate for permanent and temporary impacts on species habitat. BIO-MM#9 will minimize impacts associated with mitigation efforts. BIO-MM#12 gives the project biologist authority to halt work to prevent the death or injury to special-status species found in a work area and to notify when work can be restarted. BIO-MM#18 requires the project biologist to conduct a pre-construction survey of the work area in order to guide the placement of ESAs or conduct species relocation for the California red-legged frog and western pond turtle. BIO-MM#19 requires the project biologist to monitor construction within suitable habitat for special-status reptile and amphibian species and to identify actions, to the extent feasible, sufficient to avoid impacts on any individuals of these special-status species observed in the construction area. BIO-MM#20 requires the contractor, under the direction of the project biologist, to install exclusion measures as required pursuant to regulatory authorizations issued under the FESA and for the project biologist to conduct daily inspections of the WEF prior to and during any construction activities inside the WEF from August to February. BIO-MM#21 requires the Authority to compensate for impacts on modeled California red-legged frog habitat at a 2:1 ratio within aquatic habitat and at a 1:1 ratio within refugia habitat. These measures are expected to minimize direct and indirect impacts on California red-legged frog and western pond turtle and to offset the loss of habitat.

Therefore, these mitigation measures will be effective in minimizing the project's impacts associated with habitat conversion or degradation, or individual fatalities, for California red-legged frog and western pond turtle.

The Authority finds that BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#8, BIO-MM#9, BIO-MM#12, BIO-MM#18, BIO-MM#19, BIO-MM#20, and BIO-MM#21 are required under the Preferred Alternative and that these mitigation measures will reduce the project's impacts on California red-legged frog and western pond turtle to a less-than-significant level.

4.4.5 Impact BIO#5: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Francisco Garter Snake

Construction of the Preferred Alternative next to the SFO West-of-Bayshore property in the San Bruno to San Mateo Subsection would take place in or adjacent to habitat for San Francisco garter snake, a species listed as endangered under the FESA and California Endangered Species Act (CESA) and designated as fully protected under state law. Such activities would convert or disturb a small amount of habitat and could result in the injury or mortality of individual garter snakes. Specifically, relocation of OCS poles associated with lateral track displacements in this area may require ground disturbance in habitat for San Francisco garter snake. This impact would also occur inside BCDC's shoreline band jurisdiction.

Prior to construction in areas with habitat for San Francisco garter snake, the Authority will submit to the appropriate wildlife agencies the names and qualifications of project biologists, designated biologists, species-specific biological monitors, and general biological monitors retained to conduct biological resource monitoring activities and implement avoidance and minimization measures (BIO-IAMF#1). The project biologist will prepare a BRMP consolidating permit conditions and an array of other requirements relevant to protection of sensitive biological resources (BIO-IAMF#5). Workers will be provided with environmental awareness training to help them understand their responsibilities in following procedures to reduce impacts and to increase their capability to identify and avoid San Francisco garter snakes potentially present in the work area (BIO-IAMF#3). Staging areas will be sited away from sensitive resources (BIO-IAMF#8). The Authority will develop and implement a BMP field manual addressing proper waste management and storage, nonstormwater management, and other general site cleanliness measures (BIO-IAMF#11).

During construction, several actions will be undertaken to protect San Francisco garter snakes and other special-status wildlife. Erosion control materials that could entrap garter snakes and other terrestrial wildlife will be prohibited (BIO-IAMF#6) to prevent mortality and harm associated with inadvertent entrapment. Covering trenches, pits, and other excavations when not in use and inspecting them regularly (BIO-IAMF#7) will prevent garter snakes and other terrestrial wildlife from falling into these areas and being trapped there.

While pre-construction and construction actions to protect special-status species are part of the project, these actions would not prevent the conversion and temporary disturbance of habitat in the project footprint. Because San Francisco garter snakes use underground burrows and are therefore very difficult to detect, their absence from construction areas cannot be guaranteed. Earthmoving, excavation, and vehicle operation during construction could crush, entomb, or physically disturb individual snakes. Ground disturbance, noise, and vibration associated with these activities could disrupt the activities of individual snakes and may impair normal life cycle behaviors. The use of chemicals and hazardous substances during construction (e.g., oils, gasoline) may cause mortality if individuals enter aquatic habitat that has been contaminated by spills or other vehicle and equipment leaks. While many protections will be implemented, the potential for physical harm and mortality of individuals would not be eliminated.

Therefore, even with these IAMFs, the project could result in habitat conversion or degradation, or individual fatalities, for San Francisco garter snake, which is considered a significant impact under CEQA (Authority 2022a: page 3.7-64).

The following measures mitigate this impact: BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#8, BIO-MM#9, BIO-MM#12, BIO-MM#18, BIO-MM#19, BIO-MM#20, and BIO-MM#21.

The Authority would implement mitigation measures to reduce the impacts on San Francisco garter snake. BIO-MM#3 requires the project biologist to establish ESAs and nondisturbance zones (including WEF, where applicable) that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#4 and BIO-MM#5 require the project biologist to monitor construction activities for compliance with avoidance and minimization measures and established ESAs and nondisturbance zones and to document such monitoring through a compliance reporting program, respectively. BIO-MM#8 involves preparation and implementation of a CMP that will require creating, preserving, restoring, or enhancing habitat for special-status species in the regional RSA to compensate for permanent and temporary impacts on species habitat. BIO-MM#9 will minimize impacts associated with mitigation efforts. BIO-MM#12 gives the project biologist authority to halt work to prevent the death or injury to special-status species found in a work area and to notify when work can be restarted. BIO-MM#18 requires the project biologist to conduct a pre-construction survey of the work area in order to guide the placement of ESAs or conduct species relocation for the San Francisco garter snake. BIO-MM#19 requires the project biologist to monitor construction within suitable habitat for special-status reptile and amphibian species and to identify actions sufficient to avoid impacts on any of these special-status species observed in the construction area. BIO-MM#20 requires the contractor, under the direction of the

project biologist, to install exclusion measures as required pursuant to regulatory authorizations issued under the FESA and for the project biologist to conduct daily inspections of the WEF prior to and during any construction activities inside the WEF from August to February. BIO-MM#21 requires the Authority to compensate for impacts on modeled San Francisco garter snake habitat at a 2:1 ratio within aquatic habitat and at a 1:1 ratio within refugia habitat. These measures are expected to minimize direct and indirect impacts on San Francisco garter snake and to offset the loss of habitat. Therefore, these mitigation measures will be effective in minimizing the project's impacts associated with habitat conversion or degradation, or individual fatalities, for San Francisco garter snake.

The Authority finds that BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#8, BIO-MM#9, BIO-MM#12, BIO-MM#18, BIO-MM#19, BIO-MM#20, and BIO-MM#21 are required under the Preferred Alternative and that these mitigation measures will reduce the project's impacts on San Francisco garter snake to a less-than-significant level.

4.4.6 Impact BIO#6: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Burrowing Owl

Construction of the Preferred Alternative in the San Francisco to South San Francisco (i.e., in Brisbane) would take place in suitable habitat for the burrowing owl, a CDFW species of special concern.[9] Nesting is not expected in Brisbane due to the lack of recent or historical nesting occurrences and low habitat quality but migrating or wintering individuals may occur from September to March in some years. Construction activities would convert and temporarily disturb habitat and could result in injury and mortality of individual owls and eggs, as well as nest abandonment. Ground disturbance and vehicle traffic could injure or kill burrowing owls by crushing occupied burrows or collapsing burrow entrances, trapping any owls inside. Although some burrowing owls in urban landscapes appear relatively tolerant of human disturbance (Poulin et al. 2011), it is difficult to predict how and at what distance a given nesting pair would react to noise and vibration. Consequently, it is possible that construction-generated noise and vibration near nest burrows could cause adult owls to abandon eggs or recently hatched young. Increased cover of invasive weeds could reduce habitat suitability for burrowing owls because they prefer areas with short, sparse vegetation (California Department of Fish and Game 2012). This impact would also occur inside BCDC's Bay and shoreline band jurisdiction.

Prior to ground-disturbing activity, the Authority will submit to the appropriate wildlife agencies the names and qualifications of project biologists, designated biologists, species-specific biological monitors, and general biological monitors retained to conduct biological resource monitoring activities and implement avoidance and minimization measures (BIO-IAMF#1). The project biologist will prepare a BRMP consolidating permit conditions and an array of other requirements relevant to protection of sensitive biological resources, including special-status species habitat (BIO-IAMF#5). Workers will be provided with environmental awareness training to help them understand their responsibilities in following procedures to reduce impacts and to increase their capability to identify and avoid special-status wildlife (BIO-IAMF#3). Staging areas will be sited away from sensitive resources (BIO-IAMF#8). The Authority will develop and implement a BMP field manual addressing proper waste management and storage, nonstormwater management, and other general site cleanliness measures (BIO-IAMF#11). Construction equipment will be cleaned before entering work areas to minimize opportunities for weeds and invasive species to enter the project footprint (BIO-IAMF#10).

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

[9] Construction of Alternative A would result in impacts on suitable habitat for burrowing owl in the San Jose Diridon Station Approach Subsection. These impacts are included in the Final EIR/EIS but are not included in these findings because the San Jose Diridon Station Approach Subsection was approved by the Authority Board of Directors as part of the San Jose to Merced Project Section in April 2022.

disturbance of individual owls. Therefore, even with these IAMFs, the project could result in habitat conversion or degradation, or individual fatalities, for burrowing owls, which is considered a significant impact under CEQA (Authority 2022a: page 3.7-65).

The following measures mitigate this impact: BIO-MM#1, BIO-MM#2, BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#8, BIO-MM#9, BIO-MM#12, BIO-MM#22: Conduct Surveys for Burrowing Owls, BIO-MM#23: Implement Avoidance and Minimization Measures for Burrowing Owls, and BIO-MM#24: Provide Compensatory Mitigation for Loss of Active Burrowing Owl Burrows and Habitat.

Mitigation measures will reduce the impacts on burrowing owl. BIO-MM#1 involves preparation of an RRP that will identify and describe procedures for restoring temporarily disturbed habitat to its former state. BIO-MM#2 requires the project biologist to develop a WCP prior to ground-disturbing activity to minimize and avoid the spread of invasive weeds into the project footprint and adjacent areas. BIO-MM#3 requires the project biologist to establish ESAs and nondisturbance zones (including WEF, where applicable) that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#4 and BIO-MM#5 require the project biologist to monitor construction activities for compliance with avoidance and minimization measures and established ESAs and nondisturbance zones and to document such monitoring through a compliance reporting program, respectively. BIO-MM#8 involves preparation and implementation of a CMP that will require creating, preserving, restoring, or enhancing habitat for special-status species in the regional RSA to compensate for permanent and temporary impacts on species habitat. BIO-MM#9 will minimize impacts associated with mitigation efforts. BIO-MM#12 provides the project biologist authority to halt work to prevent the death or injury to special-status species found in a work area and to notify when work can be restarted. BIO-MM#22 requires the project biologist to conduct pre-construction surveys prior to any ground-disturbing activity in burrowing owl habitat, in accordance with the Santa Clara Valley Habitat Plan's (SCVHP) condition of approval for covered activities in burrowing owl habitat and for burrowing owl within suitable habitat. BIO-MM#23 requires construction to avoid occupied burrowing owl burrows found during pre-construction surveys in accordance with the SCVHP's condition of approval for covered activities in burrowing owl habitat by establishing no-work buffers around occupied burrowing owl burrows in the work area. BIO-MM#24 requires the Authority to compensate for permanent impacts on occupied burrowing owl breeding and foraging habitat; which will require the Authority to provide compensatory mitigation at a minimum 1:1 ratio for occupied breeding and foraging habitat or other actions. These measures are expected to minimize direct and indirect impacts on burrowing owls and to offset the loss of habitat.

Therefore, these mitigation measures will be effective in minimizing the project's impacts associated with habitat conversion or degradation, or individual fatalities, for burrowing owls.

The Authority finds that BIO-MM#1, BIO-MM#2, BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#8, BIO-MM#9, BIO-MM#12, BIO-MM#22, BIO-MM#23, and BIO-MM#24 are required under the Preferred Alternative and that these mitigation measures will reduce the project's impacts on burrowing owls to a less-than-significant level.

4.4.7 Impact BIO#7: Removal or Disturbance of Active Alameda Song Sparrow and Saltmarsh Common Yellowthroat Nests

Construction of the Preferred Alternative in the San Francisco to South San Francisco Subsection would take place in or adjacent to modeled nesting habitat for Alameda song sparrow and saltmarsh common yellowthroat, both of which are CDFW species of special concern. Specifically, track modifications and construction associated with the East Brisbane LMF would convert or temporarily disturb modeled nesting habitat (i.e., saline or freshwater emergent wetland) and could result in injury and mortality of individual birds and eggs, as well as nest abandonment. This impact would also occur inside BCDC's Bay and shoreline band jurisdiction.

Prior to construction in areas with nesting habitat for Alameda song sparrow and saltmarsh common yellowthroat, the Authority will submit to the appropriate wildlife agencies the names and

qualifications of project biologists, designated biologists, species-specific biological monitors, and general biological monitors retained to conduct biological resource monitoring activities and implement avoidance and minimization measures (BIO-IAMF#1). The project biologist will prepare a BRMP consolidating permit conditions and an array of other requirements relevant to protection of sensitive biological resources (BIO-IAMF#5). Workers will be provided with environmental awareness training to help them understand their responsibilities in following procedures to reduce impacts and to increase their capability to identify and avoid song sparrow and common yellowthroat nesting habitat in and adjacent to the work area (BIO-IAMF#3). Staging areas will be sited away from sensitive resources (BIO-IAMF#8). The Authority will develop and implement a BMP field manual addressing proper waste management and storage, nonstormwater management, and other general site cleanliness measures (BIO-IAMF#11). Construction equipment will be cleaned before entering work areas to minimize opportunities for weeds and invasive species to enter the project footprint (BIO-IAMF#10). While pre-construction actions to protect special-status species are part of the project, these actions would not prevent the conversion and temporary disturbance of habitat in the project footprint, nor would they necessarily eliminate the risk of injury, mortality, and disturbance of individual birds. Ground disturbance (e.g., grubbing during site preparation) in modeled nesting habitat for these species could crush eggs or kill nestlings in active nests. Construction-generated noise and vibration near active nests could cause adults to abandon eggs or recently hatched young if they perceive such disturbances as a threat. Increased cover of tall invasive weeds with thick stems and dense growth (e.g., thistles, mustard, perennial pepperweed) in grassland or marsh would reduce the herbaceous ground cover preferred for nesting by these species. Therefore, even with these IAMFs, the project could result in removal or disturbance of nesting habitat, or injury or individual fatalities of Alameda song sparrow and saltmarsh common yellowthroat, which is considered a significant impact under CEQA (Authority 2022a: page 3.7-66).

The following measures mitigate this impact: BIO-MM#12 and BIO-MM#25: Conduct Pre-Construction Surveys and Delineate Active Nest Buffers Exclusion Areas for Breeding Birds.

The Authority will implement mitigation measures to reduce the impacts on Alameda song sparrow and saltmarsh common yellowthroat. BIO-MM#12 provides for the project biologist authority to halt work to prevent the death or injury to special-status species found in a work area and to notify when work can be restarted. BIO-MM#25 requires the project biologist to conduct pre-construction surveys prior to any ground-disturbing activity in breeding bird habitat during the bird breeding season, in accordance with the Migratory Bird Treaty Act (MBTA), the California Fish and Game Code (Cal. Fish and Game Code), or both, in breeding bird habitat and for nesting birds and active nests. These measures are expected to minimize direct and indirect impacts on Alameda song sparrow and saltmarsh common yellowthroat and to offset the loss of habitat. Therefore, these mitigation measures will be effective in minimizing the project's impacts associated with removal or disturbance of nesting habitat, or injury or individual fatalities of Alameda song sparrow and saltmarsh common yellowthroat.

The Authority finds that BIO-MM#12 and BIO-MM#25 are required under the Preferred Alternative and that these mitigation measures will reduce the project's impacts on burrowing owls to a less-than-significant level.

4.4.8 Impact BIO#9: Removal or Disturbance of Active White-Tailed Kite Nests

Construction of the Preferred Alternative in all subsections would take place in or adjacent to nesting habitat for white-tailed kite, a fully protected species. Removal or trimming of trees or shrubs in mixed riparian, ornamental woodland, and coyote brush scrub land cover types could result in injury and mortality of individual birds and eggs, and these as well as other activities could result in nest abandonment. This impact would also occur inside BCDC's Bay and shoreline band jurisdiction.

Prior to construction in areas with nesting habitat for white-tailed kite, the Authority will submit to the appropriate wildlife agencies the names and qualifications of project biologists, designated biologists, species-specific biological monitors, and general biological monitors retained to conduct biological resource monitoring activities and implement avoidance and minimization

measures (BIO-IAMF#1). The project biologist will prepare a BRMP consolidating permit conditions and an array of other requirements relevant to protection of sensitive biological resources (BIO-IAMF#5). Workers will be provided with environmental awareness training to help them understand their responsibilities in following procedures to reduce impacts and to increase their capability to identify and avoid white-tailed kite nesting habitat in and adjacent to the work area (BIO-IAMF#3). Staging areas will be sited away from sensitive resources (BIO-IAMF#8).

While pre-construction actions to protect special-status species are part of the Preferred Alternative, these actions would not prevent the conversion and temporary disturbance of habitat in the project footprint, nor would they necessarily eliminate the risk of injury, mortality, and disturbance of individual birds. Vegetation removal in nesting habitat for this species could crush eggs or kill nestlings in active nests. Construction-generated noise and vibration near active nests could cause adults to abandon eggs or recently hatched young if they perceive such disturbances as a threat. Therefore, even with these IAMFs, the project could result in removal or disturbance of nesting habitat, or injury or individual fatalities of white-tailed kite, which is considered a significant impact under CEQA (Authority 2022a: page 3.7-68).

The following measures mitigate this impact: BIO-MM#12 and BIO-MM#25.

The Authority will implement mitigation measures to reduce the impacts on white-tailed kite. BIO-MM#12 provides the project biologist authority to halt work to prevent the death or injury to special-status species found in a work area and to notify when work can be restarted. BIO-MM#25 requires the project biologist to conduct pre-construction surveys prior to any ground-disturbing activity in breeding bird habitat during the bird breeding season, in accordance with the MBTA, Cal. Fish and Game Code, or both, in breeding bird habitat and for nesting birds and active nests. These measures are expected to minimize direct and indirect impacts on white-tailed kite and to offset the loss of habitat. Therefore, these mitigation measures will be effective in minimizing the project's impacts associated with removal or disturbance of nesting habitat, or injury or individual fatalities of white-tailed kite.

The Authority finds that BIO-MM#12 and BIO-MM#25 are required under the Preferred Alternative and that these mitigation measures will reduce the project's impacts on least white-tailed kite to a less-than-significant level.

4.4.9 Impact BIO#12: Loss of Roost Sites for and Direct Mortality or Disturbance of Special-Status Bats

Construction of the Preferred Alternative in all subsections would take place near bridges or trees that provide roosting habitat for pallid bat, Townsend's big-eared bat, and western red bat, all of which are CDFW species of special concern. Construction activities would convert and temporarily disturb roosting habitat and could result in the disturbance, injury, and mortality of individual bats and the disruption of both night and maternity roost sites. The loss of roosting habitat is considered one of the primary conservation issues facing bat populations, with loss of maternity roosts considered especially significant (Caltrans 2004: page 21). This impact would also occur inside BCDC's Bay jurisdiction.

Prior to construction in areas with roosting habitat for special-status bats, the Authority will submit to the appropriate wildlife agencies the names and qualifications of project biologists, designated biologists, species-specific biological monitors, and general biological monitors retained to conduct biological resource monitoring activities and implement avoidance and minimization measures (BIO-IAMF#1). The project biologist will prepare a BRMP consolidating permit conditions and an array of other requirements relevant to protection of sensitive biological resources (BIO-IAMF#5). Workers will be provided with environmental awareness training to help them understand their responsibilities in following procedures to reduce impacts and to increase their capability to identify and avoid bat roosts in and adjacent to the work area (BIO-IAMF#3). Staging areas will be sited away from sensitive resources (BIO-IAMF#8).

While pre-construction actions to protect special-status bats are part of the Preferred Alternative, these actions would not prevent the conversion and temporary disturbance of roosting habitat in

the project footprint, nor would they necessarily eliminate the risk of disturbance, injury, or mortality of individual bats or the disruption of roost sites. Structure demolition (e.g., removal or modification of culverts and bridges) in suitable habitat for these species could destroy occupied roost sites, resulting in injury or mortality of adults and young. Construction-generated noise and vibration near potential roost sites could disturb maternity roosts and cause bats to abandon their young. Therefore, even with these IAMFs, the project could result in the loss or disturbance of roosting habitat, or individual fatalities, of special-status bat species, which is considered a significant impact under CEQA (Authority 2022a: page 3.7-71).

The following measures mitigate this impact: BIO-MM#30: Conduct Pre-Construction Surveys for Special-Status Bat Species, BIO-MM#31: Implement Bat Avoidance and Relocation Measures, and BIO-MM#32: Implement Bat Exclusion and Deterrence Measures.

The Authority will implement mitigation measures to reduce the impacts on special-status bats. BIO-MM#30 requires the project biologist, prior to replacement or modification of any bridges modeled as bat habitat and the removal of large trees, to conduct pre-construction surveys for potentially active bat roosts. BIO-MM#31 requires construction to avoid active hibernacula or maternity roosts found during pre-construction surveys and will provide for the project biologist, if avoidance is not feasible, to prepare a relocation plan and provide for an alternative bat roost outside the project footprint. BIO-MM#32 requires the project biologist to 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 if nonbreeding or no hibernating individuals or groups of bats are found roosting within the work area. These measures are expected to minimize or avoid direct impacts on individuals. Therefore, these mitigation measures will be effective in minimizing the project's impacts associated with habitat conversion or degradation, or individual fatalities, of special-status bat species.

The Authority finds that BIO-MM#30, BIO-MM#31, and BIO-MM#32 are required under the Preferred Alternative and that these mitigation measures will reduce the project's impacts on special-status bat species.

4.4.10 Impact BIO#14: Intermittent Disturbance of Habitat for and Direct Mortality of Special-Status Wildlife during Operations

Operations of the Preferred Alternative would include passing HSR trains and inspection and maintenance activities along the Caltrain right-of-way, at stations, and at the East Brisbane LMF. Most of the right-of-way has been previously subjected to extensive ground disturbance and provides limited habitat for most special-status wildlife.

Prior to on-site maintenance and inspection activities, the Authority will require that all operations and maintenance (O&M) personnel attend worker environmental awareness program (WEAP) training about sensitive biological resources within and adjacent to the right-of-way (BIO-IAMF#4). Training materials will identify and describe land cover types that may support special-status wildlife species (i.e., saline emergent wetland, freshwater emergent wetland, all land cover adjacent to the SFO West-of-Bayshore property) and their approximate locations within or adjacent to the right-of-way.

While special-status amphibians, reptiles, and mammals with small body sizes may still be able to access and occasionally move through or along the right-of-way, any features that once supported breeding (e.g., aquatic features) would either be removed or degraded during construction. Any special-status species individuals that do use enter the right-of-way after construction would be subjected to increased mortality risk from the addition of HSR trains operating at speeds up to 110 mph. This impact would also occur inside BCDC's Bay and shoreline band jurisdiction. However, even with this IAMF, operation of the project could result in disturbance or degradation of habitat, or individual fatalities, for special-status wildlife, which is considered a significant impact under CEQA (Authority 2022a: page 3.7-72).

The following measures mitigate this impact: BIO-MM#33: Install Aprons or Barriers within Security Fencing, and BIO-MM#34: Minimize Permanent Intermittent Impacts on Aerial Species Movement.

The Authority will implement mitigation measures to reduce the impacts on special-status wildlife. BIO-MM#33 will allow for the project biologist to review, prior to final construction design, 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 would be enhanced with a barrier (e.g., fine mesh fencing) 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. BIO-MM#34 requires the Authority to implement deterrent and diversion features for avian species that include installing pigeon wire to discourage birds from perching on OCS throughout the project; placing flight barriers such as fencing, pole barriers, or a tubular screen; modifying OCS poles to preclude bird entrapment in hollow poles; and designing aerial structures and tunnel portals to discourage bats from roosting in expansion joints or other crevices. These measures are expected to minimize or avoid direct impacts on special-status wildlife individuals. Therefore, these mitigation measures will be effective in minimizing the project's impacts associated with disturbance or degradation of habitat, or individual fatalities, for special-status wildlife.

The Authority finds that BIO-MM#33 and BIO-MM#34 are required under the Preferred Alternative and that these mitigation measures will reduce the project's impacts on special status wildlife to a less-than-significant level.

4.4.11 Impact BIO#18: Permanent Conversion or Degradation of Special-Status Plant Communities

Construction of the Preferred Alternative would take place adjacent to saline emergent wetlands that support pickleweed mats and within or adjacent to mixed riparian and scrub/shrub wetland land cover that may support arroyo willow thickets. Pickleweed mats and arroyo willow thickets are listed on the CDFW Sensitive Natural Communities List (CDFW 2018). Construction would result in the conversion and degradation of these communities if present within mapped land cover types. This impact would also occur inside BCDC's Bay and shoreline band jurisdiction.

Prior to construction in areas that could support special-status plant communities, the project biologist will prepare a BRMP consolidating permit conditions and an array of other requirements relevant to protection of sensitive biological resources (BIO-IAMF#5), including special-status plant communities. Workers will be provided with environmental awareness training to help them understand their responsibilities in following procedures to reduce impacts and to increase their capability to identify and avoid sensitive resources present in the work area (BIO-IAMF#3). Staging areas will be sited away from sensitive resources (BIO-IAMF#8).

During construction, several actions incorporated into the Preferred Alternative will be undertaken specifically to protect special-status plant communities. Cleaning of construction equipment (BIO-IAMF#10) will help to reduce the spread of invasive plant species and changes in vegetation structure. The contractor will develop a BMP field manual that will address proper waste management and storage, nonstormwater management, and other general site cleanliness measures to avoid spills of hazardous materials, reducing degradation of special-status plant communities (BIO-IAMF#9). The Authority will develop and implement a BMP field manual addressing proper waste management and storage, nonstormwater management, and other general site cleanliness measures (BIO-IAMF#11).

While pre-construction and construction actions to protect special-status plant communities are part of the project, these actions may not prevent the permanent conversion or temporary disturbance of special-status plant communities in the project footprint. Replacement of the Tunnel Avenue overpass near Brisbane Lagoon in the San Francisco to South San Francisco Subsection may temporarily disturb small areas of pickleweed mats in the lagoon. Track and associated structure modifications near mixed riparian land cover at stream crossings in all subsections may require trimming or removal of arroyo willow thickets. Construction of the LMF in Brisbane would remove scrub/shrub wetlands known to contain arroyo willow thickets. Ground

disturbance could indirectly affect special-status plant communities by creating new areas of bare soil that are easily colonized by nonnative invasive plants. Such plants could spread into and degrade adjacent special-status plant communities. Therefore, even with these IAMFs, the project could result in conversion or degradation of special-status plant communities, which is considered a significant impact under CEQA (Authority 2022a: page 3.7-77).

The following measures mitigate this impact: BIO-MM#1, BIO-MM#2, BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#6, BIO-MM#13, BIO-MM#35: Provide Compensatory Mitigation for Permanent Impacts on Riparian Habitat, BIO-MM#36: Restore Aquatic Resources Subject to Temporary Impacts, and BIO-MM#37: Prepare and Implement a Compensatory Mitigation Plan for Impacts on Aquatic Resources.

The Authority will implement mitigation measures to reduce the impacts on special-status plant species. BIO-MM#1 involves preparation of an RRP that will identify and describe procedures for restoring temporarily disturbed habitat to its former state. BIO-MM#2 requires the project biologist to develop a WCP prior to ground-disturbing activity to minimize and avoid the spread of invasive weeds into the project footprint and adjacent areas. BIO-MM#3 requires the project biologist to establish ESAs and nondisturbance zones (including WEF, where applicable) that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#4 and BIO-MM#5 require the project biologist to monitor construction activities for compliance with avoidance and minimization measures and established ESAs and nondisturbance zones and to document such monitoring through a compliance reporting program, respectively. BIO-MM#6 requires the project biologist to conduct presence/absence surveys for special-status plant species and special-status plant communities within the project footprint to be avoided during construction prior to any ground-disturbing activity. BIO-MM#13 requires that the project biologist direct the revegetation of any riparian areas temporarily disturbed as a result of the construction activities, using appropriate native plants and seed mixes. BIO-MM#35 requires the Authority 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. BIO-MM#36 will require the Authority to revegetate affected aquatic resources using appropriate native plants and seed mixes (from local vendors where available). BIO-MM#37 requires the Authority to prepare and implement a CMP that identifies compensatory mitigation such as the restoration, establishment, enhancement, and/or preservation of aquatic resources to address temporary and permanent loss of aquatic resources. Specific ratios are specified for seasonal wetlands, other wetland types, and nonwetlands; and on-site and off-site mitigation. These measures are expected to minimize direct and indirect impacts on special-status plant communities and to offset the loss of habitat. Therefore, these mitigation measures will be effective in minimizing the project's impacts associated with conversion or degradation of special-status plant communities.

The Authority finds that BIO-MM#1, BIO-MM#2, BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#6, BIO-MM#13, BIO-MM#35, BIO-MM#36, and BIO-MM#37 are required under the Preferred Alternative and that these mitigation measures will reduce the project's impacts on conversion or degradation of special-status plant communities to a less-than-significant level.

4.4.12 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

Construction of the Preferred Alternative would take place in areas that support aquatic resources considered jurisdictional under Section 404 of the Clean Water Act (CWA) and the state Porter-Cologne Act, or navigable waters considered jurisdictional under Section 10 of the Rivers and Harbors Act (RHA). Construction may result in the conversion and degradation of such aquatic resources through direct removal, filling, and hydrological interruption. Construction may also result in discharges that could adversely affect navigable waters.

The Preferred Alternative would require the construction of new bridges or culverts for the railbed, roadways, and other infrastructure to cross over watercourses, or the modification of existing bridges and culverts for the same purpose. To complete this work, the contractor may need to perform minor trimming of vegetation or other activities in or near wetlands or nonwetland waters that cross below or run parallel to the railbed. Some of this work may need to be conducted from within these features. Temporary stream diversions would be needed to conduct the work within perennial watercourses.

Prior to construction in areas that could support aquatic resources, the project biologist will prepare a BRMP consolidating permit conditions and an array of other requirements relevant to protection of sensitive biological resources (BIO-IAMF#5). Workers will be provided with environmental awareness training to help them understand their responsibilities in following procedures to reduce impacts and to increase their capability to identify and sensitive resources present in the work area (BIO-IAMF#3). Staging areas will be sited away from sensitive resources (BIO-IAMF#8).

During construction, several actions incorporated into the Preferred Alternative will be undertaken specifically to protect aquatic resources. Cleaning of construction equipment (BIO-IAMF#10) will help to reduce the spread of invasive plant species into wetlands. The contractor will develop a BMP field manual that will address proper waste management and storage, nonstormwater management, and other general site cleanliness measures to avoid spills of hazardous materials, reducing degradation of aquatic resources (BIO-IAMF#9).

While pre-construction and construction actions to protect aquatic resources are part of the project, these actions would not prevent the permanent conversion or temporary disturbance of aquatic resources in the project footprint. Construction activities would also result in the temporary disturbance of aquatic resources during construction and reduced value for some time after construction is completed until aquatic resources are restored and recover. Therefore, even with these IAMFs, the project could result in conversion or degradation of jurisdictional aquatic resources, which is considered a significant impact under CEQA (Authority 2022a: page 3.7-81).

The following measures mitigate this impact: BIO-MM#1, BIO-MM#2, BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#13, BIO-MM#35, BIO-MM#36, and BIO-MM#37.

The Authority will implement mitigation measures to reduce the impacts on aquatic resources. BIO-MM#1 involves preparation of an RRP that will identify and describe procedures for restoring temporarily disturbed habitat to its former state. BIO-MM#2 requires the project biologist to develop a WCP prior to ground-disturbing activity to minimize and avoid the spread of invasive weeds into the project footprint and adjacent areas. BIO-MM#3 requires the project biologist to establish ESAs and nondisturbance zones (including WEF, where applicable) that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#4 and BIO-MM#5 require the project biologist to monitor construction activities for compliance with avoidance and minimization measures and established ESAs and nondisturbance zones and to document such monitoring through a compliance reporting program, respectively. BIO-MM#13 requires that the project biologist direct the revegetation of any riparian areas temporarily disturbed as a result of the construction activities, using appropriate native plants and seed mixes. BIO-MM#35 requires the Authority 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. BIO-MM#36 requires the Authority to revegetate affected aquatic resources using appropriate native plants and seed mixes (from local vendors where available). BIO-MM#37 requires the Authority to prepare and implement a CMP that identifies compensatory mitigation such as the restoration, establishment, enhancement, and/or preservation of aquatic resources to address temporary and permanent loss of aquatic resources. Specific ratios are specified for seasonal wetlands, other wetland types, and nonwetlands; and on-site and off-site mitigation.

Therefore, these mitigation measures will be effective in minimizing the project's impacts associated with conversion or degradation of jurisdictional aquatic resources, and compensate for permanent impacts on aquatic resources.

The Authority finds that BIO-MM#1, BIO-MM#2, BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#13, BIO-MM#35, BIO-MM#36, and BIO-MM#37 are required under the Preferred Alternative and that these mitigation measures will reduce the project's impacts on conversion or degradation of jurisdictional aquatic resources to a less-than-significant level.

4.4.13 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.

Construction of the Preferred Alternative in all subsections would take place in areas that support rivers and streams subject to notification under Cal. Fish and Game Code Section 1600 et seq., including riparian communities (i.e., mixed riparian). Construction may result in the conversion and degradation of such aquatic and riparian habitat that supports fish and wildlife. Some of these resources are located in BCDC's Bay and shoreline band jurisdiction.

Prior to construction in a resource covered under Section 1602, the project biologist will prepare a BRMP consolidating permit conditions and an array of other requirements relevant to protection of sensitive biological resources (BIO-IAMF#5). Workers will be provided with environmental awareness training to help them understand their responsibilities in following procedures to reduce impacts and to increase their capability to identify and sensitive resources present in the work area (BIO-IAMF#3). Staging areas will be sited away from sensitive resources (BIO-IAMF#8).

During construction, several actions that the Authority has incorporated into Preferred Alternative design will be undertaken specifically to protect aquatic resources and species dependent on such resources. Cleaning of construction equipment (BIO-IAMF#10) will help to reduce the spread of invasive plant species into wetlands and riparian areas. The contractor will develop a BMP field manual that would address proper waste management and storage, nonstormwater management, and other general site cleanliness measures to avoid spills of hazardous materials, reducing degradation of aquatic resources (BIO-IAMF#9).

While pre-construction and construction actions to protect Section 1600 resources are part of the Preferred Alternative, these actions would not prevent the permanent conversion or temporary disturbance of aquatic resources in the project footprint. Construction activities would result in the temporary disturbance of Section 1600 resources during construction and reduced value to fish and wildlife using those resources for some time after construction is completed until resources are restored and recover. Therefore, even with these IAMFs, the project could result in conversion or degradation of aquatic resources, including riparian communities, which is considered a significant impact under CEQA (Authority 2022a: page 3.7-82).

The following measures mitigate this impact: BIO-MM#1, BIO-MM#2, BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#13, BIO-MM#35, BIO-MM#36, and BIO-MM#37.

The Authority will implement mitigation measures to reduce the impacts on aquatic resources, including riparian communities, regulated subject to notification under Cal. Fish and Game Code Section 1600 et seq. BIO-MM#1 involves preparation of an RRP that will identify and describe procedures for restoring temporarily disturbed habitat to its former state. BIO-MM#2 requires the project biologist to develop a WCP prior to ground-disturbing activity to minimize and avoid the spread of invasive weeds into the project footprint and adjacent areas. BIO-MM#3 requires the project biologist to establish ESAs and nondisturbance zones (including WEF, where applicable) that support special-status species or aquatic resources and are subject to seasonal restrictions or other avoidance and minimization measures prior to ground-disturbing activity. BIO-MM#4 and BIO-MM#5 require the project biologist to monitor construction activities for compliance with avoidance and minimization measures and established ESAs and nondisturbance zones and to document such monitoring through a compliance reporting program, respectively. BIO-MM#13 requires the project biologist to direct the revegetation of any riparian areas temporarily disturbed as a result of the construction activities, using appropriate native plants and seed mixes. BIO-MM#35 requires the Authority 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.

BIO-MM#36 requires the Authority to revegetate affected aquatic resources using appropriate native plants and seed mixes (from local vendors where available). BIO-MM#37 requires the Authority to prepare and implement a CMP that identifies compensatory mitigation such as the restoration, establishment, enhancement, and/or preservation of aquatic resources to address temporary and permanent loss of aquatic resources. Specific ratios are specified for seasonal wetlands, other wetland types, and nonwetlands; and on-site and off-site mitigation. Therefore, these mitigation measures will be effective in minimizing the project's impacts associated with conversion or degradation on aquatic habitat and riparian communities, and compensate for permanent impacts on aquatic resources and riparian communities.

The Authority finds that BIO-MM#1, BIO-MM#2, BIO-MM#3, BIO-MM#4, BIO-MM#5, BIO-MM#13, BIO-MM#35, BIO-MM#36, and BIO-MM#37 are required under the Preferred Alternative and that these mitigation measures will reduce the project's impacts on conversion or degradation of aquatic resources and riparian communities to a less-than-significant level.

4.4.14 Impact BIO#22: Intermittent Disturbance or Degradation of Aquatic Resources during Operations

Operation of the Preferred Alternative would include inspection and maintenance activities along the Caltrain right-of-way, at stations, and at the East Brisbane LMF. Right-of-way maintenance activities would include minor grading, clearing, and excavation needed to maintain adequate drainage or repair infrastructure; vegetation management, including potential trimming of riparian trees growing adjacent to the right-of-way and application of herbicide to invasive weeds within the right-of-way; and vehicle traffic along maintenance roads. Permanently affected aquatic features in the project footprint would have been eliminated during construction, and therefore would not be affected further. Aquatic resources inside the project footprint that were avoided during construction (e.g., natural watercourses spanned by bridges) and outside but adjacent to the project footprint would remain and could potentially be affected by these activities. In addition, construction would result in the creation of new aquatic resources (e.g., constructed basins and watercourses for drainage) in some portions of the project footprint, and these features could also be affected. Minor ground disturbance within the right-of-way may result in minor direct (e.g., filling, sedimentation, inadvertent release of oils and chemicals from parked vehicles or equipment) or indirect (e.g., introduction of invasive species) impacts on aquatic resources in and adjacent to the right-of-way. Occasional trimming of riparian tree branches overhanging the right-of-way is not expected to substantially degrade riparian aquatic resources because the branches of such trees are typically fast growing. If applied during high winds, herbicides could drift into aquatic resources in and beyond the right-of-way, degrading water quality and causing mortality of wetland vegetation. Dust generated by maintenance vehicles could settle on the leaves of wetland plants in and adjacent to the right-of-way, increasing the rate of water loss (i.e., transpiration). Such impacts would degrade aquatic resources remaining in the right-of-way after construction as well as those outside but within 250 feet (i.e., aquatic RSA) of the right-of-way. This impact would also occur inside BCDC's Bay and shoreline band jurisdiction.

Prior to on-site maintenance and inspection activities, the Authority will require that all O&M personnel attend WEAP training about sensitive biological resources (BIO-IAMF#4) within and adjacent to the right-of-way. Training materials will identify and describe Section 1600 resources that remain within or adjacent to the right-of-way (i.e., constructed basins at Brisbane Lagoon, natural and constructed watercourses and mixed riparian land cover that cross the right-of-way). This action will avoid and minimize impacts on remaining aquatic resources inside and adjacent to the project footprint during operations.

While pre-construction and construction actions to protect aquatic resources are part of the project, these actions would not prevent the permanent conversion or degradation of aquatic resources in the project footprint without mitigation measures. Therefore, even with this IAMF, operations of the project could result in conversion or degradation of aquatic resources, which is considered a significant impact under CEQA (Authority 2022a: page 3.7-83).

The following measure mitigates this impact: BIO-MM#38: Prepare and Implement an Annual Vegetation Control Plan.

The Authority will implement a mitigation measure to reduce the impacts on aquatic resources during operations. BIO-MM#38 requires the Authority to prepare an annual vegetation control plan that will describe site-specific vegetation control methods such as chemical vegetation control methods, mowing program consistent with Section 1415 of the Fixing America's Surface Transportation Act, other nonchemical vegetation control, and other chemical pest control methods 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. This measure is expected to minimize direct and indirect impacts on aquatic resources. Therefore, this mitigation measure, combined with the intermittent and widely dispersed nature of effects from inspection and maintenance activities, will be effective in minimizing the project's impacts on aquatic resources.

The Authority finds that BIO-MM#38 is required under the Preferred Alternative and that this mitigation measure will reduce the project's impacts on aquatic resources to a less-than-significant level.

4.4.15 Impact BIO#23: Removal of Trees Protected under Municipal Tree Ordinances

Ground disturbance and vegetation removal activities associated with construction of the Preferred Alternative could require removal or trimming of protected trees. Direct impacts on protected trees would be permanent if such trees are removed or have significant pruning to either the canopy or roots, grading or compaction in the root zone, or significantly modified drainage patterns (primarily causing water to pond in the root zone) during construction; impacts would be considered temporary if trees are minimally trimmed or their root systems have minor disruption. Any protected trees in the project footprint are in a dense urban setting and are adapted to a human-modified environment, including pavement and compaction of the root zone and the proliferation of introduced nonnative plants. The Preferred Alternative may have indirect impacts on protected trees outside the project footprint in natural settings as a result of grading and drainage pattern modifications that may cause compaction of the tree's root zone or increase ponding of water that causes anaerobic condition and root decay.

Prior to construction, the project biologist will prepare a BRMP consolidating permit conditions and an array of other requirements relevant to protection of sensitive biological resources (BIO-IAMF#5). Workers will be provided with environmental awareness training to help them understand their responsibilities in following procedures to reduce impacts and to increase their capability to identify and sensitive resources present in the work area (BIO-IAMF#3). Staging areas will be sited away from sensitive resources (BIO-IAMF#8).

While pre-construction actions to identify and preserve protected trees are part of the project, these actions would not entirely preclude impacts on protected trees. Some trees would be removed and others would be trimmed to facilitate project construction. Therefore, even with these IAMFs, the project could result in removal or trimming of protected trees, which is considered a significant impact under CEQA (Authority 2022a: page 3.7-84).

The following measure mitigates this impact: BIO-MM#39: Implement Transplantation and Compensatory Mitigation Measures for Protected Trees.

The Authority will implement a mitigation measure to reduce the impacts on protected trees during construction. BIO-MM#39 requires the project biologist to conduct surveys in the work area to identify protected trees. Therefore, this mitigation measure will be effective in minimizing the project's impacts associated with removal or trimming of protected trees.

The Authority finds that BIO-MM#39 is required under the Preferred Alternative and that this mitigation measure will reduce the project's impacts on protected trees to a less-than-significant level.

4.5 Hydrology and Water Resources (Section 3.8 in the Final EIR/EIS)

The Preferred Alternative would result in potentially significant temporary and permanent impacts on surface water quality during construction. All potentially significant impacts would be mitigated to less than significant.

These findings address impacts associated with the Preferred Alternative. Because of length, the full mitigation measure text is presented separately in the MMEP.

4.5.1 Impact HYD#4: Temporary Impacts on Surface Water Quality during Construction

Temporary construction impacts on surface water quality would result from disturbed soil, construction materials and waste, and work in aquatic resources, which would include temporary stream diversion and dewatering. Construction of the Preferred Alternative would require grading, excavation, vegetation clearing, operation of heavy equipment, and other activities that would disturb, destabilize, and stockpile soil. These construction activities are sources of sediment that would need to be controlled to prevent sediment-laden runoff from entering aquatic resources. Project features will minimize impacts. However, temporary impacts on surface water quality would result from construction, dewatering, and potentially encountering hazardous materials.

The primary water quality pollutant that would need to be controlled throughout the entire project corridor would be sediment. Aside from sediment, construction of the Preferred Alternative has the potential to encounter other pollutants of concern, including hazardous and nonhazardous wastes. The Preferred Alternative would disturb more than 1 acre of soil and will therefore need to comply with the Construction General Permit (CGP) (HYD-IAMF#3). Potential temporary impacts on water quality from soil disturbance and in-water and over-water construction activities, as well as the use, storage, and disposal of construction materials and wastes will be avoided or minimized by implementing a stormwater pollution prevention plan and standard BMPs recommended for a particular construction activity.

Minimizing areas of disturbed soil, especially with erosive soil types and geological deposits, only disturbing areas that may be stabilized before the onset of winter rains, not performing grading or earthwork during the wet months or storm events, and protecting disturbed soil areas with temporary erosion and sediment control BMPs will minimize the potential for water quality impacts during construction (GEO-IAMF#1, GEO-IAMF#10).

Temporary erosion and sediment control measures will be applied to all inactive disturbed soil areas during construction. Other methods of minimizing erosion include preserving existing vegetation and avoiding sensitive wetland and riparian habitats to the extent feasible, which will be documented in a BRMP (BIO-IAMF#5). Additionally, the stormwater pollution prevention plan will specify the installation of replacement plantings or application of a seed mix to assist in permanently stabilizing exposed soils. Wind erosion resulting in fugitive dust emissions will be avoided or minimized through standard construction site BMPs, such as construction roadway speed limits, halting activities during windy conditions, and dust suppression by wetting disturbed soil areas (AQ-IAMF#1).

The Authority will minimize hazardous substances required for construction by using an environmental management system to replace hazardous materials with nonhazardous alternatives to the extent possible (HMW-IAMF#9). Alternative materials will be evaluated on an annual basis. Any hazardous materials used during construction will be stored according to state and federal regulations (HMW-IAMF#10). BMPs to minimize the potential for accidental spills and procedures to mitigate spills will be documented in the spill prevention, control, and countermeasure plans (HMW-IAMF#6) that will be implemented at all project facilities. The construction contractor will prepare a hazardous materials and waste plan that describes responsible parties and procedures for managing hazardous waste and transporting hazardous materials on public roadways (HMW-IAMF#7).

Construction activities could result in waste liquids other than stormwater (i.e., nonstormwater). These may include equipment and vehicle wash water, accidental spills of petroleum

hydrocarbons (e.g., fuels, lubricating oils), concrete wastewater, sanitary wastes from construction worksite wash facilities, contaminated soil, and hazardous materials and waste. Nonstormwater and waste management BMPs, good housekeeping practices, and adhering to CGP conditions for the storage of hazardous materials will avoid or minimize the potential for discharging construction materials and wastes into receiving waters (HMW-IAMF#8).

Construction activities for the East Brisbane LMF will also comply with regulations that control the transport, use, and storage of hazardous materials and minimize the potential for an accidental release of hazardous materials (HMW-IAMF#7, HMW-IAMF#8). Together, these IAMFs and applicable regulations minimize the potential for accidental releases during the transport of hazardous materials and wastes within the construction site and on off-site public roadways by establishing procedures and policies for the proper handling, labeling, packaging, and transportation of these materials.

Additionally, the Authority will minimize the types of hazardous substances required for construction by using an environmental management system to replace hazardous materials with nonhazardous alternatives to the extent possible (HMW-IAMF#9). If required for construction, hazardous materials will be stored according to state and federal regulations (HMW-IAMF#10). BMPs to minimize the potential for accidental spills and procedures to mitigate spills will be documented in the spill prevention, control, and countermeasure plans (HMW-IAMF#6) that will be implemented at all project facilities. The construction contractor will prepare a hazardous materials and waste plan for Authority review and approval that describes responsible parties and procedures for hazardous waste and the transport of hazardous materials on public roadways (HMW-IAMF#7).

As described in Section 3.8, Hydrology and Water Resources, of the Final EIR/EIS, groundwater within the existing Caltrain corridor and the proposed East Brisbane LMF site is reported to contain contaminants. Nonstormwater and waste management BMPs would be critical for avoiding substantial surface-water quality impacts during construction activities that may encounter groundwater in these areas. If large quantities of contaminated groundwater are expected to be encountered, the contractor may elect to use an active treatment system in accordance with the CGP (HYD-IAMF#3).

The contractor will prepare demolition plans for the safe dismantling and removal of waste materials (HMW-IAMF#5). For bridges and other structures near water, the demolition plans will include temporary structures and systems to collect and contain falling debris, including lead-based paint and asbestos-containing materials, and prevent them from entering receiving waters as needed. This project feature will provide measures to collect and contain construction materials, debris, and other toxic substances and prevent them from entering aquatic resources.

In-water and over-water construction activities would be required. In addition to potentially exposing receiving waters to construction equipment, materials, and debris, these activities may require dewatering for excavations or temporary stream diversion, or both. Temporary stream diversions and dewatering would be required to modify a portion of the existing aquatic resource crossing structures. With project features, temporary stream diversions and dewatering would create minimal increases in turbidity and suspended sediment concentrations in receiving waters.

Construction of the Preferred Alternative would require work in waterbodies to build new bridges and culverts as well as realign and relocate aquatic resources (Authority 2022a: Table 3.8-15 and Table 3.8-17). Work in aquatic resources would result in temporary disturbance of the beds and banks of aquatic resources, leading to increased erosion and sedimentation and the exposure of construction materials, equipment, and wastes to receiving waters. Work in perennial aquatic resources would require temporary stream diversion and channel dewatering to allow work on a dry ground surface. Intermittent or ephemeral waterbodies would not likely contain flowing or standing water during summer when construction in waterbodies is anticipated to occur and would not require temporary stream diversion and dewatering. However, erosion and sedimentation would occur in all waterbodies directly disturbed by construction activities when flows occur during winter.

Even with incorporation of these IAMFs, project construction would result in temporary impacts on surface water quality. This impact is significant under CEQA (Authority 2022a: page 3.8-66).

The following measures mitigate this impact: BIO-MM#1, BIO-MM#3, BIO-MM#4, BIO-MM#13, BIO-MM#14, BIO-MM#36, and BIO-MM#37.

The Authority will implement mitigation measures to reduce temporary impacts on water quality resulting from erosion and sedimentation in waterbodies as well as potential increases in water temperature and decreases in dissolved oxygen. BIO-MM#1 involves preparation of an RRP that will identify and describe procedures for restoring temporarily disturbed habitat to its former state. BIO-MM#3 requires the project biologist to establish ESAs and nondisturbance zones that contain aquatic resources to reduce impacts on water quality prior to ground-disturbing activity. BIO-MM#4 requires the project biologist to monitor construction activities that occur within or adjacent to aquatic resources and document compliance with applicable avoidance and minimization measures, including measures set forth in regulatory authorizations issued under the CWA or Porter-Cologne Act. BIO-MM#13 requires contractors to begin revegetation of temporarily affected riparian areas within 90 days of completing construction. BIO-MM#14 requires the Authority to prepare a dewatering plan that incorporates measures to minimize turbidity and siltation of downstream waters. BIO-MM#36 minimizes temporary impacts on aquatic resources by requiring contractors to begin restoration of temporarily disturbed features within 90 days of completing construction. BIO-MM#37 requires preparation and implementation of a CMP for impacts on waters of the U.S. regulated under the federal CWA and waters of the state under the Porter-Cologne Act. These measures are expected to avoid or minimize temporary impacts on receiving water quality resulting from the conversion or loss of aquatic resources and riparian habitat. These mitigation measures will be effective in minimizing construction impacts to surface water quality.

The Authority finds that BIO-MM#1, BIO-MM#3, BIO-MM#4, BIO-MM#13, BIO-MM#14, BIO-MM#36, and BIO-MM#37 are required under the Preferred Alternative and that these mitigation measures will reduce impacts to surface water quality to a less-than-significant level.

4.5.2 Impact HYD#5: Permanent Impacts on Surface Water Quality

Construction of the Preferred Alternative would add impervious surfaces; realign, fill, or modify waterbodies; as well as remove riparian vegetation in the RSA. Prior to construction, the contractor will prepare a stormwater management and treatment plan, which will include permanent stormwater treatment BMPs to reduce the quantity and improve the quality of runoff. However, the Preferred Alternative would result in permanent impacts on water quality through direct removal, filling, hydrological interruption, and other indirect impacts on aquatic resources, as well as the permanent conversion or removal of riparian vegetation.

Prior to construction, the contractor will prepare a stormwater management and treatment plan for Authority review and approval prior to construction (HYD-IAMF#1). The plan will include permanent stormwater BMPs to reduce the quantity and improve the quality of stormwater runoff (treatment and low-impact development measures) and retain flows to prevent increases in flow rates and durations above pre-project conditions (hydromodification management). BMPs would be sized to manage the expected runoff from impervious surfaces. The design of stormwater BMPs within drainage areas connected with local drainage systems will comply with the local agency's municipal separate storm sewer system permit and associated technical guidance. With a stormwater management and treatment plan (HYD-IAMF#1) and long-term maintenance plan for permanent stormwater treatment BMPs, stormwater runoff from new and replaced impervious surfaces, including those in areas with converted land uses, will be collected and discharged in a manner that will not produce excessive erosion or come into contact with pollutant-generating activities.

Even with incorporation of these IAMFs, project construction would result in permanent impacts on surface water quality. This impact is significant under CEQA (Authority 2022a: page 3.8-69).

The following measures mitigate this impact: BIO-MM#35 and BIO-MM#37.

The Authority will implement mitigation measures to reduce permanent impacts on water quality resulting from the realignment, filling, or modification of waterbodies as well as the removal of riparian vegetation. BIO-MM#35 identifies minimum compensatory mitigation requirements for riparian habitat. BIO-MM#37 requires preparation and implementation of a CMP for both temporary and permanent impacts on aquatic resources. Together, these measures are expected to compensate for permanent impacts on receiving water quality resulting from the conversion or loss aquatic resources. These mitigation measures will be effective in minimizing permanent construction impacts to surface water quality.

The Authority finds that BIO-MM#35 and BIO-MM#37 are required under the Preferred Alternative and that these mitigation measures will reduce impacts to surface water quality to a less-than-significant level.

4.6 Hazardous Materials and Wastes (Section 3.10 of the Final EIR/EIS)

The Preferred Alternative would result in potentially significant intermittent impacts from hazardous materials and wastes activities near schools during construction. This potentially significant impact would be mitigated to less than significant.

4.6.1 Impact HMW#13: Intermittent Direct Impacts from Hazardous Material and Waste Activities near Schools during Construction

The impact from the use of hazardous materials and wastes near schools from construction of the Preferred Alternative would be potentially significant under CEQA. Potential impacts include exposure of students and school faculty to hazardous materials or wastes through skin contact, ingestion, or inhalation and environmental impacts on school grounds through contact with released hazardous materials or wastes. Materials are anticipated to be used in a manner consistent with typical construction procedures and are not anticipated to leave the project footprint.

The Preferred Alternative incorporates project features requiring management plans to transport and prevent spills of hazardous materials associated with project construction. During project construction and operations, hazardous materials will be transported in accordance with regulations regarding the transport, use, and storage of hazardous materials (HMW-IAMF#7) with the goal of minimizing the potential for a release of hazardous materials (HMW-IAMF#6) to minimize potential impacts on schools. Any hazardous material use within the project footprint will be subject to federal, state, and local 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. These regulations would apply equally near school sites and require monitoring the generation, transportation, treatment, storage, and disposal of hazardous waste. 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 (HMW-IAMF#5). Prior to construction, the contractor will provide the Authority with a hazardous materials and waste plan describing responsible parties and procedures for hazardous materials transport, containment, and storage BMPs that will be implemented during construction (HMW-IAMF#8). Hazardous materials will be stored during project construction primarily at construction staging areas, and during project operations primarily at the Brisbane LMF. Hazardous materials business plans (HMBP) (HMW-IAMF#10) and spill prevention and response plans (HMW-IAMF#6) will be prepared for safe storage of hazardous materials and to manage any spill of stored materials. Proper implementation of the materials storage procedures, as outlined in the HMBP, should limit the extent of any spilled material within a storage area to that storage facility. Further, the contractor will develop environmental management plans to identify, track, and document the locations of hazardous materials and to promote proper handling, storage, and transport of hazardous materials (HMW-IAMF#9). California Public Resources Code (Cal. Public Res. Code) Section 21151.4 states that the Authority must consult the school districts associated with the schools within 0.25 mile of the project prior to EIR certification and notify them of the proposed certification in writing at least 30

days prior. Accordingly, the Authority would give the affected schools opportunity to comment on the project and express any related concerns that may result in potential prescriptive actions, such as limits on the materials used, or restrictions on the transport and storage of such materials. The selection of materials will be aided by an environmental management system (HMW-IAMF#9), which will inventory and evaluate proposed materials, in order to minimize the amount of hazardous materials and to make substitutions for less hazardous materials where possible. The Authority has coordinated with potentially affected school districts during preparation of the environmental document.

However, although IAMFs require that materials be selected to minimize potential impacts on the public and the environment and that HMBPs and environmental management plans be used to track and document the location and types of hazardous materials used to verify that they are properly stored and transported, these IAMFs would not eliminate the possibility of a release of hazardous materials in quantities greater than the state threshold quantity given in subdivision (l) of Section 25532 of the Health and Safety Code near schools within 0.25 mile of the project footprint. This impact is significant under CEQA (Authority 2022a: page 3.10-48).

The following measure mitigates this impact: HMW-MM#1: Limit Use of Extremely Hazardous Materials Near Schools during Construction.

The Authority will implement HMW-MM#1 to reduce the potential for a release of hazardous materials near schools during construction. HMW-MM#1 requires that prior to construction, the contractor 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 Cal. Public Res. 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. 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 is required to monitor all use of extremely hazardous substances. The mitigation measure is consistent with Cal. Public Res. Code Section 21151.4. The memorandum will be submitted to the Authority prior to any construction involving an extremely hazardous substance.

This mitigation measure will be effective because it will reduce the quantities of extremely hazardous materials used near schools during project construction to below the state threshold quantity given in subdivision (l) of Section 25532 of the Health and Safety Code.

The Authority finds that HMW-MM#1 is required under the Preferred Alternative and that this mitigation measure will reduce impacts from hazardous wastes and materials near schools to a less-than-significant level.

4.7 Safety and Security (Section 3.11 of the Final EIR/EIS)

The Preferred Alternative would result in potentially significant permanent impacts on emergency access and response times. The potentially significant impact on emergency access and response times would remain significant and unavoidable even with mitigation.

4.7.1 Impact S&S#6: Continuous Permanent Impacts on Emergency Access and Response Times due to Station Traffic and Increased Gate-Down Time

Operation of the Preferred Alternative would result in increased emergency vehicle response times because of gate-down events caused by HSR trains. The following areas would be affected: Burlingame east of rail corridor between Oak Grove Avenue and Howard Avenue, Redwood City west of rail corridor between Whipple Avenue and Broadway, Menlo Park east of rail corridor centered on Ravenswood Avenue and Oak Grove Avenue, Menlo Park/Palo Alto west of rail corridor along city boundaries just north of San Hill Road, and Mountain View west of rail corridor centered in Rengstorff Avenue. In addition, the Preferred Alternative would result in increased travel time because of increased HSR station and LMF traffic. The following areas

would be affected: Fire Station 8 in San Francisco near the 4th and King Street Station, Fire Station 37 in Millbrae near the Millbrae Station, and San Francisco Station 44 near the Brisbane LMF.[10] This increased travel time for emergency response vehicles would be considered a significant impact under CEQA (Authority 2022a: page 3.11-87).

The following measures mitigate this impact: SS-MM#3: Install Emergency Vehicle Priority Treatments near HSR Stations; SS-MM#4: Install Emergency Vehicle Priority Treatments Related to Increased Gate-Down Time Impacts; installing traffic signals under TR-MM#1a.2: North Lane/California Drive—Install Traffic Signal, TR-MM#1a.3: North Lane/Carolan Avenue—Install Traffic Signal, and TR-MM#1a.5: Brewster Avenue/Perry Street—Install Traffic Signal; adding overlap signal phase and optimizing signal timing under TR-MM#1h: Whipple Avenue/Arguello Street—Add Overlap Signal Phase and Optimize Signal Timing; and optimizing signal timing under TR-MM#1i: Whipple Avenue/Arguello Street—Optimize Signal Timing.[10]

The Authority will implement these mitigation measures to reduce impacts on emergency vehicle response times. These mitigation measures will reduce emergency vehicle response times by monitoring at-grade crossing conditions and providing a fair share contribution to emergency vehicle response improvements on key routes that serve affected fire stations/first responders as needed. These mitigation measures will fully mitigate the project's impacts on emergency vehicle response if implemented. Although the Authority can provide funding for the construction of emergency vehicle response improvements, it cannot compel the City of Burlingame, City of Redwood City, City of Menlo Park, City of Palo Alto, and City of Mountain View to construct and operate the improvements.

The Authority finds that SS-MM#3, SS-MM#4, TR-MM#1a.2, TR-MM#1a.3, TR-MM#1a.5, TR-MM#1h, and TR-MM#1i are required under the Preferred Alternative; however, because the Authority cannot compel the construction and operation of the improvements as discussed above, the CEQA impact on emergency vehicle response time would remain significant and unavoidable. The Authority finds that there are no other feasible mitigation measures or alternatives that could be adopted to reduce this remaining impact to less-than-significant levels. The Authority finds that despite this otherwise significant and unavoidable impact, specific economic, social, and other considerations identified in the Statement of Overriding Considerations (Chapter 8) support certification of the Final EIR/EIS and approval of the project.

4.8 Station Planning, Land Use, and Development (Section 3.13 in the Final EIR/EIS)

Construction of the Preferred Alternative would result in potentially significant permanent impacts related to alteration of land use patterns from land use conversion at stations and the Brisbane LMF, permanent impacts related to alteration of land use patterns from project operations, and conflicts with BCDC shoreline band policies. The potentially significant impacts under the Preferred Alternative related to alteration of land use patterns from land use conversion at stations and the Brisbane LMF would remain significant and unavoidable, while the potentially significant impacts related to permanent alteration of land use patterns from project operations, and conflicts with BCDC shoreline band policies would be mitigated to less than significant.

These findings address impacts associated with the Preferred Alternative. Because of length, the full mitigation measure text is presented separately in Attachment A to these CEQA findings. As explained in the Final EIR/EIS, with implementation of LU-MM#2, there may be

[10] Additional emergency response impacts would occur under Alternative A within the San Jose Diridon Station Approach Subsection, affecting San Jose Fire Station 1 and San Jose Fire Station 30. Mitigation measures would be available to reduce these impacts. These impacts and mitigation measures are included in the Final EIR/EIS but are not included in these findings because the San Jose Diridon Station Approach Subsection was approved by the Authority Board of Directors as part of the San Jose to Merced Project Section in April 2022.

limited disturbance of prior landfill materials; all relevant construction controls for work within the landfill for the project will apply to trail construction under LU-MM#2.

4.8.1 Impact LU#4: Permanent Alteration of Land Use Patterns from Land Use Conversion and Introduction of Incompatible Uses at Stations

The HSR modifications to Millbrae Station would require permanent conversion of 7.8 acres under the Preferred Alternative. Construction of the Millbrae Station modifications would result in a substantial, significant change in existing land uses due to the commercial uses being converted to transportation uses.[11] Construction of the Millbrae Station modifications would also result in a substantial, significant change in planned land use patterns by conflicting with the planned Millbrae Serra Station Development project. This alteration and conversion of existing and planned land uses at stations would be considered a significant impact under CEQA (Authority 2022a: page 3.13-61).

The Authority finds that there are no feasible mitigation measures or alternatives that could be adopted to reduce the impact of construction of the Millbrae Station on existing and planned land uses. The Authority finds that despite this significant and unavoidable impact, specific economic, social, and other considerations identified in the Statement of Overriding Considerations (Chapter 8) support certification of the Final EIR/EIS and approval of the project.

4.8.2 Impact LU#5: Permanent Alteration of Land Use Patterns from Land Use Conversion at the Brisbane Light Maintenance Facility

Construction of the East Brisbane LMF under the Preferred Alternative would require the permanent acquisition of lands designated as planned development (residential prohibited). The Authority will continue ongoing coordination with the City of Brisbane and the developers for the Brisbane Baylands in order to minimize potential incompatibilities between the Brisbane LMF and the planned development for the Brisbane Baylands. The alteration and conversion of planned land uses at the Brisbane LMF would be considered a significant impact under CEQA (Authority 2022a: page 3.13-66).

The Authority finds that there are no feasible mitigation measures or alternatives available that would reduce the impact of construction of the East Brisbane LMF on planned land uses. The Authority finds that despite this significant and unavoidable impact, specific economic, social, and other considerations identified in the Statement of Overriding Considerations (Chapter 8) support certification of the Final EIR/EIS and approval of the project.

4.8.3 Impact LU#6: Permanent Alteration of Land Use Patterns from Increased Noise, Light, and Glare

Operation of the Preferred Alternative would increase noise levels above the conditionally acceptable noise limits established in the Brisbane General Plan. Increased train service and operation of the East Brisbane LMF would introduce a new source of nighttime noise that would affect areas designated for planned development at the Brisbane Baylands site, including planned development (residential prohibited). The conservatively estimated noise levels would exceed both the normally acceptable and conditional acceptable noise levels for residential and commercial uses per the Brisbane General Plan. In addition, it could result in a change in planned land use patterns by pushing planned development further out from the mainline track alignments. Operations of the project could result in alteration of land use patterns in Brisbane as a result of increased noise, light, and glare, which is considered a significant impact under CEQA (Authority 2022a: page 3.13-70).

The following measure mitigates this impact: LU-MM#1: Implement Noise Mitigation in Conjunction with Land Use Development in Brisbane.

[11] Refer to Section 6.1.2.2, Millbrae Reduced Site Plan Design Variant, for discussion of the design variant for the Millbrae Station that is not proposed for approval as part of the Preferred Alternative.

The Authority will implement LU-MM#1 to reduce noise impacts and potential changes in land use patterns in Brisbane by constructing noise barriers and installing building sound insulation. This mitigation measure will be effective in minimizing the project's impacts on land use patterns in Brisbane associated with increased noise, light, and glare.

The Authority finds that LU-MM#1 is required under the Preferred Alternative and that this mitigation measure will reduce the project's impacts on land use patterns in Brisbane to a less-than-significant level.

4.8.4 Impact LU#7: Conflict with BCDC Shoreline Band Policies

Construction of the Preferred Alternative on BCDC's shoreline band would be inconsistent with the San Francisco Bay Plan's policies because project components do not include measures to maximize, to the extent feasible, public access to the Bay or shoreline. The Preferred Alternative would be located on the shoreline bands of Guadalupe Valley Creek and on the shoreline band of Visitacion Creek. This conflict with BCDC's shoreline band policies is considered significant under CEQA (Authority 2022a: page 3.13-74).

The following measure mitigates this impact: LU-MM#2: Shoreline Access Improvements in Brisbane.

The Authority will implement LU-MM#2 that includes construction of a new bicycle/pedestrian trail that will maximize public access to Brisbane Lagoon and San Francisco Bay. This mitigation measure will result in a net increase in public access, relative to existing conditions consistent with the BCDC San Francisco Bay Plan. The Authority finds that LU-MM#2 is required under the Preferred Alternative and that this mitigation measure will reduce the project's impacts on BCDC's shoreline band to a less-than-significant level.

4.9 Cultural Resources (Section 3.16 of the Final EIR/EIS)

The Preferred Alternative would result in potentially significant impacts associated with permanent disturbance of both known and unknown archaeological sites.[12] Impacts on known and unknown archaeological sites would be mitigated to less than significant.

These findings address impacts associated with the Preferred Alternative. Because of length, the full mitigation measure text is presented separately in Attachment A to these CEQA findings.

4.9.1 Impact CUL#1: Permanent Disturbance of Unknown Archaeological Resources

Construction of the Preferred Alternative could potentially affect unknown archaeological resources, including buried archaeological deposits, through ground-disturbing activities. Unknown archaeological resources might encompass the full range of pre-contact or historic-period activities conducted over time, including pre-contact lithic scatters and village sites, historic-period homestead remains, and human burials. Unknown or unrecorded archaeological resources that are not observable when conducting standard surface archaeological inspections, including subsurface buried archaeological deposits, may exist in urbanized and suburban areas, although most ground-disturbing activities would take place within an existing, disturbed Caltrain right-of-way; therefore, the potential for archaeological resources at or near the ground surface at these locations is anticipated to be low. Unknown or unrecorded archaeological resources may also exist in areas where permission to enter has not been granted. Construction staff will be trained in identifying cultural resources (CUL-IAMF#2). Pre-construction phased identification

[12] The Final EIR/EIS includes an additional significant impact (Impact CUL#4: Permanent Demolition, Destruction, Relocation, or Alteration of Built Resources or Setting) that would occur under Alternative A only within the San Jose Diridon Station Approach Subsection. This impact is not included in these findings because the San Jose Diridon Station Approach Subsection was approved by the Authority Board of Directors as part of the San Jose to Merced Project Section in April 2022.

surveys will take place as parcel access is acquired (CUL-IAMF#3). Damaging or destroying an archaeological site reduces the site's integrity, and reduces or eliminates the site's ability to provide important scientific information, which diminishes the site's integrity. Accordingly, impacts associated with disturbance of unknown archaeological resources would be considered a significant impact under CEQA (Authority 2022a: page 3.16-47).

The Authority will limit potential impacts on unknown archaeological resources by developing a memorandum of agreement (MOA) for each undertaking where it is determined that there would be an adverse effect on historic properties or when phased identification is necessary and impacts would occur. The Authority and the State Historic Preservation Officer (SHPO) will use the MOA to enforce the required actions arising from the Section 106 consultation.

The following measures mitigate this impact: 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; 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; and CUL-MM#3: Other Mitigation for Effects on NRHP-Eligible Pre-Contact Archaeological Resources.

The Authority will implement mitigation measures to minimize the impacts on unknown archaeological resources. CUL-MM#1 requires mitigation of significant impacts on sites found during these surveys, including site avoidance if feasible, evaluation, and data recovery if necessary. CUL-MM#2 specifies procedures and protocols to be followed in the event of unanticipated discoveries during construction, including stopping work, preservation of the discovery until evaluated by a qualified archaeologist, and treatment of human remains as required by law. CUL-MM#3 requires consultation efforts to develop meaningful mitigation measures for impacts on as-yet-unidentified Native American archaeological resources that cannot be avoided to be negotiated with the tribal consulting parties.

These mitigation measures will reduce the impacts on unknown archaeological resources during project construction.

The Authority finds that CUL-MM#1, CUL-MM#2, and CUL-MM#3 are required under the Preferred Alternative and that these mitigation measures will reduce impacts associated with disturbance of unknown archaeological sites to a less-than-significant level.

4.9.2 Impact CUL#2: Permanent Disturbance of Known Archaeological Sites

The Preferred Alternative would cross all or part of 21 known archaeological resources in the project footprint.[13] These cultural resources would be subject to phased evaluation, and they are assumed eligible until they can be evaluated and their eligibility determined. Grading, trenching, and excavating in the project footprint during construction, as well as compaction resulting from the use of heavy machinery and other vehicular traffic on the construction site or in TCEs, may affect the integrity of artifact-bearing archaeological deposits. Project features will help reduce this impact through archaeological resource mapping of known sites, allowing their avoidance; pre-construction surveys; training of workers to identify cultural resources and avoid damaging them; and implementing the archaeological monitoring plan (CUL-IAMF#1, CUL-IAMF#2, CUL-IAMF#3, and CUL-IAMF#5). However, even with these IAMFs, permanent disturbance of known archaeological sites would still occur and would be considered a significant impact under CEQA (Authority 2022a: pages 3.16-48 to 3.16-56).

The following measures mitigate this impact: CUL-MM#1, CUL-MM#2, and CUL-MM#3.

[13] Six additional known archaeological resources are within the project footprint of Alternative A in the San Jose Diridon Station Approach Subsection. Impacts on these resources are included in the Final EIR/EIS but are not included in these findings because the San Jose Diridon Station Approach Subsection was approved by the Authority Board of Directors as part of the San Jose to Merced Project Section in April 2022.

The Authority will survey areas prior to work (CUL-MM#1) and implement the archaeological treatment plan (ATP) (CUL-MM#2), which provides specific performance standards so that each impact will be avoided, minimized, or mitigated to the extent possible and provide enforceable performance standards to follow the National Register of Historic Places (NRHP) and the Secretary of the Interior's standards when implementing the mitigation measures. Specifically, the ATP will focus on the treatment of known and unknown archaeological resources, and will require phased identification, evaluation, and mitigation of archaeological resources determined eligible and located in the area of potential effects. In addition, the Authority will implement CUL-MM#3. The mitigation measures will reduce or eliminate impacts on known archaeological resources.

The Authority finds that CUL-MM#1, CUL-MM#2, and CUL-MM#3 are required under the Preferred Alternative and that these mitigation measures will reduce impacts associated with permanent disturbance of known archaeological sites to a less-than-significant level.

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5 CUMULATIVE IMPACTS (SECTION 3.18 OF THE FINAL EIR/EIS)

This chapter presents the Authority's findings regarding the cumulative impacts from implementing the Preferred Alternative in combination with other closely related past, present, and reasonably foreseeable future projects. CEQA defines cumulative impacts as two or more individual impacts that, when evaluated together, are considerable or capable of compounding or increasing other environmental impacts (CEQA Guidelines § 15355). Under CEQA, when a project would contribute to a significant cumulative impact, an EIR must discuss whether the project's incremental effect would be "cumulatively considerable." Cumulatively considerable means that the project's incremental effect would be significant when viewed in the context of past, present, and reasonably foreseeable projects (cumulative projects) that contribute to the cumulative impact. The discussion of cumulative impacts need not provide as much detail as that provided for the effects attributable to the project alone (CEQA Guidelines § 15130(b)). As described in the Final EIR/EIS, the focus of the cumulative impacts analysis is on the Preferred Alternative and the regional context appropriate for each resource area, including adjacent sections of the California HSR System.

As presented in the Final EIR/EIS, Section 3.18, Cumulative Impacts, the analysis concludes that cumulative impacts are less than significant under CEQA for the following subject areas: electromagnetic fields/electromagnetic interference; public utilities and energy; hydrology and water resources; hazardous materials and wastes; socioeconomics and communities; station planning, land use, and development; parks, recreation, and open space; and archaeological resources. Because the overall cumulative impact in each of these subject areas is determined to be less than significant, as described in Section 3.18, the project cannot contribute to a significant cumulative impact and therefore the project contributions are less than significant. Consequently, these subjects are not discussed further below as the discussion focused on significant cumulative impacts to which the project would contribute.

5.1 Transportation

Construction of cumulative projects would result in a potentially significant cumulative impact on passenger and freight rail service because track closures and other construction activities would disrupt or interfere with expanded passenger and freight operations. Disruption of passenger rail and freight rail service and potential diversion of commuter rail riders as well as freight shipments to alternative modes of travel or transport during construction is considered a significant cumulative impact. However, construction of the Preferred Alternative would not contribute to this cumulative impact because the Authority will implement TR-MM#3 (Section 4.1, Transportation (Section 3.2 of the Final EIR/EIS)), which includes effective measures to minimize potential delays of passenger and freight rail service during construction. With this mitigation measure, the contribution of the Preferred Alternative to cumulative impacts on passenger and freight rail service will be reduced and not be cumulatively considerable.

Operation of cumulative projects would result in significant cumulative impacts on bus transit service performance because of added vehicle traffic in station areas and increased gate-down time at at-grade crossings which would lead to delays and effects on on-time performance. The Preferred Alternative's contribution to this significant cumulative impact would be considerable because even after implementation of TR-MM#2 (Section 4.1), the overall performance of the network would remain below the identified service standards for several high-frequency bus routes in San Francisco. No additional mitigation is available to reduce the cumulative impact other than TR-MM#2 already identified as required under the Preferred Alternative in Section 4.1 of this document. Therefore, the incremental effect of the operations of the Preferred Alternative would be cumulatively considerable for bus transit, and remain significant and unavoidable.

Operation of cumulative projects would result in significant cumulative impacts on pedestrian facility capacity at the 4th and King Street Station. The project would contribute to a cumulative impact due to the effect of additional HSR riders on the pedestrian frontage at the 4th and King Street Station. However, construction of the Preferred Alternative would not contribute to this cumulative impact because the Authority will implement TR-MM#5 (Section 4.1), which will

increase sidewalk capacity along the Fourth Street station frontage between Townsend Street and King Street and will address the project's contribution to pedestrian impacts associated with new pedestrian trips generated by HSR. With this mitigation, the contribution of the Preferred Alternative to cumulative impacts on pedestrian facility capacity at the 4th and King Street Station would be reduced and not be cumulatively considerable.

The Authority finds that transportation mitigation measures have been incorporated into the Preferred Alternative (Section 4.1) and that these mitigation measures reduce the Preferred Alternative's impacts to a less than cumulatively considerable level except for permanent impacts on bus transit service performance. The Authority finds that there are no other feasible mitigation measures or alternatives that will reduce this operations-related impact on bus transit to a less-than-cumulatively-considerable level. To the extent that this cumulatively considerable adverse impact remains significant and unavoidable, the Authority finds that specific economic, social, and other considerations identified in the Statement of Overriding Considerations (Chapter 8) support certification of the Final EIR/EIS and approval of the project.

5.2 Air Quality and Greenhouse Gases

Construction of the Preferred Alternative, in combination with cumulative projects in the cumulative RSA, would result in a significant regional cumulative impact for NO_X because construction activities would exeed air district thresholds. The Preferred Alternative's contribution to this significant cumulative impact would not be cumulatively considerable because purchase of offsets through project-level mitigation (AQ-MM#2, Section 4.2, Air Quality and Greenhouse Gases (Section 3.3 of the Final EIR/EIS)) would offset NO_X emissions to below air district thresholds or net zero. Therefore, CEQA does not require any further mitigation.

Construction of the Preferred Alternative, in combination with cumulative projects in the cumulative RSA, would result in a significant cumulative impact to localized $PM_{2.5}$ and PM_{10} concentrations. The Preferred Alternative's contribution to this significant cumulative impact would be cumulatively considerable because of new or worsened violations of the ambient air quality standards even after all feasible mitigation. No further mitigation is available to address this cumulative impact other than the measures incorporated into the Preferred Alternative as identified in Section 4.2 of this document. Therefore, the incremental effect of construction of the Preferred Alternative would be cumulatively considerable for localized $PM_{2.5}$ and PM_{10} emissions, and significant and unavoidable.

The combined effects of the electrified passenger rail service, displacement of vehicle miles traveled (VMT) and air travel, and motor vehicle and stationary source turnover represent the new emissions paradigm to which receptors would be exposed. Although there are areas of the RSA with greater existing health risks, the addition of HSR service would achieve health risk reductions in the RSA, constituting a localized air quality benefit. Nevertheless, combined total cumulative cancer risks and noncancer impacts on sensitive receptors near the project footprint would exceed the BAAQMD's thresholds, resulting in a significant cumulative impact. The project's contribution to this cumulative impact during construction would be cumulatively considerable. Although no feasible mitigation measures are known at this time, the Authority will coordinate with BAAQMD to identify if there are feasible additional measures consistent with the HSR project that may lower some of the cumulative health risks in areas with existing cumulative health risks above cumulative thresholds and where the HSR project would contribute in a limited way to those risks. This may result in lowering of some of the cumulative health risks identified, but the feasibility and effectiveness of any such measures are unknown at this time and not presumed for the purposes of CEQA determinations. Therefore, the incremental effect of operations for the Preferred Alternative would be cumulatively considerable for total cumulative cancer risks and noncancer impacts on sensitive receptors, and significant and unavoidable.

Past, present, and future projects cumulatively contribute to nonattainment of the NAAQS and CAAQS in the SFBAAB. Emission reductions achieved during HSR project operations, however, would help improve regional air quality and cumulative air quality conditions, resulting in a beneficial effect. Accordingly, CEQA does not require mitigation.

Project operations, in combination with cumulative projects in the cumulative RSA, would result in a local significant cumulative impact with respect to local $PM_{2.5}$ because local concentrations at sensitive receptors near operation of freight trains on shifted track would exceed the BAAQMD's threshold. The project's contribution to this significant cumulative impact would not be cumulatively considerable because the $PM_{2.5}$ concentrations with the project would be less than under existing conditions. Accordingly, the freight track shifts would not contribute any additional risk to the existing significant impact. Similarly, the project would not contribute to a new long-term cumulatively considerable impact as health risks from the HSR stations and the LMF, in combination with planned projects in the cumulative RSA, would not exceed the BAAQMD's health risk thresholds. Therefore, CEQA does not require mitigation.

Project construction and operations, in combination with planned projects in the cumulative RSA, would result in a local significant cumulative health impact because local risks and $PM_{2.5}$ concentrations at sensitive receptors would exceed the BAAQMD's thresholds. The project's contribution to this significant cumulative impact would be cumulatively considerable. Although no feasible mitigation measures are known at this time, the Authority will coordinate with BAAQMD to identify if there are feasible additional measures consistent with the HSR project that may lower some of the cumulative health risks in areas with existing cumulative health risks above cumulative thresholds and where the HSR project would contribute in a limited way to those risks. This may result in lowering of some of the cumulative health risks identified, but the feasibility and effectiveness of any such measures are unknown at this time and not presumed for the purposes of CEQA determinations. Therefore, the incremental effect of the Preferred Alternative would be cumulatively considerable for health risks of $PM_{2.5}$ concentrations, and significant and unavoidable.

Past, present, and future projects cumulatively contribute to GHG impacts. Although construction of the Preferred Alternative would result in a temporary increase in GHG emissions, project operations would decrease overall GHG emissions by reducing vehicle and aircraft trips, offsetting the increase in GHG emissions associated with project construction within a few months of operation, and resulting in substantial GHG emissions reductions over the lifetime of the HSR project. Operational GHG impacts would be beneficial because the project would result in a statewide and regional reduction of GHG emissions. Therefore, CEQA does not require mitigation.

The Authority finds that construction air quality mitigation measures have been incorporated into the Preferred Alternative (Section 4.2) and that these mitigation measures reduce the Preferred Alternative's construction emissions to a less-than-cumulatively-considerable level except for localized $PM_{2.5}$ and PM_{10}. The Authority further finds that the CEQA impacts for total cumulative cancer risks and noncancer impacts on sensitive receptors, and health risks of $PM_{2.5}$ concentrations, remain cumulatively considerable. The Authority finds that there are no other feasible mitigation measures or alternatives that will reduce these impacts to a less-than-cumulatively-considerable level. To the extent that these cumulatively considerable adverse impacts remain significant and unavoidable, the Authority finds that specific economic, social, and other considerations identified in the Statement of Overriding Considerations (Chapter 8) support certification of the Final EIR/EIS and approval of the project.

5.3 Noise and Vibration

Operation of the Preferred Alternative would result in significant cumulative noise impacts under CEQA because noise-sensitive receptors would experience noise levels above existing ambient levels and in exceedance of FRA criteria for severe noise impacts. The Preferred Alternative's contribution to the cumulative impact would be considerable because it would cause the largest change in the baseline ambient noise conditions of the cumulative projects. The Authority will implement mitigation measures (NV-MM#3, NV-MM#5, NV-MM#6, and NV-MM#7; Section 4.3, Noise and Vibration (Section 3.4 of the Final EIR/EIS)) to minimize operations noise impacts. While these mitigation measures will be effective at reducing the number of severe noise impacts in the cumulative RSA, they will not mitigate all cumulative noise impacts. Therefore, the

incremental effect of operations for the Preferred Alternative would be cumulatively considerable for noise impacts, and remain significant and unavoidable.

Operations of the Preferred Alternative, combined with other cumulative projects, would result in a significant cumulative noise impact associated with traffic-related noise increases. The Preferred Alternative would result in increases in traffic-related noise at two roadway segments near the 4th and King Street Station (2029), increasing ambient noise above existing levels by more than 3 dB. The Authority will implement mitigation measures to minimize impacts from traffic noise increases (NV-MM#3 and NV-MM#7; Section 4.3). These mitigation measures will reduce but not eliminate traffic-related cumulative noise impacts. Therefore, the incremental effect of operations for the Preferred Alternative would be cumulatively considerable for noise impacts from traffic-related noise, and remain significant and unavoidable.

During operations, the Preferred Alternative in combination with other cumulative projects would generate a significant cumulative vibration impact under CEQA because vibration levels would exceed acceptable FRA criteria at multiple receptors. The contribution of the project to this cumulative impact would be considerable because it would be the primary contributor to the increases in ground-borne vibration along the corridor. The Authority will implement NV-MM#8 (Section 4.3) to reduce vibration impacts from operations. There are various options to reduce train vibration, though it may not be possible in all instances to mitigate all vibration impacts because it may not be cost effective or acoustically feasible. The specific design and implementation of this mitigation measure would be identified during final design. There is no additional feasible mitigation. Therefore, the incremental effect of operations for the Preferred Alternative would be cumulatively considerable for operational vibration impacts, and significant and unavoidable.

The Authority finds that there are no other feasible mitigation measures that will reduce these impacts to operational noise and operational vibration to a less-than-cumulatively-considerable level. To the extent that these cumulatively considerable adverse impacts remain significant and unavoidable, the Authority finds that specific economic, social, and other considerations identified in the Statement of Overriding Considerations (Chapter 8) support certification of the Final EIR/EIS and approval of the project.

5.4 Biological and Aquatic Resources

5.4.1 Special-Status Plant and Wildlife Species

Construction and operation of the Preferred Alternative, in combination with cumulative projects, would result in a significant cumulative impact under CEQA with respect to special-status plant and wildlife species because it would contribute to ongoing habitat loss caused by development. The permanent conversion of existing land uses to residential, commercial, agricultural, and transportation uses would result in cumulative impacts on special-status species.

The project's contribution to the significant cumulative impact would not be considerable, however, because extensive mitigation measures, such as species-specific avoidance, minimization, and compensatory mitigation measures (Section 4.4, Biological and Aquatic Resources (Section 3.7 of the Final EIR/EIS)), will reduce the project's contribution to this impact. These measures will offset impacts on special-status species such that the project would not result in a cumulatively considerable contribution to impacts on special-status species.

The Authority therefore finds that mitigation measures have been incorporated in the Preferred Alternative that will reduce the Preferred Alternative's cumulatively considerable construction impact on special-status plant and wildlife species to less than cumulatively considerable.

5.4.2 Non-Special-Status Wildlife

Construction and operation of the Preferred Alternative, in combination with cumulative projects, would result in a significant cumulative impact under CEQA with respect to non-special-status wildlife because their construction would convert or degrade habitat for some species and encourage the expansion of generalist species that have adapted to and thrive in human-

dominated landscapes, often at the expense of other native species. However, the Preferred Alternative's contribution to the significant cumulative impact would not be considerable because these impacts would be minimal compared to the total amount of remaining habitat for native wildlife in the cumulative RSA and would be confined to an area that is dominated by urban development and exposed to ongoing human disturbance. Most non-special-status wildlife species affected by the project alternatives are common and highly adapted to the urban environment. Because the Preferred Alternative would not make a considerable contribution, CEQA does not require mitigation.

5.4.3 Special-Status Plant Communities

Construction and operation of the Preferred Alternative, in combination with cumulative projects, would result in a significant cumulative impact under CEQA with respect to special-status plant communities because they would have a substantial adverse effect, both directly (i.e., causing mortality of individual animals) and through habitat modifications (i.e., conversion or degradation of habitat), on such species. The Preferred Alternative's contribution to this impact would not be considerable, however, because of the low number and limited extent of communities and the small amount affected and because of the offsetting effects associated with adherence to required mitigation measures, including but not limited to BIO-MM#6 and BIO-MM#7 (Section 4.4). These mitigation measures will minimize direct and indirect impacts on habitat for special-status plants and provide for the avoidance or salvage and relocation of special-status plant occurrences in the project footprint. These measures will be effective in minimizing the project's impacts associated with habitat conversion on special-status plants and reducing the project's contribution to this impact.

The Authority therefore finds that mitigation measures have been incorporated in the Preferred Alternative that will reduce the Preferred Alternative's cumulatively considerable construction impact on special-status plant communities to less than cumulatively considerable.

5.4.4 Aquatic Resources

Construction and operation of the Preferred Alternative in combination with other cumulative projects would result in a significant cumulative impact on aquatic resources under CEQA because the cumulative projects would contribute to loss and degradation of wetlands, such as federally protected wetlands as defined by Section 404 of the CWA, throughout the cumulative RSA. The Preferred Alternative's contribution to the significant cumulative impact would not be considerable, however, because of the low habitat quality and limited extent of affected wetlands, as well as the project-level mitigation. Mitigation measures such as BIO-MM#35 and BIO-MM#37 (Section 4.4) will compensate for permanent and temporary impacts by providing for on- or off-site creation, restoration, enhancement, or preservation of "in kind" wetlands or nonwetland waters that provide the same functions and values as those impacted by construction. These mitigation measures will be effective in minimizing the project's impacts associated with conversion or degradation of jurisdictional aquatic resources, and compensate for permanent impacts on aquatic resources. With these mitigation measures, the contribution of the Preferred Alternative to cumulative impacts on aquatic resources will be reduced and not be cumulatively considerable.

The Authority therefore finds that mitigation measures have been incorporated in the Preferred Alternative that will reduce the Preferred Alternative's cumulatively considerable construction impact on aquatic resources to less than cumulatively considerable.

5.4.5 Protected Trees

Construction and operation of the Preferred Alternative in combination with other cumulative projects would result in a significant cumulative impact on protected trees under CEQA because they would conflict with local tree preservation policies or ordinances throughout the cumulative RSA, specifically if construction activities require the removal or trimming of trees protected under local tree protection ordinances. Although the project would result in the removal or trimming of protected trees, the number of such trees is expected to be small because many within the

Caltrain right-of-way will be removed during construction of the Peninsula Corridor Electrification Project (PCEP). Additionally, the Authority will implement BIO-MM#39 (Section 4.4), which requires the project biologist to conduct surveys in the work area to identify protected trees and requires compensatory mitigation for removal of protected trees based on requirements set out in applicable local government ordinances, policies, and regulations. This measure is expected to avoid or compensate for direct impacts on protected trees. With this mitigation, the Preferred Alternative's contribution to the significant cumulative impact would be reduced and not be cumulatively considerable.

The Authority therefore finds that a mitigation measure has been incorporated in the Preferred Alternative that will reduce the Preferred Alternative's impact on protected trees resources to less than cumulatively considerable.

5.4.6 Wildlife Corridors

Construction and operation of the Preferred Alternative in combination with other cumulative projects would result in a significant cumulative impact on wildlife corridors under CEQA because they would interfere substantially with the movement of native wildlife and with established native resident and migratory wildlife corridors. The Preferred Alternative's contribution to the significant cumulative impact would not be considerable, however, because it would not affect any established wildlife corridors and construction impacts on resident wildlife movement across the blended Caltrain/HSR right-of-way would be short-term and temporary. Because the Preferred Alternative would not make a considerable contribution, CEQA does not require mitigation.

5.4.7 Conservation Areas

Construction and operation of the Preferred Alternative in combination with other cumulative projects would result in a significant cumulative impact on habitat conservation plans under CEQA because they would conflict with the provisions of an adopted habitat conservation plan and natural community conservation plan (SCVHP) and local habitat conservation plan (Coyote Valley Landscape Linkages Report). The project would not contribute to the significant cumulative impact, however, because there are no conservation areas that overlap with the project footprint and the portion of the project footprint that overlaps with the SCVHP (County of Santa Clara et al. 2012) and Santa Clara Valley Greenprint (Santa Clara Valley Open Space Authority 2014) would not conflict with any provisions of these plans. Because the Preferred Alternative would not make a considerable contribution, CEQA does not require mitigation.

5.5 Geology, Soils, Seismicity, and Paleontological Resources

The Preferred Alternative, in combination with other cumulative projects, would result in a significant cumulative impact under CEQA with respect to paleontological resources because these actions would have the potential to disturb, damage, or destroy scientifically important fossil resources throughout the cumulative RSA. The Preferred Alternative's contribution to this cumulative impact would not be cumulatively considerable because the project incorporates requirements for monitoring, discovery procedures, and halting construction when resources are found, which would prevent project-related destruction of unique paleontological resources or sites. Because the Preferred Alternative would not make a considerable contribution, CEQA does not require mitigation.

5.6 Safety and Security

The Preferred Alternative, in combination with cumulative projects, would result in a significant cumulative impact under CEQA with respect to emergency response because of permanent delays in emergency vehicle access and response times during project operations. During operations, the Preferred Alternative's contribution to this cumulative impact would be cumulatively considerable because the project would be a substantial contributor toward the degraded intersection operations that would result in increased emergency response times. Although mitigation measures (SS-MM#3, TR-MM#2; Section 4.7, Safety and Security (Section 3.11 of the Final EIR/EIS)) will address some of the intersection delays contributing to increase emergency vehicle response times, increases in emergency response times would continue to

affect emergency responders during construction and in Burlingame, Redwood City, Menlo Park, Palo Alto, and Mountain View during operation. Through an additional mitigation measure (SS-MM#4; Section 4.7), the Authority will provide a fair-share payment towards additional emergency-related improvements in each of these communities. If each community ultimately opts to construct such improvements, the contribution of the Preferred Alternative to this significant cumulative impact would not be considerable. If communities do not opt to construct such improvements, the Authority will implement certain site-specific traffic mitigation measures included in TR-MM#1 (Section 4.7) for intersections at locations of project-related delays to emergency vehicle response delays due to increased gate-down time at certain at-grade crossings. If the mitigation proposed is not adequately implemented, the Preferred Alternative in combination with other cumulative projects would result in cumulatively significant delays to emergency response times. Therefore, the incremental effect of the Preferred Alternative would be cumulatively considerable for emergency response times, and remain significant and unavoidable.

The Authority finds that there are no other feasible mitigation measures that will reduce this impact to emergency response times to a less-than-cumulatively-considerable level. To the extent that this cumulatively considerable adverse impact remains significant and unavoidable, the Authority finds that specific economic, social, and other considerations identified in the Statement of Overriding Considerations (Chapter 8) support certification of the Final EIR/EIS and approval of the project.

5.7 Aesthetics and Visual Quality

The construction of new permanent project infrastructure, combined with other planned development in the cumulative RSA, would result in permanent significant cumulative aesthetic impacts under CEQA where the visual quality and setting would be degraded by construction that contrasts in scale with existing development and where highly sensitive residential viewers are present. While aesthetic guidelines (AVQ-IAMF#1) and an aesthetic review process to integrate the HSR infrastructure in the surrounding landscape and local context (AVQ-IAMF#2) will be incorporated into the project, the project would still change the existing visual character. However, while project construction activities would be limited to areas on or adjacent to the existing rail line, planned developments would be built in scattered locations, with greater exposure to highly sensitive residential viewers than project construction activities. Construction of the Preferred Alternative would not contribute considerably to these permanent cumulative impacts on aesthetics and visual quality. Therefore, under CEQA, no mitigation is required.

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6 FEASIBILITY OF POTENTIAL ALTERNATIVES

CEQA requires the lead agency—the Authority—to consider a reasonable range of potentially feasible alternatives to the proposed project (Cal. Public Res. Code §§ 21002 and 21081; see also CEQA Guidelines § 15126.6). *Feasible* means capable of being accomplished in a successful manner within a reasonable time, taking into account economic, environmental, legal, social, and technological factors (CEQA Guidelines § 15364). The range of alternatives to be considered is governed by a "rule of reason" that requires the EIR to set forth only those alternatives necessary to permit a reasoned choice. The alternatives must be limited to ones that would feasibly attain most or all of the basic objectives of the project (CEQA Guidelines § 15126.6(f)) while avoiding or substantially lessening any of the significant effects of the project. An EIR need not study in detail an alternative that a lead agency "has reasonably determined cannot achieve the project's underlying fundamental purpose" (*In re Bay-Delta Programmatic Environmental Impact Report Coordinated Proceedings* (2008) 43 Cal.4th 1143, 1165).

Prior to moving forward with a project for which significant impacts on the environment are identified, CEQA requires that the lead agency find that "specific economic, legal, social, technological, or other considerations, including considerations for the provision of employment opportunities for highly trained workers, make infeasible the project alternatives identified in the environmental impact report" (Cal. Public Res. Code § 21081). The determination of infeasibility "involves a balancing of various 'economic, environmental, social, and technological factors'" (*City of Del Mar v. City of San Diego* [1982] 133 Cal.App.3d 401, 417). Where there are competing and conflicting interests to be resolved, the determination of infeasibility "is not a case of straightforward questions of legal or economic feasibility," but rather, based on policy considerations (*California Native Plant Society v. City of Santa Cruz* [2009] 177 Cal.App.4th 957, 1001-02). "[A]n alternative that is 'impractical or undesirable from a policy standpoint' may be rejected as infeasible" (Id. at p. 1002 citing 2 Kostka & Zischke, Practice under CEQA (Cont.Ed.Bar 2010) Section 17.29, p. 824).

The key policy considerations that must be balanced in determining the feasibility of the project alternatives include the following:

- The Authority's statutory responsibility, which is to:
  - "[D]irect the development and implementation of intercity high-speed rail service that is fully integrated with the state's existing intercity rail and bus network, consisting of interlinked conventional and high-speed rail lines and associated feeder buses. The intercity network in turn shall be fully coordinated and connected with commuter rail lines and urban rail transit lines developed by local agencies, as well as other transit services, through the use of common station facilities whenever possible (Public Utilities Code § 185030)."
- The purpose of the statewide HSR system, which is to provide reliable high-speed electrified train system that links the major metropolitan areas of the state, and that 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.
- The purpose of the San Francisco to San Jose Project Section, which is 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 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

- The Authority's objectives, which are to:
  - Provide intercity travel capacity to supplement critically overused interstate highways and commercial airports
  - Meet future intercity travel demand that will be unmet by current transportation systems, and increase capacity for intercity mobility
  - Maximize intermodal transportation opportunities by locating stations to connect with local transit, airports, and highways
  - Improve the intercity travel experience for Californians by providing comfortable, safe, frequent, and reliable high-speed travel
  - Provide a sustainable reduction in travel time between major urban centers
  - Increase the efficiency of the intercity transportation system
  - Maximize the use of existing transportation corridors and rights-of-way, to the extent feasible
  - Develop a practical and economically viable transportation system that can be implemented and generate revenues in excess of O&M costs
  - Provide intercity travel in a manner sensitive to and protective of the region's natural and agricultural resources and reduce emissions and VMT for intercity trips

- The characteristics enumerated in Streets and Highways Code Section 2704.09 for the statewide HSR system as a whole, which include electric trains that can operate at high speeds, specified non-stop service travel times between certain cities, and following existing transportation and utility corridors to the extent feasible, as determined by the Authority, to reduce the potential for environmental impacts

- The ability of an alternative to comply with federal CWA Section 404 by qualifying as the least environmentally damaging practicable alternative (LEDPA) in terms of adverse effects on waters of the U.S. and jurisdictional wetlands (CWA § 404(b)(1)). Alternatives other than the LEDPA would not receive the federal Section 404 permit that is necessary for construction. In June 2020, the U.S. Army Corps of Engineers and USEPA provided letters concurring that the Authority's Preferred Alternative is the preliminary LEDPA for purposes of Section 404 compliance.

6.1 Alternatives Studied in the Final EIR/EIS and Not Selected for Approval

The Draft EIR/EIS and Revised/Supplemental Draft EIR/EIS evaluated the No Project Alternative and Alternatives A and B, and two design variants—the Millbrae Station Reduced Site Plan Design Variant (RSP Design Variant) and the Diridon Design Variant. The Diridon Design Variant was approved by the Authority Board of Directors as part of the San Jose to Merced Project Section in April 2022. Alternative B and the RSP Design Variant were not selected for inclusion in the Authority's Preferred Alternative and are discussed below. The alternatives and design variants are described in detail in Chapter 2 of the Final EIR/EIS.

Figure 2-1 in the Final EIR/EIS shows the two alternatives carried forward for analysis in the Draft EIR/EIS and Final EIR/EIS.

6.1.1 No Project Alternative—Planned Improvements

The No Project Alternative would result in no construction or operation of the HSR system between San Francisco and San Jose; rather, it considers current plans for land use and transportation in the vicinity of the Project Section, including planned improvements to the highway, aviation, conventional passenger rail, freight rail, and port systems through the 2040 planning horizon. Under the No Project Alternative, the Caltrain PCEP would be built, and the DTX project would extend existing Caltrain commuter service to the STC.

The No Project Alternative is contrary to the Authority's 2005 programmatic decision to choose the HSR system to meet the state's transportation demands instead of expanding airports or freeways or doing nothing. The No Project Alternative would not meet any of the project objectives, would not meet the project's underlying fundamental purpose, and would not allow the Authority to comply with its statutory mandate to "prepare a plan for the construction and operation of a high-speed train network for the state" (Public Utilities Code § 185032) and of Prop 1A (Streets and Highways Code § 2704 et seq.) to develop an HSR project. The Authority therefore finds the No Project Alternative is infeasible and rejects it on that basis.

6.1.2 Selection of the Preferred Alternative over Other Final EIR/EIS Alternatives

The Authority identified the Preferred Alternative by considering environmental, economic, technical, and other factors, and balancing the adverse and beneficial impacts of the project on the human and natural environment. Taking this approach means that no single issue was a decisive factor in identifying the Preferred Alternative in any given geographic area.

The Authority identified Alternative A as the Preferred Alternative for the following reasons:

- Alternative A would have fewer impacts on communities because it would result in fewer displacements and 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.
- 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.
- Alternative A is also the lower cost alternative and is in better alignment with the Caltrain Business Plan (Caltrain 2040 Service Vision).

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

6.1.2.1 Alternative B

Although Alternative B would have some operational benefits (e.g., shorter HSR average operational service times, faster recovery from perturbations) and fewer operation noise impacts, Alternative B was rejected as the Preferred Alternative because:

- Alternative B would result in a substantially greater number of residential and business displacements.
- Construction of Alternative B would build the West Brisbane LMF in an area designated for both planned development (residential permitted)—where up to 2,200 residential units are permitted—and planned development (residential prohibited).
- Construction of Alternative B would require 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). This would eliminate potentially suitable breeding and rearing habitat for three federally listed butterfly species—Bay checkerspot butterfly, callippe silverspot butterfly, and Mission blue butterfly.
- Alternative B would have greater impacts on jurisdictional aquatic resources.
- Construction of the passing track would require more road closures and generate more construction-related vehicle traffic, resulting in greater temporary congestion/delay on roadways affecting vehicles, emergency response times, and bus transit.

- Construction of the passing track would result in greater disruption to passenger rail and freight rail operations.

6.1.2.2 Millbrae Station Reduced Site Plan Design Variant

The Authority developed the RSP Design Variant as a potentially feasible alternative design for the Millbrae Station to address stakeholder concerns by analyzing a smaller, potentially feasible footprint for the Millbrae Station. 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 design of the Millbrae Station evaluated in the Draft EIR/EIS (Millbrae Station Design) and selected by the Authority as the Preferred Alternative by:

- Eliminating surface parking lots on the west side of the alignment that would have served as replacement parking for displaced Caltrain and BART parking spaces
- Relocating the new HSR station entrance hall
- Eliminating lane modifications to El Camino Real
- Eliminating the California Drive extension north of Linden Avenue to El Camino Real from the project

The RSP Design Variant was evaluated in a Revised/Supplemental Draft EIR/EIS, released for public review in July 2021. Subsequently, the analysis of the RSP Design Variant was incorporated into Section 3.20, Millbrae Station Reduced Site Plan Design Variant, of the Final EIR/EIS.

The RSP Design Variant is not included as the preferred design for the Millbrae Station (as part of the Preferred Alternative) because it does not avoid adverse impacts on planned development at the Millbrae Station, the City of Millbrae did not support either the RSP Design Variant or the Millbrae Station Design, and the Millbrae Station Design has substantial operational benefits over the RSP Design Variant in that multimodal and pedestrian access to and within the station are more efficient and effective:

- 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 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.

In addition, the RSP Design Variant does not offer substantial environmental benefits compared to the Millbrae Station Design evaluated as part of the Preferred Alternative in the Draft EIR/EIS. 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 of the Final EIR/EIS includes a comparison of impacts for the Millbrae Station Design and RSP Design Variant.

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

6.1.2.3 Findings on Final EIR/EIS Alternatives Not Adopted

The selection of the Preferred Alternative reflects a careful balance by the Authority among the factors summarized above as discussed in Chapter 8 of the Final EIR/EIS. The Authority finds Alternative B does not offer a substantial environmental advantage or operational benefits over the Preferred Alternative. The Authority further finds that the specific economic, social, technological and other considerations discussed in Chapter 8 of the Final EIR/EIS and summarized above make Alternative B infeasible. The Authority further finds that the RSP Design Variant is infeasible because it has operational disadvantages compared to the Millbrae Station Design in terms of multimodal and pedestrian access to and within the station, does not avoid conflicts with planned development at the Millbrae Station, and does not offer substantial environmental benefits compared to the Millbrae Station Design.

6.2 Alternatives Suggested in Comments

Comments on the Draft EIR/EIS suggested additional alternatives that commenters believed merited consideration and analysis in the EIR/EIS. These include the following proposals:

- **Millbrae Station**—Commenters suggested alternatives to the proposed Millbrae Station, such as:
  - **Undergrounding some or all of the HSR station and tracks**—The Authority does not consider an underground station option through Millbrae to be a potentially feasible alternative because construction of below-grade station improvements would severely interrupt Caltrain service through the station area, would result in greater disruption of utilities, would have substantially greater capital costs, and would not avoid effects on planned development west of the Millbrae Station.
  - **Removing BART's third track and realigning other tracks at the Millbrae Station to reduce the project footprint**—The Authority does not consider removal of BART's third track and realignment of other tracks a potentially feasible alternative because BART has confirmed that all three BART tracks are integral to the safe and efficient operations of the entire BART system.
  - **Refinement of the project design to avoid conflicts with the Millbrae Station Area Specific Plan (MSASP) development**—In response to comments received on the Draft EIR/EIS, the Authority introduced and evaluated impacts of the RSP Design Variant in a Revised/Supplemental Draft EIR/EIS. The RSP Design Variant reflects the smallest possible footprint for the Millbrae Station given engineering and operational requirements and would reduce but not avoid conflicts with the MSASP. No HSR station configuration through Millbrae, even one operating underground, would fully avoid conflict with the MSASP and the Millbrae Serra Station Development. Vertical circulation elements (elevators, escalators/stairs) of an underground station would still require an aboveground footprint that would project into the area designated for the Millbrae Serra Station Development.
  - **Omitting replacement parking or eliminating surface parking at the station**—The Authority determined the use of underground or multilevel parking garages not to be a potentially feasible alternative given their greater cost and construction impacts. The Authority analyzed a variant (the RSP Design Variant) that did eliminate replacement parking and the Authority determined that it was not feasible for the reasons identified in other sections of this document and the Final EIR/EIS.
  - **Eliminating or moving the additional HSR tracks through the Millbrae Station**—Eliminating the additional HSR tracks through the Millbrae Station by sharing tracks with Caltrain is not consistent with the Prop 1A requirement for HSR trains to have the capability to transition through or bypass the station at mainline speeds, which could

affect the reliability of train operations. Sharing tracks with Caltrain would also reduce the resiliency of the system, as dedicated infrastructure provides additional contingencies for both operators in case of emergencies. Moving the HSR bypass track and platform to a location south of the Millbrae Avenue overpass was not found to be feasible due to existing curve constraints south of the station and HSR platform design criteria. Additionally, a track configuration with split platforms would be detrimental to the functionality of the Millbrae Station as an intermodal station. Locating the HSR platform at a substantial distance from BART/Caltrain platforms would also discourage transfers between modes. Based in part on the above reasons, these alternatives were determined to not be feasible.

  - **Undergrounding BART tracks and co-locating HSR tracks above the BART track**—The Authority does not find undergrounding the existing BART tracks and station a potentially feasible alternative based in part on conflicts with BART operations during construction, conflicts with existing underground utilities, the substantial increased costs of constructing a trench/tunnel structure, and the reduced functionality of the Millbrae Station as an intermodal station.

- **LMF**—Commenters suggested alternatives to the Brisbane LMF options, including some sites previously evaluated by the Authority and several sites that were not previously considered by the Authority. These sites were determined to be infeasible, as detailed in Section 17.3.3.4, Light Maintenance Facility Alternatives Suggested by Commenters, of the Final EIR/EIS. Some of those detailed reasons are summarized below:

  - **Bayview Industrial District**—Commenters suggested that the Authority consider a potential LMF site in the Bayview Industrial District in San Francisco. An LMF at the Bayview Industrial District would result in major impacts on aquatic resources (approximately 5 acres) and street circulation elements (Cesar Chavez Street and I-280) in San Francisco. Impacts on the I-280 freeway and associated ramps would likely be unacceptable to Caltrans. For these reasons, the Authority does not consider the Bayview Industrial District a potentially feasible site for the LMF.
  - **Coyote Valley**—Commenters suggested that the Authority evaluate LMF sites south of San Jose, including at a location in the Coyote Valley. A Coyote Valley LMF would be approximately 65 miles from the San Francisco terminal station, which would increase costs and reduce operational reliability associated with increasing the number of miles a non-revenue-generating train would travel. In addition, a Coyote Valley LMF alternative would have greater environmental impacts on habitat for common, threatened, and endangered species than the Brisbane LMF. Therefore, a Coyote Valley LMF is not considered a potentially feasible alternative.
  - **Gilroy**—Commenters suggested that the Authority evaluate LMF sites south of San Jose, including at a location near Gilroy. A Gilroy LMF would be approximately 80 miles from the San Francisco termination station, which would increase costs and reduce operational reliability associated with increasing the number of miles a non-revenue-generating train would travel. The operation costs and inefficiencies would be worse than the Coyote Valley LMF alternative. Furthermore, a Gilroy LMF alternative would have greater environmental impacts, including impacts to habitat for common, threatened, and endangered species, greater hydrology and water quality impacts, and greater impacts related to operational noise than a Brisbane LMF alternative. Therefore, a Gilroy LMF is not considered a potentially feasible alternative.
  - **Two Northern California LMFs**—Comments asserted that the maximum maintenance level at the Brisbane LMF could be lowered to Level I if a Level III LMF were constructed between San Jose and Gilroy. The concept of two separate LMFs, one in Brisbane and one in Gilroy was not considered a potentially feasible alternative because it would require a much larger total footprint than a single LMF providing Level I, II, and III maintenance, resulting in additional construction environmental effects, additional operational costs and staffing, and additional permanent environmental effects.

- **Caltrain 2040 Service Vision**—Commenters suggested that the Authority should include infrastructure to accommodate the Caltrain 2040 Service Vision Plan which includes substantial increases in Caltrain service above the 6 Caltrain trains per peak hour per direction included in blended service planning between the Authority, Caltrain and other transportation planning agencies. The Caltrain Service Vision is beyond the purpose and need of the San Francisco to San Jose Project Section. The Preferred Alternative would not preclude the future corridor improvements envisioned by Caltrain. Thus, the additional infrastructure to support the Caltrain 2040 Service Vision is not part of the HSR project. The Authority has collaborated with Caltrain during development of the vision and will continue to collaborate in rail planning going forward.

If an EIR contains a reasonable range of alternatives, it is not deficient for excluding analysis of other potential alternatives suggested in comments by members of the public or agencies. The Authority finds that the Final EIR/EIS included a reasonable range of alternatives and that the range of alternatives was sufficient to permit a reasoned choice. The Authority therefore finds that no further alternatives were required to be evaluated in the Final EIR/EIS beyond those presented in the Draft EIR/EIS and the Final EIR/EIS.

As summarized above, the Authority further finds that the alternatives suggested in comments are not environmentally superior, do not adequately meet the project purpose/objectives, and/or are infeasible. Detailed information supporting these findings is provided in Standard Response FJ-Response-ALT-2: Millbrae Station Alternatives Considerations and Standard Response FJ-Response-ALT-3: Light Maintenance Facility Alternatives in Final EIR/EIS Volume 4, Responses to Comments on the Draft EIR/EIS and Revised/Supplemental Draft EIR/EIS, Chapter 17, Standard Responses.

6.3 Alternatives Previously Considered and Not Carried Forward for Study in the Draft EIR/EIS

The Authority undertook an extensive screening process for alternatives to study in the Draft EIR/EIS. The many potential alternatives considered but eliminated from detailed study are discussed in Section 2.5, Alternatives Considered during Alternatives Screening Process, of the Final EIR/EIS, Volume 2, Appendix 2-K, Light Maintenance Facility Site Selection Evaluation, and summarized in Standard Response FJ-Response-ALT-1: Alternatives Selection and Evaluation Process and Standard Response FJ-Response-ALT-3: Light Maintenance Facility Alternatives, in Final EIR/EIS Volume 4, Chapter 17. The Authority recently updated and refined the data comparing the costs of the Brisbane LMF sites to other locations considered for evaluation and described in the LMF Site Section Memorandum, dated May 2020, included in Appendix 2-K. While the updated costs show higher costs for the Brisbane LMF sites, the East Brisbane LMF included in the Preferred Alternative remains less expensive than the other sites outside of Brisbane considered. As a part of this recent review, the Authority also evaluated the environmental factors discussed in Appendix 2-K and confirmed the conclusions remain valid.

The Authority finds that each potential alternative discussed in Chapter 2, Appendix 2-K, and the Standard Responses and not carried forward into the Final EIR/EIS for detailed study was appropriately eliminated. Such potential alternatives either failed to adequately meet the project purpose and need/project objectives, failed to offer a substantial environmental advantage to the alternatives studied in the Draft EIR/EIS, or were deemed to not be potentially feasible from a cost, technical or engineering perspective. The Authority therefore finds all such alternatives to be infeasible.

6.4 Preferred Alternative

Alternative A is comprised of a blended system[14] that minimizes community and environmental impacts, while still meeting the overall project objectives consistent with voter-approved Prop 1A. The Authority identified Alternative A as the Preferred Alternative.

As explained in Chapter 8 of the Final EIR/EIS, the Preferred Alternative is an appropriate approval choice among other alternatives considered in the Final EIR/EIS because it represents the best balance of adverse and beneficial impacts on the natural environment and community resources, and it maximizes the transportation and safety benefits of the HSR system at the lowest cost. The Preferred Alternative would result in fewer displacements and 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. The Preferred Alternative would also 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. The Preferred Alternative is also the lower-cost alternative.

Of the 148 Section 4(f) properties evaluated within the RSA for recreational and cultural resources, two historic resources (SPRR Depot/Millbrae Station and SPRR/Menlo Park Railroad Station) were determined to have *de minimis* impacts. The Final EIR/EIS concluded no constructive use of Section 4(f) resources by the Preferred Alternative. The Final EIR/EIS concluded the Preferred Alternative would not affect any Section 6(f) resources.

CEQA Guidelines Section 15126.6(e)(2) states that if the environmentally superior alternative is the No Project Alternative, then the EIR must also identify an environmentally superior alternative among the other alternatives. For the reasons described in the Final EIR/EIS, the environmentally superior alternative is not the No Project Alternative. The HSR alternatives would provide benefits, such as reducing vehicle trips on freeways and reducing regional air pollutants that would not be realized under the No Project Alternative. CEQA does not require a lead agency to select the environmentally superior alternative as its preferred alternative. Nevertheless, the Preferred Alternative is the environmentally superior alternative. The HSR system would have adverse environmental impacts regardless of which alternative is selected, but overall, the Preferred Alternative is identified as the environmentally superior alternative.

The Authority finds that the Preferred Alternative is the environmentally superior alternative overall that best meets the project purpose and need and project objectives.

6.5 Conclusion on Alternatives

In summary, the Authority finds that there are no feasible alternatives that would avoid or substantially lessen the significant adverse impacts of the Preferred Alternative that would remain after application of feasible mitigation measures, while still meeting the project's underlying purpose and project objectives. Because adverse environmental impacts remain, the Authority adopts a Statement of Overriding Considerations, as discussed in the Chapter 8.

[14] The blended system framework defines the system as a predominately two-track blended system that would remain substantially within the existing Caltrain right-of-way.

7 MITIGATION MEASURES SUGGESTED BY COMMENTERS

Some of the comments on the San Francisco to San Jose Project Section Draft EIR/EIS and Revised/Supplemental Draft EIR/EIS suggested additional mitigation measures or modifications to the measures recommended in these documents. Some comments also suggested additions to the project that are not necessarily connected to an adverse environmental impact. The mitigation measures recommended in the San Francisco to San Jose Project Section Draft EIR/EIS represent the professional judgment of subject matter experts on reasonable and feasible approaches to reduce significant adverse environmental impacts. Nevertheless, in some instances, the Authority has incorporated suggestions from comments to refine or improve mitigation in the Final EIR/EIS. This discussion explains the reasons for not incorporating certain of the mitigation measures suggested in comments. The Authority considered the following points in determining whether to include a mitigation measure suggested in comments:

- Whether the suggestion relates to a significant and unavoidable impact of the project, or instead relates to an impact that is already less than significant or can be mitigated to less-than-significant levels by proposed mitigation measures in the Draft EIR/EIS
- Whether the proposed language represents clear improvement, from an environmental standpoint, over the draft language that a commenter seeks to replace
- Whether the proposed language is sufficiently clear to be easily understood by those who will implement the mitigation as finally adopted
- Whether the language might be too inflexible to allow pragmatic implementation
- Whether the suggestions are feasible from an economic, technical, legal, policy, or other standpoint
- Whether the measure addresses an impact not caused by the HSR project
- Whether the measure addresses a social or economic impact, as opposed to an impact on the physical environment

Authority staff, with assistance from subject matter experts, have carefully considered mitigation measures proposed in comments. The following identifies suggestions for mitigation measures that the Authority has not incorporated and the rationale for not including those measures. The list below is not intended to be exhaustive. To the extent that suggestions on mitigation measures that were rejected are not identified below, the Authority finds, based on the analysis contained in the Final EIR/EIS and the record as a whole, that such suggestions are appropriately rejected for one or more of the reasons identified above.

7.1 Section 3.2, Transportation

7.1.1 Measure Addresses an Impact That Is Less Than Significant

The following mitigation measure was not adopted because the impact was identified as less than significant:

- Dedicated bicycle and pedestrian overcrossing in the North Fair Oaks area in unincorporated San Mateo County

San Mateo County suggested the Authority should install a dedicated bicycle and pedestrian overcrossing to link two parts of the North Fair Oaks community that are separated by the existing Caltrain right-of-way, as the County asserts the project would further divide the community. As described in responses to comments in Final EIR/EIS Volume 4, the project would not separate the North Fair Oaks community because it would not create a new community division or further exacerbate the existing community division. There are no at-grade crossings in the North Fair Oaks area, so the project would not affect traffic or emergency vehicle response delay in the area. As described in Final EIR/EIS Section 3.2, the project would not have significant impacts on pedestrian or bicycle access except near the 4th and King Street Station in San Francisco (for which mitigation is identified to reduce the impact to a less-than-significant level). As described in

Section 3.12, Socioeconomics and Communities, the project would have less-than-significant impacts related to disruption or division of an establish community. Consequently, this mitigation is not related to a significant impact.

The following mitigation measure was not adopted because the impact was identified as less than significant after changes in the construction sequence were included in the Final EIR/EIS:

- Temporary Road Access during Brisbane LMF Construction: The Tunnel Avenue bridge relocation (East and West Brisbane LMF) and Tunnel Avenue realignment (East Brisbane LMF only) shall be designed and constructed so as to maintain access along Tunnel Avenue from Beatty Avenue to Bayshore Boulevard as well as access along Lagoon Road between Tunnel Avenue and Sierra Point Parkway open at all times throughout construction of the Brisbane LMF.

The Final EIR/EIS reflects revisions to project plans that will eliminate the need for a temporary roadway closure. As detailed in the conceptual staging plans in the Final EIR/EIS, Tunnel Avenue will remain open in its current configuration and thus continue to provide access until the new overpass is completed. This additional mitigation is not required to address a significant impact.

7.1.2 Measures That Are Considered Infeasible from an Economic, Technical, Legal, Policy, or Other Standpoint

Grade Separations

The following mitigation measures were not adopted because they are considered infeasible due to high capital costs, road closures and traffic disruptions during construction, extensive right-of-way acquisitions, life-cycle maintenance costs, aesthetic concerns due to height of elevated structures, and space-intensive designs:

- Install grade separations at one, multiple, or all at-grade crossings between San Francisco and San Jose to address traffic or transit delays

The Authority initially considered grade-separated alternatives between San Francisco and San Jose in the 2010 Alternatives Analysis and Supplemental Alternatives Analysis for the San Francisco to San Jose Project Section. Such alternatives would require substantial areas of right-of-way acquisition outside the Caltrain right-of-way and displacement of adjacent land uses. With the passage of Senate Bill 1029, the Authority focused on blended service alternatives that are mostly within the Caltrain right-of-way and at grade.

The Final EIR/EIS analyzes the effect of increased gate-down time at the at-grade crossings with the Preferred Alternative on traffic delays at adjacent/nearby intersections under Impact TR#5 in Section 3.2. Because automobile delay is not a significant impact under CEQA, no significant impact is identified under Impact TR#5. TR-MM#1 (as revised for the Final EIR/EIS to include site-specific traffic mitigation measures) provides various standard vehicle capacity enhancements, such as signal retiming or additions, lane restriping, road/intersection widening, and turn pocket additions/increases (including right-of-way acquisitions as needed) to address NEPA effects of traffic delay. TR-MM#1 does not include grade separations as a potential mitigation option for traffic delay.

Constructing grade separations to separate a rail alignment from roads would considerably widen the project footprint and increase environmental impacts including road closures and traffic disruptions during construction, extensive right-of-way acquisitions, aesthetic concerns due to height of elevated structures, and space-intensive designs. In addition, when grade separating alignments, the infrastructure typically extends far beyond an individual roadway crossing because rail operations require that railway slope changes must be gradual. Thus, where there are at-grade roads crossing a rail alignment in close proximity to each other, any grade separation that uses a change in the railway elevation would likely require the changed elevation (whether above or below roadways) to be maintained across all the nearby at-grade crossings. In other words, it would likely not be possible to construct only one grade separation in some areas, where close proximity of at-grade crossings means that constructing one grade separation would

then require constructing multiple other grade separations. This would increase environmental impacts including displacements, construction disruption, and aesthetic effects as well as cost.

While grade separation in the form of putting the rail alignment underground via tunnel can avoid or minimize some of the effects of surficial grade separations, tunnelling approaches still require substantial disturbance areas at the entry and exit points of the tunnel and tunnelling is the most expensive form of grade separation (see discussion below of a tunnel approach in San Francisco).

Overall, grade separations are a highly expensive mitigation strategy. Using an average assumed cost of $75 million to $150 million per crossing,[15] grade separating the 39 at-grade crossings between 4th and King Street Station in San Francisco and Scott Boulevard in Santa Clara under the Preferred Alternative would cost an additional $2.925 billion to $5.850 billion. Grade separations can cost more than $150 million each depending on site-specific factors, so this could be an underestimate. For example, the City and County of San Francisco is evaluating options to eliminate the at-grade rail crossings at Mission Bay Drive and 16th Street as an extension of the DTX with the estimated cost ranging from $1.2 billion for trenched streets up to $2.1 billion for the currently preferred Pennsylvania Avenue Extension tunnel alignment (these costs are in addition to the estimated $3.9 billion for DTX itself) (San Francisco County Transportation Authority n.d.; San Francisco Planning 2018).

The Authority, as described in its Business Plans, has not secured funding for constructing the entire Phase 1 system, including the San Jose to Merced Project Section and the San Francisco to San Jose Project Section. Cost has been and will continue to be a major concern for the HSR project as a whole. Given the high costs and disruptions associated with grade separations, committing to grade separations as part of mitigation for Preferred Alternative for the San Francisco to San Jose Project Section is not feasible, as further described in the Final EIR/EIS and its Standard Responses.

However, the Authority, in cooperation with local jurisdictions, transportation funding agencies, and state and federal agencies, supports community-led grade separation efforts. The Authority will work with local jurisdictions that are pursuing grade separation projects on their own so the HSR project, to the extent possible, does not create conflicts with future grade separation efforts.

Traffic Intersection Mitigation

The following mitigation measures were not adopted because they are considered infeasible because they would be inconsistent with the Authority's policy on traffic mitigation:

- There were numerous suggestions from commenters that the Authority should include intersection mitigations at locations other than those proposed in Section 3.2 in the Final EIR/EIS.

As explained in Final EIR/EIS Section 3.2, and Appendix 3.2-C, Traffic Mitigation Measure Screening, the Authority reviewed all intersections identified with NEPA adverse effects on traffic delay. Based on that review, a series of site-specific traffic mitigation measures were identified and screened against the Authority's policy on traffic mitigation, which includes criteria concerning avoiding increases in VMT, consistency with Senate Bill 743, not being more disruptive to the

[15] This is a rough approximation of the average cost of grade separations. Cost varies by existing conditions and design. The City of San Jose, in their comments on the San Jose to Merced Draft EIR/EIS, estimated the cost of grade separating Skyway, Branham, and Chynoweth as ranging from $400 million to $1.4 billion ($133 million to $467 million per crossing). On the lower end, Caltrain completed the San Bruno Grade Separation Project in 2014, which included three crossings and cost $147 million, which is approximately $49 million per crossing (PCJPB 2015). Caltrain and the City of San Mateo completed the San Mateo 25th Avenue Grade Separation Project, which included three crossings and cost $205 million or about $68 million per crossing (Caltrain n.d.). Grade separations along busy streets in cities will be of the higher end in terms of costs, whereas locations on smaller roads with lower volumes and less intervening development will be on the low end.

community than the traffic effect itself, not resulting in unmitigable secondary environmental effects, and practicability (including technical, logistical and financial feasibility including the views of local jurisdictions). Appendix 3.2-C provides the reasons why mitigation at other intersections with adverse effects were not included.

The following mitigation measure was not adopted because the Authority is not subject to local impact fees and the EIR/EIS has analyzed potential feasible measures in accordance with Authority policy:

- The Authority should address any unmitigated traffic impacts by paying into a local transportation impact fee.

As explained in Final EIR/EIS Section 3.2 and Appendix 3.2-C, the Authority reviewed all intersections identified with NEPA adverse effects on traffic delay and identified feasible mitigation where it met the Authority's policy on traffic mitigation. The Authority as a state agency is not subject to local jurisdiction requirements. Traffic delay is not an environmental impact that requires mitigation under CEQA.

7.2 Section 3.3, Air Quality and Greenhouse Gases

7.2.1 Measure Addresses an Impact That Is Less Than Significant

The following mitigation measure was not adopted because the impact was identified as less than significant:

- The Draft EIR/EIS should be revised to include a construction GHG emissions mitigation measure that achieves the net zero target. The new mitigation measure should incorporate best management practices to reduce construction GHG emissions recommended by BAAQMD: using alternatively fueled (e.g., biodiesel, electric) construction vehicles/equipment in at least 15 percent of the fleet; using local building materials of at least 10 percent; and recycling or reusing at least 50 percent of construction waste or demolition materials.

As discussed under Impact AQ#14 in the Final EIR/EIS, construction of the Preferred Alternative would result in a less-than-significant GHG impact because emission reductions during operations from reduced auto and aircraft trips would more than offset the short-term construction-related contribution to increased GHG emissions. Accordingly, mitigation to reduce construction-generated GHG emissions is not required. The Authority's Sustainability Policy states the goal of reducing GHG emissions. This goal is not a CEQA significance threshold, has not been adopted as such by the Authority or BAAQMD, and the project is not inconsistent with the policy.

As for incorporation of BMPs to minimize GHG emissions, AQ-IAMF#3 requires construction contractors to use renewable diesel fuel in all heavy-duty off-road diesel-fueled construction equipment and on-road diesel trucks, which will minimize associated GHG emissions. Construction of the project is also subject to the Authority's Sustainability Policy, which requires recycling 100 percent of the steel and concrete from construction and demolition and diverting at least 75 percent of all other construction and demolition waste from landfills, unless local regulations specify a higher diversion rate. The Authority is also committed to sustainable and local procurement.

7.2.2 Measure That is Considered Infeasible from an Economic, Technical, Legal, Policy or Other Standpoint

The following mitigation measure was not adopted because it precludes necessary flexibility in the construction equipment that can be used by the contractor given uncertainty about the availability of construction vehicles to make up the fleet to be used for construction, and therefore is infeasible from a technical, economic, and policy standpoint:

- Commit to using only zero-emission on road and offroad trucks and construction equipment or otherwise use equipment with the best available technology offered at the time of construction.

Existing air quality IAMFs (AQ-IAMF#3 through AQ-IAMF#5) address standards for the construction equipment to be used to construct the Project Section, which will minimize exhaust emissions. Further, the Authority has identified feasible mitigation to address temporary construction impacts on localized air quality from criteria pollutants, including AQ-MM#1 and AQ-MM#2. Moreover, AQ-MM#3 and AQ-MM#4 will offset VOC, NO_X, and particulate matter emissions, as required. However, these offsets could occur regionally throughout the SFBAAB. Therefore, the emission reductions achieved by these offsets may not contribute to enough localized reductions to avoid a project-level violation of the CAAQS or exceedance of an SIL.

From a technical and economic perspective, the Authority is not positioned to require its contractor to use ZE vehicles for 100 percent of its on-road and off-road trucks and construction equipment, in constructing the Project Section. Even analyzing projections of the market for construction equipment in the year 2028, based on conservative assumptions (Chapter 2 of the Final EIR/EIS identifies the construction period as 2022–2028), the market for ZE vehicles for heavy construction and off-road equipment will not be sufficiently mature to allow for the Authority's contractor to use entirely ZE construction equipment (Authority 2022b). While there may be certain prototype equipment being developed, such prototypes are not projected to be available at the scale needed to undertake construction of this large infrastructure project.

From a policy perspective, the Authority is committed to small business participation (Authority 2018a). Requiring an inflexible commitment to ZE construction equipment would not serve the Authority's policy goals related to small business participation, as those small businesses have comparatively less capacity to convert their fleets of off-road vehicles and other construction equipment to ZE.

However, the Authority has committed to integrating ZE vehicles into construction of the Project Section through AQ-MM#1. Moreover, the Authority has committed to using renewable diesel fuel (AQ-IAMF#3) and best available technology for diesel equipment (Tier 4) through AQ-IAMF#4 and AQ-IAMF#5; Tier 4 is currently the strictest emissions standard adopted by CARB.

7.3 Section 3.4, Noise and Vibration

7.3.1 Measures That Are Considered Infeasible from an Economic, Technical, Legal, Policy, or Other Standpoint

The following mitigation measure was not adopted because it is incompatible with the requirements for the HSR project in Prop 1A.

- Operating at slower operating speeds (such as 79 mph instead of up to 110 mph) to reduce noise impacts

The purpose of the HSR project is to provide an efficient rail connection between northern and southern California, including the Central Valley. Prop 1A establishes time requirements for travel on the HSR system that the system must be capable of meeting. In addition, to meet travel demands, the HSR system is designed to achieve travel durations that are competitive with air travel and road travel; accordingly, it must be designed consistent with certain speed requirements. Slowing operational speeds down beyond that currently proposed would hinder the ability of the project to meet its purpose. Furthermore, the EIR/EIS identified feasible mitigation measures to address noise impacts, as described in Section 3.4, Noise and Vibration.

The following mitigation measure was not adopted because it would substantially lengthen the construction period, increasing costs and disruption along the corridor:

- Constructing only in daytime if other measures cannot reduce nighttime impacts to a less than significant level

As explained in response to comments (Volume 4 of the Final EIR/EIS), NV-MM#1 in Section 3.4.7, Mitigation Measures, discusses construction noise mitigation measures. NV-MM#1 requires the contractor to establish a construction noise monitoring program and implement measures to comply with FRA construction noise limits (an 8-hour equivalent sound level of 80 dBA 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. Measures for minimizing construction noise would include prohibiting certain noise-generating activities during nighttime hours, but due to the constraints of working within an active rail corridor some track realignments would require nighttime construction work that could exceed FRA construction noise limits at night.

The following mitigation measure was not adopted because it would be inconsistent with the Authority's established noise mitigation guidelines and policy:

- Elimination of cost-effectiveness criteria of $95,000 for noise mitigation

The Authority's noise mitigation guidelines are summarized in NV-MM#3 in Section 3.4 of the Final EIR/EIS. These guidelines specify that noise barriers must be considered reasonable and feasible, including achieving a minimum of 5 dB noise reduction, benefitting at least 10 receptors per barrier, be at least 800 feet long, and be cost effective, which is defined as not exceeding $95,000 per benefitted receptor. The cost-effectiveness criterion is consistent with Caltrans' criteria.

The following mitigation measure was not adopted because it is considered infeasible due to high capital costs, road closures and traffic disruptions during construction, extensive right-of-way acquisitions, life-cycle maintenance costs, aesthetic concerns due to height of elevated structures, and space-intensive designs:

- Grade separations of at-grade crossings to address noise due to sounding of horns at at-grade crossings

Overall, grade separations are a highly expensive and environmentally disruptive mitigation strategy. As noted in Section 7.1 of this document, using an average assumed cost of $75 million to $150 million per crossing, grade separating the 39 at-grade crossings between 4th and King Street Station in San Francisco and Scott Boulevard in Santa Clara could cost an additional $2.925 billion to $5.850 billion. Grade separations can cost more than $150 million each depending on site-specific factors, so this estimate may be an underestimate.

In addition to costs, constructing with grade separations to separate the rail alignment from roads would considerably widen the project's footprint and result in greater environmental impacts including road closures and traffic disruptions during construction, extensive right-of-way acquisitions, aesthetic concerns due to height of elevated structures, and space-intensive designs. In addition, when grade separating alignments, the infrastructure typically extends far beyond an individual roadway crossing because rail operations require that railway slope changes must be gradual.[16] Thus, where there are at-grade roads crossing a rail alignment in close proximity to each other, any grade separation that uses a change in the railway elevation would likely require the changed elevation (whether above or below roadways) to be maintained across all the nearby at-grade crossings. In other words, it would not be possible to construct only one grade separation in some areas, where close proximity of at-grade crossings means that constructing one grade separation would then require constructing multiple other grade separations. This can increase the construction and operational environmental impacts of a grade-separated rail alignment.

The Authority, as described in its Business Plans, has not secured funding for constructing the entire Phase 1 system, including the San Jose to Merced Project Section and the San Francisco to San Jose Project Section. Cost has been and will continue to be a major concern for the HSR project as a whole. Given the high costs and disruptions associated with grade separations, the Authority cannot commit to grade separations as part of mitigation.

[16] HSR design (Authority 2019a) for vertical curves limit the design to 0.26 percent to 0.4 percent per 100 feet (e.g., a change of 0.26 to 0.4 foot over 100 feet) at speeds of 125 mph. Allowed vertical curves for higher speeds than 125 mph are more gradual and allowed vertical curves for speeds less than 125 mph are less gradual.

However, the Authority, in cooperation with local jurisdictions, transportation funding agencies, and state and federal agencies, supports community-initiated grade separation efforts. The Authority will work with local jurisdictions that are pursuing grade separation projects on their own so the HSR project, to the extent possible, does not create conflicts with future grade separation efforts.

7.4 Section 3.11, Safety and Security

7.4.1 Measure Addresses an Impact That Is Less Than Significant

The following mitigation measure was not adopted because the impact was identified as less than significant:

- Grade separations of at-grade crossings to address at-grade crossing safety
- Automated enforcement technology
- Intrusion detection
- Closure of driveways and frontage roads

Significant safety impacts are not expected related to increased HSR train crossings through at-grade crossings after consideration of project safety improvements for HSR portions of the corridor and Caltrain existing and planned safety improvements for the Caltrain corridor. As such, no mitigation is proposed for at-grade crossing safety in the EIR/EIS.

Since the project includes the installation of four-quadrant gates, it will also include the installation of vehicle presence detection at the at-grade crossings since California Public Utilities Commission (CPUC) regulations require such detection systems whenever exit gates are used. *Intrusion detection* refers to something above and beyond the mandatory vehicle presence detection at the at-grade crossings when exit gates are used.

Regarding intrusion detection and automated enforcement technology, as explained in the Final EIR/EIS Volume 4, the blended system operations between San Francisco and Scott Boulevard in Santa Clara would be within the Caltrain corridor and the Peninsula Corridor Joint Powers Board (PCJPB) is responsible, as the host railroad, to comply with FRA and CPUC safety requirements for the corridor in consideration of the operating speed and track classifications. While the Authority will install four-quadrant gates at the at-grade crossings that comply with CPUC requirements, it would be up to Caltrain, as the host railroad and operator of the signaling system, to determine if intrusion detection would be integrated with the railroad signaling system for blended system track or whether automated enforcement technology is warranted.

Regarding closure of driveways and frontage roads, this has not been identified in the EIR/EIS as necessary to address at-grade crossing safety. This suggestion, which was made by the CPUC, will be considered by the Authority during final design in coordination with the CPUC.

7.4.2 Measures That Are Considered Infeasible from an Economic, Technical, Legal, Policy, or Other Standpoint

The following mitigation measure was not adopted because of the disadvantages of grade separation include high capital costs, road closures and traffic disruptions during construction, extensive right-of-way acquisitions, life-cycle maintenance costs, aesthetic concerns due to height of elevated structures, additional environmental impacts, and space-intensive designs:

- Grade separations of at-grade crossings to address emergency vehicle response delay impacts

The Authority has identified feasible mitigation to address emergency vehicle response delay impacts, but residual impacts may occur if some of the necessary improvements included in SS-MM#4 are not implemented by local jurisdictions. Grade separations are considered financially infeasible and have extensive environmental effects.

Overall, grade separations are a highly expensive mitigation strategy. As noted in Section 7.1, using an average assumed cost of $75 million to $150 million per crossing, grade separating the

39 at-grade crossings between 4th and King Street Station in San Francisco and Scott Boulevard in Santa Clara would cost an additional $2.925 billion to $5.850 billion. Grade separations can cost more than $150 million each depending on site-specific factors, so this estimate may be an underestimate.

The Authority, as described in its Business Plans, has not secured funding for constructing the entire Phase 1 system, including the San Jose to Merced Project Section and the San Francisco to San Jose Project Section. Cost has been and will continue to be a major concern for the HSR project as a whole. Given the high costs and disruptions associated with grade separations, the Authority cannot commit to grade separations as part of mitigation.

In addition to costs, constructing with grade separations to separate a rail alignment from roads would considerably widen the project's footprint and increase environmental impacts including road closures and traffic disruptions during construction, extensive right-of-way acquisitions, aesthetic concerns due to height of elevated structures, and space-intensive designs. In addition, when grade separating alignments, the infrastructure can extend far beyond an individual roadway crossing because rail operations require that railway slope changes must be gradual.[17] Thus, where there are at-grade roads crossing a rail alignment in close proximity to each other, any grade separation that uses a change in the railway elevation will likely require the changed elevation (whether above or below roadways) to be maintained across all the nearby at-grade crossings. In other words, it would likely not be possible to construct only one grade separation in some areas, where close proximity of at-grade crossings means that constructing one grade separation would then require constructing multiple other grade separations. This would increase the construction and operational environmental impacts of a grade-separated rail alignment.

However, the Authority, in cooperation with local jurisdictions, transportation funding agencies, and state and federal agencies, supports community-initiated grade separation efforts. The Authority will work with local jurisdictions that are pursuing grade separation projects on their own so the HSR project, to the extent possible, does not create conflicts with future grade separation efforts.

The following mitigation measure was not adopted because it is considered incompatible with the requirements for the HSR project in Prop 1A:

- Operating at slower operating speeds (such as 79 mph instead of up to 110 mph) to reduce safety impacts

The purpose of the HSR project is to provide an efficient rail connection between northern and southern California, including the Central Valley. Prop 1A establishes time requirements for travel on the HSR system that the system must be capable of meeting. In addition, to meet travel demands, the HSR system is designed to achieve travel durations that are competitive with air travel and road travel; accordingly, it must be designed consistent with certain speed requirements. Slowing operational speeds down beyond that currently proposed would hinder the ability of the project to meet its purpose. As described in Section 3.11, Safety and Security, of the Final EIR/EIS, with project designs and features, no significant impact related to safety at the at-grade crossings was identified.

[17] HSR design (Authority 2019a) for vertical curves limit the design to 0.26% to 0.4% per 100 feet (e.g., a change of 0.26 to 0.4 feet over 100 feet) at speeds of 125 mph. Allowed vertical curves for higher speeds than 125 mph are more gradual, and allowed vertical curves for speeds lower than 125 mph are less gradual.

8 STATEMENT OF OVERRIDING CONSIDERATIONS

The San Francisco to San Jose Project Section Final EIR/EIS, and the CEQA Findings of Fact conclude that the Preferred Alternative for the San Francisco to San Jose Project Section of the California HSR System would result in certain significant impacts on the environment that cannot be avoided or substantially lessened with feasible mitigation measures or feasible alternatives. This Statement of Overriding Considerations is therefore necessary to comply with CEQA, Cal. Public Res. Code Section 21081, and CEQA Guidelines Section 15093. The significant and unavoidable impacts and the benefits related to the Preferred Alternative are described below. The Authority Board has carefully weighed these impacts and benefits and finds that each of the benefits of the Preferred Alternative, independent of the other described benefits, outweighs the significant and unavoidable environmental impacts.

8.1 General Findings on Significant and Unavoidable Impacts Associated with the Preferred Alternative

Based upon the Final EIR/EIS and the CEQA Findings of Fact contained herein, as well as the evidentiary materials supporting these documents, the Authority finds that the Preferred Alternative could result in the following list of significant and unavoidable impacts on the environment:

Transportation

- Impact TR#8: Temporary Impacts on Bus Transit
- Impact TR#11: Continuous Permanent Impacts on Bus Services

Air Quality

- Impact AQ#5: Temporary Direct Impacts on Localized Air Quality in the SFAAB—Criteria Pollutants

Noise and Vibration

- Impact NV#1: Temporary Exposure of Sensitive Receptors to Construction Noise
- 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#9: Intermittent Permanent Exposure of Sensitive Receptors to Vibration from Operations

Safety and Security

- Impact S&S#6: Continuous Permanent Impacts on Emergency Access and Response Times due to Station Traffic and Increased Gate-Down Time

Station Planning, Land Use, and Development

- Impact LU#4: Permanent Alteration of Land Use Patterns from Land Use Conversion and Introduction of Incompatible Uses at Stations
- Impact LU#5: Permanent Alteration of Land Use Patterns from Land Use Conversion at the Brisbane Light Maintenance Facility

Cumulative Impacts

- Operation of the Preferred Alternative would make a cumulatively considerable contribution to cumulatively significant impacts on bus transit service performance at certain locations.

- Construction of the Preferred Alternative would make a cumulatively considerable contribution to cumulatively significant impacts for localized $PM_{2.5}$ and PM_{10} emissions after all feasible mitigation.
- Construction of the Preferred Alternative would make a cumulatively considerable contribution to cumulatively significant impacts for total cumulative cancer risks and noncancer impacts on sensitive receptors and health risks of $PM_{2.5}$ concentrations. While the Authority will coordinate with BAAQMD to identify if there are feasible additional measures consistent with the HSR project that may lower some of the cumulative health risks, the feasibility and effectiveness of any such measures are unknown at this time and not presumed for the purposes of CEQA determinations.
- Operation of the Preferred Alternative would make a cumulatively considerable contribution to cumulatively significant noise impacts and vibration impacts after all feasible mitigation.
- Operation of the Preferred Alternative would make a cumulatively considerable contribution to cumulatively significant impacts on emergency response times.

With the approval of the Preferred Alternative and the adoption of the CEQA Findings of Fact, the Authority is committing to the mitigation measures identified for the Preferred Alternative to mitigate significant impacts to a less-than-significant level to the extent feasible, and minimize and mitigate the project's contribution to cumulative impacts to the extent feasible. As set forth in detail in Chapter 4, Findings on Specific Impacts and Mitigation Measures, the Authority finds that the mitigation measures adopted with the findings are the appropriate measures to approve at this time because they apply to the Preferred Alternative.

The Authority further finds that while the mitigation measures it adopts as part of the CEQA Findings of Fact will substantially lessen or avoid many of the significant environmental impacts discussed in the Final EIR/EIS, and mitigation adopted to address one area may result in beneficial effects in other subject areas, the impacts listed above would not all be mitigated to a less-than-significant level, and remain significant and unavoidable.

The Authority finds that each of the following specific economic, legal, social, technological, environmental and other considerations and benefits of the Preferred Alternative, separately and independently, outweighs the unavoidable adverse environmental effects of the project. The Authority further finds that each is an overriding consideration independently warranting project approval. The Authority finds that the significant and unavoidable impacts of the project are overridden by each of these individual considerations, standing alone. The significant and unavoidable environmental impacts remaining after mitigation measures are considered acceptable in light of these significant benefits of the Preferred Alternative, as described in this Statement of Overriding Considerations.

8.2 Overriding Considerations for the Preferred Alternative as Part of the Phase 1 High-Speed Rail System between San Francisco and Los Angeles/Anaheim

There are numerous benefits of the Preferred Alternative when considered as an integral part of the Phase 1 HSR system between San Francisco and Los Angeles/Anaheim. These benefits, viewed both individually and collectively, outweigh the significant and unavoidable adverse effects of the Preferred Alternative. These benefits are in the areas of the environment, transportation, economics, and social considerations, and are set forth in the following subsections.

8.2.1 Environmental Benefits

As discussed in the Final EIR/EIS, the benefits of the HSR system include reduced VMT, reduced energy use for transportation, and reduced air pollution from transportation sources, including reduced emissions of GHGs (Section 3.2, Section 3.3, and Section 3.6 of the Final EIR/EIS). These benefits were derived based on the assumption in the Final EIR/EIS that the San Francisco to San Jose Project Section will be operational as part of the Phase 1 HSR system

between San Francisco and Los Angeles/Anaheim. The following summarizes the conclusions of specific benefits that were disclosed in the Final EIR/EIS.

8.2.1.1 Benefits from a Reduction in Vehicle Miles Traveled

The HSR project as a whole would divert automobile trips to HSR trips, thus reducing statewide, regional, and local VMT (Authority and FRA 2012). For 2029 at full Phase I HSR system operations (San Francisco to Anaheim), Silicon Valley to Central Valley HSR ridership is estimated to be 48.9 million annual trips with 41.5 million annual trips diverted from automobiles and 3.8 million annual trips diverted from air travel. For 2040 at full Phase I HSR system operations, Silicon Valley to Central Valley HSR ridership is estimated to be 54.1 million annual trips with 47.3 million annual trips diverted from automobiles and 4.7 million annual trips diverted from air travel (Appendix 3.2-B, Vehicle Miles Traveled Forecasting, of the Final EIR/EIS). Statewide air travel would also be decreased with mode shifting from air to HSR travel assumed by reductions in the number of statewide flights. With the implementation of Silicon Valley to Central Valley HSR service, air flights are anticipated to be reduced by 107,154 flights in 2040 with full Phase 1 HSR system in operation. The reduction in both automobile and air travel VMT would provide benefits in the form of reduced congestion on the state's highway system and at airports.

Section 3.2 of the Final EIR/EIS for the project arrives at similar conclusions regarding VMT reduction at a regional level. By 2029, the project would reduce overall VMT from 2.530 billion miles to 2.512 billion miles in San Francisco County, from 4.735 billion miles to 4.669 billion miles in San Mateo County, and from 12.185 billion miles to 12.026 billion miles in Santa Clara County. By 2040, the project would reduce overall VMT from 2.720 billion miles to 2.697 billion miles in San Francisco County, from 4.963 billion miles to 4.873 billion miles in San Mateo County, and from 13.202 billion miles to 12.972 billion miles in Santa Clara County (Authority 2022a: Impact TR#1).

8.2.1.2 Benefits from a Reduction in Air Pollution and Greenhouse Gas Emissions

The Final EIR/EIS considered the air quality emissions associated with the Preferred Alternative. As shown in Table 3.3-25 through Table 3.3-27 in the Final EIR/EIS, emission results indicate that operation of the Preferred Alternative would result in net decreases in all criteria pollutant emissions (VOC, CO, NO_X, sulfur dioxide, PM_{10}, and $PM_{2.5}$) when compared to 2015 Existing and 2029 and 2040 No Project conditions. These decreases would be beneficial to the affected air basins and help the basins meet their attainment goals, consistent with the air quality management plan set forth by the BAAQMD. Although project operations would increase criteria pollutants associated with power plants, train movement, stations, and a maintenance facility, it would result in sizeable emissions reductions from on-road vehicles and aircraft relative to the 2015 Existing and 2029 and 2040 No Project conditions. These emissions benefits would be achieved by reductions in single-occupancy vehicle trips and aircraft activity; with more people traveling on the HSR system, fewer vehicle and aircraft trips would occur. Ultimately, the criteria pollutant reductions achieved by changes in on-road vehicles and aircraft activity would more than offset the emissions increase from project operations (electricity, train movement, stations, and a maintenance facility). Long-term operations of the project and the larger HSR system would, therefore, result in a net reduction in operational emissions from the 2015 Existing and 2029 and 2040 No Project conditions (Authority 2022a: Tables 3.3-25 through 3.3-27).

Emission reductions during operations of the project from reduced auto and aircraft trips would offset the short-term construction-related contribution to increased GHG emissions. Preferred Alternative construction would generate GHG emissions. However, these emissions would be almost fully offset after 2 to 6 months of the Preferred Alternative operating as part of Phase 1 (depending on the ridership scenario). Shortly following the first year of operations, the Preferred Alternative operating as part of Phase 1 would result in annual emissions reductions and a GHG benefit as travel modes shift away from on-road vehicles and aircraft trips to HSR.

Additionally, the project is identified in CARB's Assembly Bill (AB) 32 Scoping Plan and 2017 Scoping Plan Update as a component of a sustainable transportation system, and would be consistent with the state's plan to achieve GHG emissions reductions in the long run (CARB 2008, 2018). The GHG reductions from the Preferred Alternative operating as part of the Phase 1 HSR system would be consistent with statewide goals. Long-term operation of the HSR system would reduce GHG emissions, relative to No Project conditions, resulting in a statewide and regional GHG benefit. Annual reductions would range from 1.1 million metric tons carbon dioxide equivalent (CO_2e) to 1.6 million metric tons CO_2e, depending on the ridership scenario (Authority 2022a: Impact AQ#17, Table 3.3-32).

SB 375 is one major tool being used to meet AB 32's goals. SB 375 sets priorities to help California meet GHG-reduction goals and requires that regional transportation plans prepared by metropolitan planning organizations include a sustainable communities strategy that supports the GHG emission reduction targets set by CARB. However, recent CARB (2018, 2021) analysis indicates that California is not on track to meet its climate-based mobility goals, and additional reductions in VMT are needed. That said, because of the potential for transit-oriented development and other land use planning benefits from HSR implementation in San Francisco and Millbrae, the HSR project would contribute to planned VMT and GHG reductions as a key investment strategy in the Metropolitan Transportation Commission's adopted *Plan Bay Area 2050* (Association of Bay Area Governments and Metropolitan Transportation Commission 2021). The HSR project would expand and modernize the regional rail system, with HSR stations as a Plan Bay Area 2050 growth geography, a focal point in the region to locate future jobs and housing, which, combined with other *Plan Bay Area 2050* strategies, would result in a compact, efficient growth pattern that meets CARB's GHG reduction targets and provides adequate housing for the Bay Area's growing population.

8.2.1.3 Benefits from a Reduction in Energy Use

The Final EIR/EIS acknowledges that, although the Phase 1 HSR project would require electricity to operate, it would nevertheless result in permanent net reduction in energy use because it would divert trips from transportation modes with higher energy use (commercial air flights and automobiles) to HSR, which has lower energy use. Section 3.6, Public Utilities and Energy, of the Final EIR/EIS concluded that operation of the HSR would result in a reduction in VMT in San Francisco, San Mateo, and Santa Clara Counties and would also result in a reduction in airplane flights in the Bay Area in which the project is located. The reduction in energy consumption for other modes of transportation that would result from operation of the HSR exceeds the increase in energy consumption for HSR operation of the project, resulting in a net decrease in statewide energy consumption. As a result, operation of the HSR would result in a net benefit to energy resources.

The HSR system would decrease automobile VMT and reduce energy consumption by automobiles, resulting in an overall reduction in energy use for intercity and commuter travel. Table 3.6-19 in the Final EIR/EIS shows the change in estimated daily VMT and associated energy consumption with and without the HSR system for the medium and high ridership scenarios for 2029 and 2040. HSR operation would reduce daily VMT in San Francisco, San Mateo, and Santa Clara Counties by 182 million to 246 million VMT per year in 2029 for the medium and high ridership scenarios, and by 345 million to 462 million VMT per year in 2040 for the medium and high ridership scenarios. These values, together with associated average daily speed estimates, were used to develop predictions of the change in energy use associated with VMT for the three counties. The reduction in energy use from the VMT reduction in San Francisco, San Mateo, and Santa Clara Counties in 2029 ranges from 586,580 million British thermal units (MMBtu) per year to 787,880 MMBtu per year under the medium and high ridership scenarios. The reduction in energy use from the VMT reduction in San Francisco, San Mateo, and Santa Clara Counties in 2040 ranges from 984,740 MMBtu per year to 1,117,360 MMBtu per year under the medium and high ridership scenarios.

The number of airplane flights statewide (intrastate) would decrease with implementation of the HSR system when analyzed against the future No Project and existing conditions because some

travelers would choose to use HSR rather than fly to their destination. Table 3.6-20 of the Final EIR/EIS shows the reduction in the number of airplane flights associated with the Preferred Alternative for the medium and high ridership scenarios. Operation under the medium ridership scenario would reduce energy consumption from airplane flights by 2,478,640 MMBtu per year for the Bay Area and by 6,255,290 MMBtu per year statewide in 2029. Operation under the high ridership scenario would reduce energy consumption from airplane flights by 2,716,740 MMBtu per year for the Bay Area and by 6,915,460 MMBtu per year statewide in 2029. Operation under the medium ridership scenario would reduce energy consumption from airplane flights by 5,279,340 MMBtu per year for the Bay Area and by 13,362,110 MMBtu per year statewide in 2040. Operation under the high ridership scenario would reduce energy consumption from airplane flights by 5,052,810 MMBtu per year for the Bay Area and by 12,855,700 MMBtu per year statewide in 2040.

Final EIR/EIS Table 3.6-21 and Table 3.6-22 summarize energy consumption for project operation and the resulting changes in regional and statewide energy consumption from the reduction in VMT and airplane flights that would occur as a result of operation of the HSR for 2029 and 2040. Operation of the project in 2029 would reduce regional energy consumption by 2,791,310 MMBtu per year under the medium ridership scenario and by 3,203,320 MMBtu per year under the high ridership scenario. Operation of the project in 2029 would reduce statewide energy consumption by 8,365,550 MMBtu per year under the medium ridership scenario and by 5,964,040 MMBtu per year under the high ridership scenario. Operation of the project in 2040 would reduce regional energy consumption by 5,943,280 MMBtu per year under the medium ridership scenario and by 5,817,300 MMBtu per year under the high ridership scenario. Operation of the project in 2040 would reduce statewide energy consumption by 15,427,700 MMBtu per year under the medium ridership scenario and by 23,641,110 MMBtu per year under the high ridership scenario (Authority 2022a: Impact PU&E#13).

8.2.1.4 Other Environmental Benefits

The Authority has planned the Phase 1 HSR system by following existing transportation corridors to the maximum extent feasible as a way to avoid and minimize the potential for environmental impacts while still meeting the project's fundamental purpose and objectives. The Preferred Alternative has been designed to minimize the potential for adverse environmental impacts and to maximize compatibility with Peninsula communities, to the greatest extent feasible in light of the project's objectives. In this way, the San Francisco to San Jose Project Section meets the purpose and need and project objectives for improving the state's transportation options and meeting growing transportation demand, while doing so in an environmentally sensitive way.

The Authority's studies have shown that the HSR system can be constructed with less land and with fewer natural and community impacts than providing a similar level of mobility through expanded highways and airports (Authority 2012b, 2019b). The 2019 Equivalent Capacity Analysis Report found that it would cost an estimated $122 billion to $199 billion to provide the equivalent level of transportation capacity in highway lane-miles (4.196 lane-miles) and airport capacity (91 gates and 2 runways) that the Phase 1 HSR system would provide. Compared to the Phase 1 cost estimates, which range from $69 billion to $99 billion, investment in HSR is the more affordable choice (Authority 2019b).

8.2.2 Transportation Benefits

8.2.2.1 Increases Mobility, Reduces Congestion, and Travel Delays by Providing a Safe, Reliable, and New High-Speed Travel Mode

The capacity of California's intercity transportation system is insufficient to meet existing and future demand, and the current and projected future congestion of the system will continue to result in deteriorating transportation conditions, reduced reliability, and increased travel times. The system has not kept pace with the tremendous increase in population, economic activity, and tourism in California. The interstate highway system, commercial airports, and 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 20 years and beyond. Moreover, the ability to expand major highways and key airports is uncertain; some needed expansions may be impractical or may be constrained by physical, political, or other factors, as discussed in the Final EIR/EIS Section 1.2.4, Statewide and Regional Need for the High-Speed Rail System in the San Francisco to San Jose Project Section.

As described in Final EIR/EIS Chapter 1, Project Purpose, Need, and Objectives, the Preferred Alternative as part of the Phase 1 HSR system would meet the need for a safe, reliable mode of travel that would link the major metropolitan areas of the state and deliver predictable, consistent travel times sustainable over time. The HSR system also would provide quick, competitive travel times between California's major intercity markets. For intercity trips such as Merced to San Francisco or Los Angeles, the HSR system would provide considerably quicker travel times than either air or automobile transportation, and would bring frequent HSR service to portions of the state such as the Central Valley that are not well served by air transportation. In addition, due to the HSR pricing model, the passenger cost for travel on HSR would be lower than for travel by air for the same intercity markets (Authority 2020a: Table 5-1).

The result with implementation of the HSR project would be substantial reduction in expected VMT in the counties crossed by the project alignment when compared to the No Project conditions, which would reduce traffic on intercity highways and around airports and reduce the need for their expansion by adding a new mode to the state's transportation infrastructure. As discussed in Section 3.2 of the Final EIR/EIS, the project would reduce overall 2029 VMT by 17.7 million miles in San Francisco County, 66.2 million miles in San Mateo County, and 159 million miles in Santa Clara County. By 2040, the project would reduce overall VMT by 24.4 million miles in San Francisco County, 90.3 million miles in San Mateo County, and 230 million miles in Santa Clara County (Authority 2022a: Impact TR#1). In addition to reducing VMT and traffic on intercity highways, the San Francisco to San Jose Project Section would connect the HSR system and SFO via the Millbrae Station, which would help to alleviate capacity constraints at SFO by providing a new transportation mode between San Francisco and Los Angeles as part of the Phase 1 HSR system.

By providing a new intercity, interregional, and regional passenger mode, the HSR system would improve connectivity and accessibility to other existing transit modes and airports. Travel options available in the Central Valley and other areas of the state with limited bus, rail, and air service for intercity trips would be improved. The HSR system connecting the Bay Area to the Central Valley would provide beneficial transportation impacts beyond additional modal connectivity. The change from vehicles to HSR would reduce daily auto trips and corresponding vehicle delay and congestion. A substantial amount of intercity auto travel (primarily using U.S. Highway [US] 101, State Route [SR] 99, and I-5) would divert to HSR service, relieving projected future congestion on these highways. The reduction in future intercity trips would also improve the ability of US 101, SR 99, and I-5 to accommodate freight traffic and would improve projected travel speeds on the freeway. The HSR system would also provide system redundancy in cases of extreme events such as adverse weather or petroleum shortages (HSR trains are powered by electricity, which can be generated from non-petroleum fueled sources; most automobiles and airplanes currently require petroleum). The HSR system would provide a predominantly separate transportation system that is less susceptible to many factors influencing reliability such as capacity constraints, congestion, and incidents that disrupt service.

The state's growing population and the growing demand on the state's transportation system were the early impetus for HSR in California. There are plans for improving the existing freeway network in San Francisco, San Mateo, and Santa Clara Counties through efficiency enhancements and widening roadways to add capacity; however, these improvements would not be sufficient to ease traffic flow and accommodate expected population and employment growth in the area (Authority and FRA 2005: Chapter 1). The same trends that motivated California to investigate, support, and proceed to plan the HSR system are just as compelling today as in the last two decades. The state's need for an expanded safe, reliable, and fast mode of intercity travel to meet its growing transportation demands continues to be a critical policy basis for moving the Preferred Alternative forward as part of the larger HSR system (Final EIR/EIS Section

1.2, Purpose of and Need for the High-Speed Rail System and the San Francisco to San Jose Project Section).

8.2.2.2 Provides Passenger Rail and Transit Connectivity Between the Central Valley and San Francisco Bay Area

The project, which would provide connectivity between sections of the HSR system in the Central Valley and the Bay Area, would provide a new regional surface transportation system that complements and connects with existing transportation modes. Connecting the Central Valley with the Bay Area would transform the relationship between the two regions by increasing mobility and reducing travel times (Authority 2018b). There is limited passenger rail service between the Bay Area and the Central Valley and car travel between the regions can take multiple hours. The Preferred Alternative operating as part of the Phase 1 HSR system would offer substantially more transportation service than existing rail passenger service at a much more reliable and faster travel time than cars between the regions (Authority 2020a). Additionally, the HSR connection would provide redundancy in the transportation network that maintains a transportation connection between the regions in the case of major disruptions on the roads. Regular, fast, and reliable travel would allow employers to expand their option for office locations and for employees to have a wider range of job opportunities available to them. Agglomeration economies are likely to accrue to the state's economy from this increased and improved connectivity between the two regions (Authority 2018a: pages 6 and 20; 2018b).

8.2.3 Economic and Social Benefits

The Phase 1 HSR system would generate economic benefits related to revenue generated by the system, economic growth and jobs generated by construction and operation of the system, benefits from reduced delays to air and auto travelers, and economic advantages related to proximity to the HSR system's stations.

8.2.3.1 Revenue Benefits

As described in the Final EIR/EIS, during operation, the Preferred Alternative operating as part of the Phase 1 HSR system would generate sales tax in the region from both direct and indirect effects (Authority 2022a: Impact SOCIO#18). The sales tax generation associated with operation of the Preferred Alternative is anticipated to exceed sales tax revenues lost from displacements (Authority 2022a: Impact SOCIO#12). The increased sales tax revenues generated by purchases associated with operation of two passenger rail stations would go to the cities and counties. In addition, HSR employees as well as patrons arriving at and departing from the two stations would make purchases that would contribute to increases in regional sales tax revenues.

8.2.3.2 Economic Growth and Jobs

The Phase 1 HSR system would generate the equivalent of approximately 624,000 job years of employment, $46 billion in labor income, and nearly $131 billion in economic output (Authority 2020a). Operation of the Phase 1 HSR system is estimated to create up to 3,800 direct jobs (Authority 2016). In addition, the HSR system would improve the economic productivity of workers engaging in intercity travel by providing an option to avoid the delays and unpredictability associated with air and highway travel. These economic benefits are in marked contrast to the cost of expanding airports and highways, which would be approximately twice the cost of the HSR system to meet the future transportation demand, assuming this type of expansion is even feasible (Authority 2012c; Parsons Brinkerhoff 2011).

8.2.3.3 Economic Advantages Related to Proximity to HSR Stations

Experiences in other countries have shown that an HSR system can provide a location advantage to those areas in proximity to an HSR station because an HSR system would improve accessibility to labor and customer markets, potentially improving the competitiveness of the state's industries and the overall economy. Businesses that locate in proximity to an HSR station could operate more efficiently than businesses elsewhere (Final EIR/EIS Section 3.12). This competitive advantage may be pronounced in high-wage employment sectors that are frequently

in high demand in many communities. The HSR system would provide an opportunity for connectivity for sectors of the population who currently are limited in their travel options. In addition, HSR is a mode of transportation that can strengthen urban centers. In combination with supportive local land use policies, the increased accessibility afforded by the HSR system would encourage more intensive urban development and lead to higher property values around stations.

Economic benefits at state, regional and local levels are anticipated with increased statewide accessibility and reduced travel times of HSR service. Regional employment and income growth that strengthens global competitiveness can arise from agglomeration economies associated with a statewide HSR network that links together California's largest cities and regions with supportive land use policy to enable higher-density urban development in HSR station areas (Mirakami and Cervero 2010).

Increased HSR interregional accessibility can attract knowledge and service-based firms to co-locate at higher density, regional transportation served HSR station areas (Mirakami and Cervero 2010), which can foster the agglomeration benefits of higher labor productivity, creativity, and synergy associated with face-to-face contact to exchange knowledge and access to specialized labor (Cambridge Systematics, Inc. 1998).

Cities can realize agglomeration benefits with proactive public policies to guide public and private investment to enable transit-oriented urban development that leverages the accessibility efficiencies and competitive economic advantages of station areas linked together in a statewide HSR network (Mirakami and Cervero 2010). Attracting transit-oriented employment and population growth in station areas can lead to higher transit ridership, revenues, property values and investment in station areas (Cervero et al. 2002).

8.2.4 Benefits May Be Lower Initially than in 2040, but Will Increase Over Time

The Authority's 2016, 2018, and 2020 Business Plans (Authority 2016, 2018a, 2020a) describe a phased implementation strategy for construction of the Phase 1 HSR system that acknowledge funding constraints. Because the system may be constructed and implemented more slowly over time than assumed in the Final EIR/EIS for purposes of environmental analysis (the Final EIR/EIS assumed 520-mile Phase 1 statewide HSR system with mature operations by 2040), based on funding availability, benefits of the system may also accrue more slowly over time. The Final EIR/EIS assumed a time horizon for analysis of 2040, and prepared analysis of project benefits for that horizon year. An operational HSR system, however, would continue to provide VMT reduction, air pollutant reduction, and GHG reduction benefits long past the 2040 horizon of the Final EIR/EIS, and these benefits would build over time as ridership on the system increases. As discussed in the 2020 Business Plan, over time, the average annual GHG emissions savings of the Phase 1 HSR system, 1.9 million metric tons CO_2e, is projected to be the equivalent of taking 400,000 passenger vehicles off the road every year (Authority 2020a).

In addition, the Authority has previously committed to power HSR with an energy portfolio of 100 percent renewable sources and confirmed the feasibility of this approach with industry (Authority 2008, 2014a). This commitment was reaffirmed in the 2018 and 2020 Business Plans (Authority 2018a, 2020a). The environmental benefit of powering HSR with 100 percent renewable energy is substantial in terms of carbon dioxide reduction benefits. Over time, a 100 percent renewable portfolio has potential to increase the GHG reduction benefits from HSR operations over a non-renewable portfolio.

In summary, although benefits of the HSR system in the areas of VMT reduction, air pollution, GHG reduction, and reduced transportation energy use may be lower initially than described in the Final EIR/EIS because of a phased implementation strategy, the benefits would still be significantly positive, would still continue to accrue and grow over time, and would eventually achieve and exceed the level of benefit the Final EIR/EIS describes. These benefits therefore still outweigh the significant and unavoidable adverse environmental impacts described in the Final EIR/EIS and CEQA Findings of Fact.

8.3 Benefits of the Preferred Alternative in Connection with the Previously Approved San Jose to Merced, Merced to Fresno, Fresno to Bakersfield, and Bakersfield to Palmdale Project Sections

The Preferred Alternative would also have numerous benefits that outweigh the unavoidable adverse impacts in the San Francisco to San Jose Project Section when considered with the previously approved San Jose to Merced, Merced to Fresno, Fresno to Bakersfield, and Bakersfield to Palmdale Project Sections, even without considering other portions of the Phase 1 HSR system that are anticipated to be approved and constructed in the future.

8.3.1 Expands the Initial HSR in the Central Valley to Reach the Bay Area and Provides Opportunity for Expanded Early Interim Service

An important benefit of the Preferred Alternative is that it would create an opportunity for the Authority to expand its initial HSR service in the Central Valley between Merced and Bakersfield to the west, to reach the Bay Area. The Authority has previously approved the Merced to Fresno and Fresno to Bakersfield Project Sections, comprising the roughly 171-mile backbone of the Phase 1 HSR system in the Central Valley, including the Central Valley Wye and HSR alignment to the west (Authority 2012d, 2012e, 2014b, 2018c, 2018d, 2020b, 2020c, 2020d). In 2021, the Authority approved the Bakersfield to Palmdale Project Section Preferred Alternative, adding 79 miles between Bakersfield and Palmdale to create 250 miles of contiguously approved HSR alignment (Authority 2021a, 2021b, 2021c). In April 2022, the Authority approved the San Jose to Merced Project Section, adding 89 miles between the Central Valley Wye and San Jose. The Preferred Alternative would extend the HSR alignment another 43 miles to the west and north, reaching the 4th and King Street Station in San Francisco and creating 382 miles of approved HSR alignment. See Figure 3 for locations and project status of the California HSR project sections.

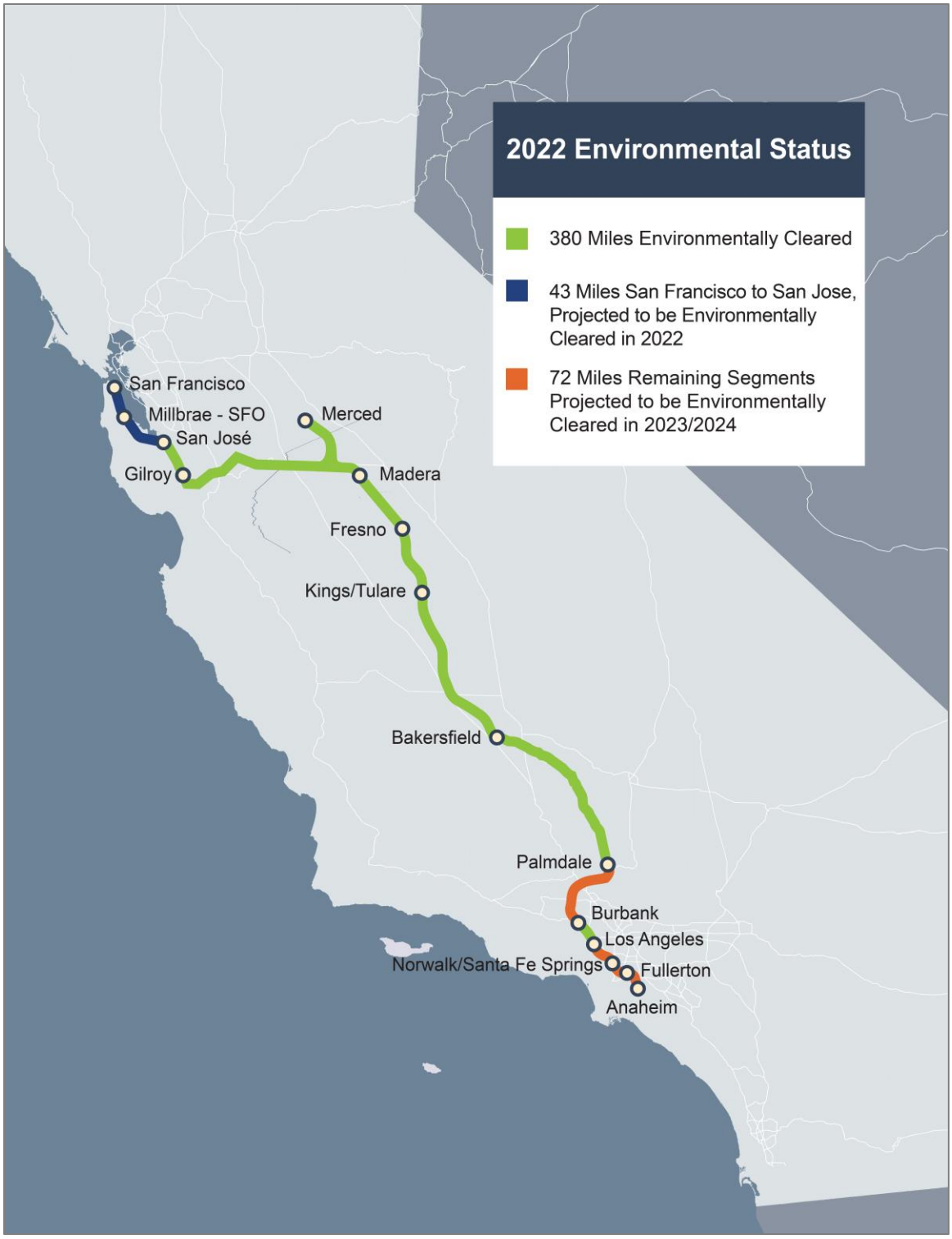

Figure 3 Map of Environmental Document Status and Progress

The Authority has 119 miles of construction under way in the Central Valley between Madera and north of Bakersfield, which forms the foundation of the HSR system (Authority 2012a, 2014a). The Authority's 2020 Business Plan supports expanding construction to 171 miles of HSR connecting Merced, Fresno, and Bakersfield as part of an early interim HSR service in the southern Central Valley (Authority 2020a). Preliminary studies indicate an initial HSR service in the Central Valley is a viable interim step toward the Phase 1 HSR system (Authority 2022b). The Authority has also previously found that adding the 79-mile Bakersfield to Palmdale Project Section to the Central Valley would help realize a viable initial HSR service by connecting the Central Valley to Palmdale and/or connecting the initial Silicon Valley to Central Valley HSR service to Palmdale, where the Palmdale Station would offer Metrolink connections to Los Angeles, even if funding for the HSR system between Palmdale and Los Angeles/Anaheim is not immediately available (Authority 2021d). The Authority also found that the San Jose to Merced Project Section would contribute to realizing a viable initial HSR service by connecting the Silicon Valley to Central Valley service to Palmdale and Los Angeles County. The Preferred Alternative for the San Francisco to San Jose Project Section would build on these approved HSR project sections and further contribute to realizing a viable initial HSR service, connecting the Bay Area to the Central Valley and Palmdale and Los Angeles County, creating an opportunity for a total of 382 miles of initial HSR service, and serving as a critical foundation of the statewide HSR system (Authority 2022b).

8.3.2 Provides a New Expedited and Consistent Travel Option that Connects to San Francisco

As discussed in the Authority's Business Plans, the Central Valley ranks as one of California's most underserved regions for rail transportation. The Central Valley is home to approximately 6 million residents and is becoming more prominent as the state's third regional economic engine. Fresno and Bakersfield, 2 of the 10 most populated cities in California, have experienced 20 percent population growth since 2000. The planned Merced to Bakersfield early interim HSR service will connect the three largest cities in the Central Valley and provide connections to existing and improved passenger rail and bus services to the north, west, and south of the Central Valley, reducing travel times by up to 100 minutes through the heart of California (Authority 2022c).

By connecting to the Merced to Bakersfield early interim HSR service and extending it to San Francisco, the Preferred Alternative would provide reduced travel time between the Central Valley and San Francisco. In addition, HSR service at the STC would expand modal connectivity among local and regional transit networks while providing new linkages to the North and East Bay. Specifically, HSR service at the STC, in downtown San Francisco, would connect HSR passengers to the Alameda–Contra Costa Transit District, BART, Caltrain, Golden Gate Transit, Greyhound, SamTrans, MUNI, WestCAT Lynx, Amtrak, and Paratransit buses. HSR service at the Millbrae Station would provide a direct connection to SFO as well as to regional bus transit by SamTrans lines. The new HSR mode would improve transportation options for travelers between the Bay Area and Los Angeles County.

8.3.3 Reduces Vehicle Miles Traveled

Extending the Merced to Bakersfield service further to Palmdale in the south and San Francisco in the north assuming the DTX project, a further reduction of 1,866 million annual vehicle miles is estimated which represents a further increase of 723 percent in vehicle miles saved over the Palmdale extension from Bakersfield. This large increase captures new travel markets using the HSR system and allows much longer travel distances by extending the system to San Francisco and to Palmdale. This extension also would offer higher frequency service with addition of a San Francisco to Palmdale service in addition to the Merced to Palmdale service. The service parameters were derived from the Silicon Valley to Central Valley alternative, which assumes higher service frequencies compared to the Merced to Bakersfield alternative (Authority 2022d).

8.3.4 Improves Air Quality

Based on the statewide analyses, the Central Valley segment (Merced to Bakersfield) shows reductions in all criteria pollutants and GHGs prior to implementation of the full Phase 1 system. The addition of the Bakersfield to Palmdale, San Jose to Merced, and San Francisco to San Jose Project Sections to the Central Valley segment would continue to develop these emissions savings statewide and is a key element to achieving the full emission reductions of the Phase 1 system (Authority 2022d).

8.3.5 Provides Economic and Social Benefits by Extending the Central Valley Construction to San Francisco

The Authority's current construction of 119 miles along the HSR alignment in the Central Valley is providing important economic benefits to the region and extension of the system to San Francisco would both increase the construction economic benefits and expand the benefits to other regions of the state.

In fiscal year 2020–2021, construction in the Central Valley supported more than 5,000 well-paying construction jobs for women and men working at 35 construction sites. These jobs benefited people who live in the region, including many small businesses, disadvantaged businesses, and disabled veteran businesses. As of March 31, 2022, construction worker statistics included:

- 72 percent of the people employed in the construction of the project lived in the region
- More than 700 small businesses were working on the project, including:
  - 225 certified Disadvantaged Business Enterprises
  - 80 certified Disabled Veteran Business Enterprises

This ongoing construction in the Central Valley is tied to the Board-approved Merced to Fresno (adopted 2012) and Fresno to Bakersfield (adopted 2014) Project Sections. Together, these two project sections are anticipated to support a total of over 33,600 direct, indirect, and induced job-years over the entire duration required to complete construction.

Since August 2021, additional project sections of the California HSR System have completed the CEQA/NEPA environmental review process and have been approved by the Board. As project funding becomes available, construction activities will be able to expand substantially to provide the necessary infrastructure to link San Francisco in the Bay Area to Palmdale in Los Angeles County. Based on estimates presented in each of the project section Final EIR/EIS documents, total estimated direct, indirect, and induced job creation includes the following:

- Bakersfield to Palmdale (adopted August 2021)—The 80-mile Bakersfield to Palmdale Project Section is estimated to support a total of 150,100 job-years.
- San Jose to Merced (adopted April 2022)—The 90-mile San Jose to Merced Project Section is estimated to support a total of 31,510 job-years.

Together, these four project sections are anticipated to support an estimated 215,256 job-years. These jobs would be based in the southern portion of the Bay Area, the Central Valley from Merced south to Bakersfield, and continuing south over the Tehachapi Mountains to Palmdale in Los Angeles County.

With approval of the San Francisco to San Jose Project Section, construction activities associated with the California HSR System would extend north from San Jose to San Francisco. The Project Section would be mostly within the existing Caltrain rail right-of-way; and as such, the 43-mile extension of the construction activities would be more limited than for other project sections. However, these construction activities would increase total construction job-years for the California HSR System by an additional 4,900 job-years, or an increase of about 2 percent. In

total, extending the Central Valley construction to San Francisco would increase total project construction jobs to more than 220,000.

The project construction expenditures related to the San Francisco to San Jose Project Section would benefit residents and businesses in the three counties through which HSR would travel—Santa Clara, San Mateo, and San Francisco Counties. The project would directly hire construction workers and would make purchases of goods and services. Through the Authority's Community Benefits Agreement, each prime contractor must commit 30 percent of all construction dollars to hiring local small businesses, including separate goals for the hiring of disadvantaged and disabled veteran businesses. Through a cooperative partnership with skilled craft unions, the Authority also would help to promote pre-apprenticeship and apprenticeship training programs in economically disadvantaged communities. As such, the project construction activities would generate broad indirect effects in the regional economy as local businesses provide goods and services to support project construction and as project workers spend portions of their wages on goods and services for themselves and their households.

8.3.6 Lays the Foundation for the Nationwide High-Speed Rail Industry

The Authority plans to begin full HSR service once it connects the Central Valley with Silicon Valley. This operation will be able to demonstrate the benefits of this new mode of transport (for the United States) and can lay the foundation for a nationwide HSR industry. The San Francisco to San Jose Project Section would contribute to expansion of the HSR system to see those major benefits.

A new HSR line requires a whole series of products, parts, and high-tech systems to operate. This starts with the trains and the thousands of components and parts, to the power systems, signaling and communication systems, high-tech control centers, workshops, and stations. A new HSR network will create new manufacturing industry including an extensive supply chain made up of thousands of specialty companies. This new domestic industry will encourage small businesses, and create long-term, good paying, family-supporting jobs. The U.S. High Speed Rail Association estimates there will be millions of long-term jobs created throughout this entirely new domestic manufacturing industry and that this new industry will keep growing for many decades, cross-stimulate a number of other industries along the way, and will be an economic boon for the United States well into the future (U.S. High Speed Rail Association 2022).

8.4 Benefits of the Preferred Alternative on Its Own

The Preferred Alternative offers the greatest benefits when viewed as part of the Phase 1 HSR system between San Francisco and Los Angeles/Anaheim. The Preferred Alternative also offers considerable benefits when viewed in conjunction with the already approved HSR sections between San Jose and Palmdale. The benefits, however, are further augmented by the benefits the Preferred Alternative offers on its own, even without considering other sections of the HSR system. Some of the benefits accrue inclusive of the San Jose Diridon Station Approach Subsection; other benefits accrue even without the subsection.

8.4.1 Connectivity and Integration with Local Transit

The overall effect of HSR is expected to be an increase in the use of other transit services as a complement to HSR service by providing transit connections to local geographies to and from the HSR stations. HSR riders at HSR stations would create new demands for Caltrain and other transit systems as they transfer from HSR to reach destinations served by other transit systems. For example, the Authority modeled that in 2040, HSR service would result in a net increase in Caltrain ridership by 6.5 percent compared to the 2040 No Project conditions (Table 3.2-20). The primary source of increase to Caltrain ridership would be the increase in HSR riders at the Millbrae Station, where Caltrain would serve as a feeder service to and from HSR.

The increase in HSR service over time would result in increased use of connecting transit systems by HSR passengers. The increase in HSR riders at the STC would also result in an increase to MUNI light rail service, MUNI bus, and BART system ridership. The increase in HSR riders at the Millbrae Station would also result in an increase to SamTrans and BART system ridership using the existing connections.

8.4.2 Circulation Benefits

The Preferred Alternative includes circulation improvements for the Millbrae Station area on the west side of the existing Caltrain corridor, including extension of California Drive to Victoria Avenue and a new pedestrian signal at the El Camino Real/Chadbourne Avenue intersection, which would improve access to the Millbrae Station for all modes. Existing access to the west side of the Millbrae Station is provided via side street stop-controlled intersections at El Camino Real/Linden Avenue and El Camino Real/Serra Avenue, as well as via California Drive to and from the south. The extension of California Drive to a signalized intersection at El Camino Real/Victoria Avenue, combined with a new pedestrian signal at Chadbourne Avenue, would improve accessibility to the west side of the Millbrae Station from El Camino Real. In addition, the Preferred Alternative would demolish and reconstruct the Tunnel Avenue overpass north of the intersection of Bayshore Boulevard/Valley Drive. This change to the roadway network would improve LOS conditions at the intersection of Bayshore Boulevard/Old County Road. The improvements in flow of traffic near the Millbrae Station and Bayshore Boulevard/Old Country Road would have a beneficial effect on circulation and traffic safety.

8.4.3 Safety Benefits

The Preferred Alternative would be built according to international safety guidelines and would include several key safety mechanisms, such as positive train control, safety improvements at existing Caltrain stations, perimeter fencing, and four-quadrant gates at at-grade crossings. The Preferred Alternative would involve the installation of four-quadrant gates, barriers, and roadway channelization at 40 at-grade crossings for Alternative A, which would prevent drivers from traveling in opposing lanes to avoid the lowered gate arms. Pedestrian crossing gates would be built parallel to the tracks and would be aligned with the vehicular gates on either side of the roadway. The project would also complete the perimeter fencing of the Caltrain right-of-way, which would reduce the potential for train conflicts with motor vehicles, pedestrians, and cyclists and discourage trespassing. These project elements would have a beneficial effect on vehicular and pedestrian safety and would reduce traffic hazards by minimizing the potential for conflicts between trains and motor vehicles, pedestrians, and bicycles.

The Preferred Alternative would also include safety improvements at existing Caltrain stations. Major safety improvements would be implemented at the Broadway Caltrain Station. At this station, new northbound outboard platforms would be built to eliminate the need for passengers to board and alight from the train between the active tracks. This would improve the safety of passengers during train operations and eliminate the hold-out rule requiring oncoming trains to stop outside the station zone until the passengers are safely clear. Safety improvements would also be implemented at existing Caltrain station platforms to accommodate HSR trains passing through stations. These safety improvements could include increasing the width of the tactile platform strips that are currently installed at Caltrain stations, modifying the tactile platform strips to use raised bars instead of raised dots, and providing additional visual and audible warnings of approaching HSR trains. PCJPB, as the owner and operator of the Caltrain stations, would be responsible for design and implementation of safety improvements at Caltrain station platforms.

8.4.4 Benefits from Upgrading Infrastructure

The Preferred Alternative would include upgrades and improvements within the existing Caltrain corridor. These upgrades would expand and modernize the regional rail system, enhancing rail corridor infrastructure and increasing Caltrain maximum operating speeds from 79 to 110 mph.

8.4.5 Economic Benefits

- As described in the Final EIR/EIS, construction of the Preferred Alternative would generate sales tax revenue gains for the region over the 6-year construction period that have been estimated at approximately $9.4 million. These sales tax revenue gains would increase local government revenues during the construction period and provide an economic benefit (Authority 2022a: Impact SOCIO#13)

- As described in the Final EIR/EIS, construction of the Preferred Alternative would generate approximately 4,900 direct, indirect and induced job-years (Authority 2022a: Table 3.17-9). This includes 380 direct operations and maintenance jobs including train operations, infrastructure and equipment maintenance, station and train cleaning, ticketing and other commercial activities. The 540 indirect annual jobs include additional employment supporting, servicing, or supplying train operations, administration and dispatching, infrastructure and equipment maintenance, station and train cleaning, ticketing and other commercial activities, and other occupations such as security, operations of concessions, and provision of goods and services to riders entering and leaving the HSR system (Authority 2022a: Impact SOCIO#14).
- As described in the Final EIR/EIS, operation of the Preferred Alternative would generate approximately 920 direct and indirect jobs annually (Authority 2022a: Table 3.17-13).
- As described in the Final EIR/EIS, the statewide HSR system (San Francisco to Los Angeles) could increase statewide employment by 102,000 jobs because of improved connectivity, of which 2,530 would be in the three-county RSA (Authority 2022a: Impact SOCIO#14).
- As the Authority has done in the Central Valley, the Authority will work to ensure that the local workforce is prepared for these kinds of economic opportunities by investing in workforce training and development through the Authority's Community Benefits Agreement (Final EIR/EIS Section 3.17.6.3, Project Impacts, Construction Impacts).

8.5 Conclusion

The Preferred Alternative for the San Francisco to San Jose Project Section of the California HSR System would result in certain significant impacts on the environment that cannot be avoided or substantially lessened with the application of feasible mitigation measures or feasible alternatives, as identified in Section 8.1, General Findings on Significant and Unavoidable Impact Associated with the Preferred Alternative, and as disclosed in the Final EIR/EIS. The Authority finds, however, that the above-enumerated benefits of the Preferred Alternative as part of the HSR system (Section 8.2) and viewed on its own (Section 8.3) outweigh the unavoidable adverse environmental effects. This finding is based on the Authority's careful consideration of and balancing of the unavoidable adverse environmental effects against the Preferred Alternatives' substantial environmental benefits, which render the unavoidable adverse environmental effects acceptable.

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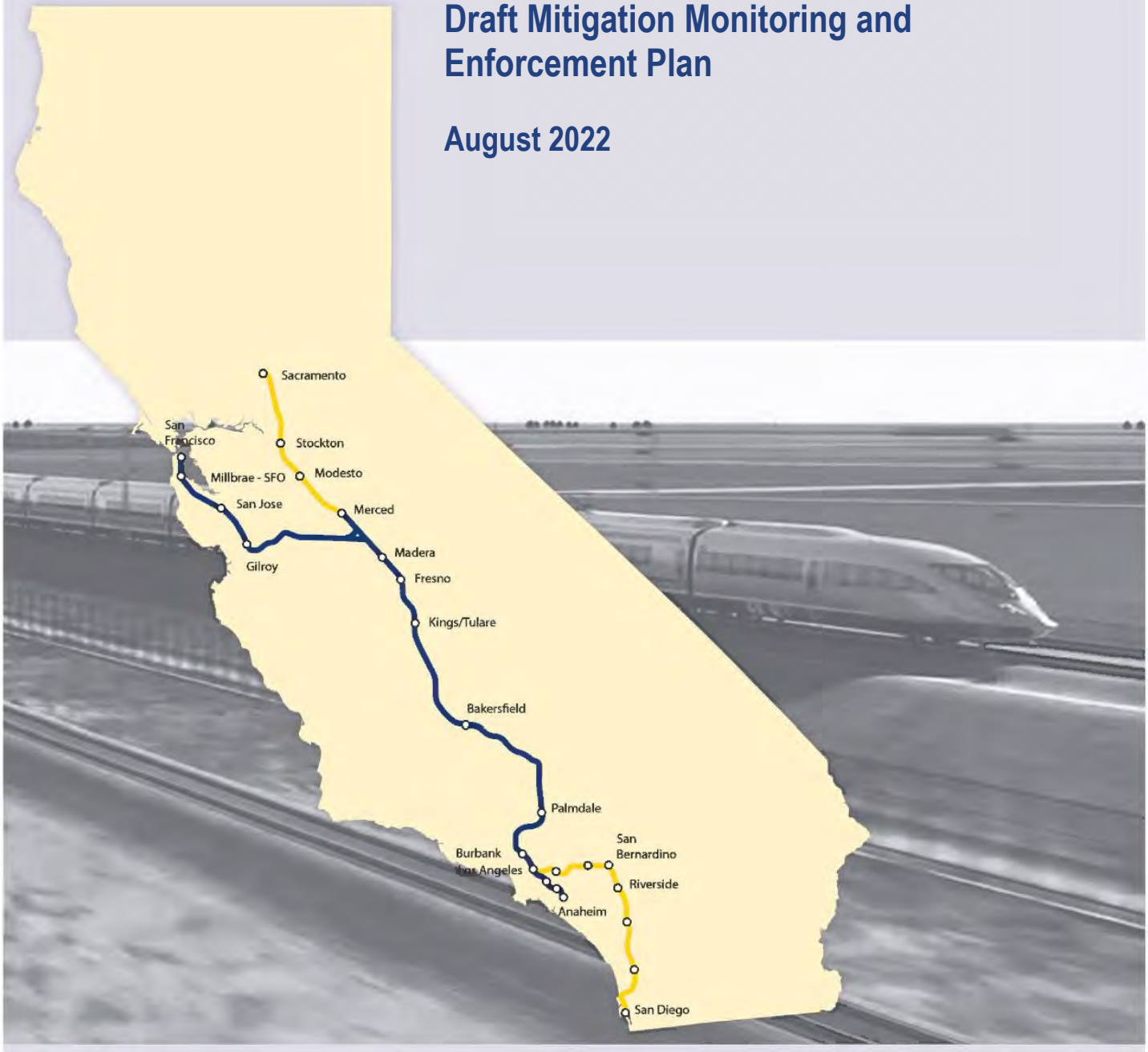
ATTACHMENT A: MITIGATION MONITORING AND ENFORCEMENT PLAN

California High-Speed Rail Authority

San Francisco to San Jose Project Section

Draft Mitigation Monitoring and Enforcement Plan

August 2022



CALIFORNIA High-Speed Rail Authority

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

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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	Prior to project operations, the contractor will install traffic signals at the following locations: ▪ 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 The following equipment and features are assumed as part of the traffic signal improvements to limit the potential for secondary effects: ▪ 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 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.	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#1b	Second Street/Townsend Street—Optimize Signal Timing (NEPA Effect Only)	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.	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)	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.	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	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: ▪ 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) 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.	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
		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. The Authority will require the construction contractor, in cooperation with Caltrain, to implement the following coordination and consultation requirements: ▪ 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. 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: ▪ 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

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		▪ 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	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.	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	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	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

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	Off-Road Equipment	cars, light-duty trucks) associated with the project (e.g., on-site vehicles, contractor vehicles) use ZE or 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.							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	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 (O_3 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	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	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

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		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	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: ▪ 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

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		possible from noise-sensitive sites. ▪ 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. 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.							

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	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. **Noise Barriers** 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	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	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

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		requirements, aesthetics, durability, cost, and maintenance considerations usually determine the selection of materials for noise barriers. 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. 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: ▪ 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 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. 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 provides more details. **Install Building Sound Insulation** 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								

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		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. **Noise Easements** 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.							
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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		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: ▪ 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 The RRP will be submitted to the Authority and regulatory agencies, as defined in the conditions of regulatory authorizations, for review and approval.								Degradation of Essential Fish Habitat 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 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#2	Prepare and Implement a Weed Control Plan	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: ▪ 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	Impact BIO#1: Permanent Conversion or Degradation of Habitat for Special-Status Plant Species 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

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		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 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								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#3	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 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. 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.	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	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

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementing Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
										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

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementing Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
										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	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. Pre-activity survey reports will be submitted within 15 days of completing the surveys and will include: ▪ 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 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: ▪ Date, time, and weather conditions observed at each location where monitoring occurred ▪ Personnel who conducted compliance monitoring ▪ Project activities monitored, including construction equipment in use ▪ Compliance conditions implemented successfully ▪ Noncompliance events observed Daily compliance reports will also be included in the	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	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 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 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,

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementing Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		monthly compliance reports, which will be submitted to the Authority by the 10th of each month and will include: ▪ Summary of construction activities and locations during the reporting month, including any noncompliance events and their resolution, work stoppages, and take of threatened or endangered species ▪ Summary of anticipated project activities and work areas for the upcoming month ▪ Tracking of impacts on suitable habitats for each threatened and endangered species identified in USFWS and CDFW authorizations, including: – An accounting of the number of acres of habitats for which we provide compensatory mitigation that has been disturbed during the reporting month – An accounting of the cumulative total number of acres of threatened and endangered species habitat that has been disturbed during the project period ▪ Up-to-date GIS layers, associated metadata, and photodocumentation used to track acreages disturbed ▪ Copies of all pre-activity survey reports, daily compliance reports, and noncompliance/work stoppage reports for the reporting month Annual reports will be submitted to the Authority by the 20th of January and will include: ▪ Summary of all monthly compliance reports for the reporting year ▪ A general description of the status of the project, including projected completion dates ▪ All available information about project-related incidental take of threatened and endangered species ▪ Information about other project impacts on the threatened and endangered species ▪ A summary of findings from pre-construction surveys (e.g., number of times a threatened or endangered species or a den, burrow, or nest was encountered, location, if avoidance was achieved, if not, what other measures were implemented) ▪ Written description of disturbances to threatened and endangered species habitat within work areas, both for the preceding 12 months and in total since issuance of regulatory authorizations by USFWS, 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. In addition to the compliance reporting requirements, the following items will be provided for compliance documentation purposes: ▪ 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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		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. ▪ 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: – 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 *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities* (CDFW 2018) and *Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Plants* (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

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementing Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		sites, refuges, reserves, federal or state lands, and public/private mitigation banks. 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.								
BIO-MM#8	Prepare a Compensatory Mitigation Plan for Species and Species Habitat	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: ▪ 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: – 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	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 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

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		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: – Impacts on species (typically measured as habitat loss) are reduced or increased as a result of changes in project design – Pre-construction site assessments indicate that habitat features are absent (e.g., because of errors in land cover mapping or land cover conversion) – The habitat is determined to be unoccupied based on negative species surveys – Impacts initially categorized as permanent qualify as temporary impacts ▪ An overview of the strategy for mitigating 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	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 FESA or CESA, Cal. Fish and Game Code Section 1600 et seq., the CWA, and the Porter-Cologne Act. Restoration, enhancement, or creation of aquatic resources may result in the permanent conversion of	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 of-site habitat restoration, enhancement, and creation/ 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 Degradation of Essential Fish Habitat Impact BIO#4: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Red-Legged Frog

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		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: ▪ 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	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. If a cofferdam is required, the Authority will implement the following measures, unless other methods are approved by NMFS: ▪ 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 The agency-approved biologist will continuously monitor the placement of cofferdams and dewatering of isolated areas for the purpose of removing and relocating any	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

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementing Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		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	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: ▪ Measures to minimize underwater sound pressure levels to below the following thresholds for peak pressure and accumulated sound exposure levels: – 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 – 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. 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.	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	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:	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

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementing Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
	Habitat, and Essential Fish Habitat	▪ 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 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: ▪ Riparian habitat conditions that are consistent with the existing flow regime and maintain and improve habitat characteristics (e.g., shade, formation and maintenance of refugia) ▪ Local and regional conservation goals ▪ Long-term access for monitoring and maintenance ▪ Upstream and downstream conditions Conservation options developed to offset impacts to steelhead 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).						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	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: ▪ California red-legged frog ▪ San Francisco garter snake ▪ Western pond turtle 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.	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	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	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

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementing Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		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

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementing Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
BIO-MM#21	Compensate for Impacts on San Francisco Garter Snake and California Red-Legged Frog Habitat	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: ▪ 2:1 for permanent impacts on aquatic habitat ▪ 1:1 for permanent impacts on refugia habitat 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/ 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	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#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	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: ▪ 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: – 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
		– 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. 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: ▪ 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	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. Compensatory mitigation lands proposed as compensatory mitigation will meet the following criteria:	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
		▪ 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: – 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	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. 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.	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	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 Blackbird Impact BIO#9: Removal or Disturbance of Active White-Tailed Kite Nests
BIO-MM#30	Conduct Pre-Construction Surveys for Special-Status Bat Species	Prior to replacement or modification of any bridges modeled as bat habitat, the project biologist will conduct pre-construction bridge surveys as follows: ▪ 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

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		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). ▪ 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. 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: ▪ 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	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. 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.	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	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. 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.	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	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. The project biologist will make sure that the selected apron material and climber barrier does not cause harm,	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: ▪ 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: ▪ 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: ▪ 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 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
		the following primary information: ▪ 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. 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.							
BIO-MM#38	Prepare and Implement an Annual Vegetation Control Plan	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: ▪ 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) Only Caltrans-approved herbicides may be used in the vegetation control program. Pesticide application will be	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

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementing Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		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	Prior to ground-disturbing activities, the project biologist will conduct surveys in the work area to identify protected trees. 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. 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: ▪ 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	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.	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	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: ▪ 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
		endowment for long-term management of the property-specific conservation values ▪ An in-lieu fee contribution determined through negotiation and consultation with the USFWS 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. As described under BIO-MM#8, the Authority will prepare and implement a compensatory mitigation plan that will include considerations ions listed in this measure.								
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	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.	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
Safety and Security										
SS-MM#3	Install Emergency Vehicle Priority Treatments near HSR Stations	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	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
		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. 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.							
SS-MM#4	Install Emergency Vehicle Priority Treatments Related to Increased Gate-Down Time Impacts	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. 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	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
		October. Travel time data will be collected at the following intervals: ▪ 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 operations[3] 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 Travel time data will be collected at the following at-grade crossing locations: 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) 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								

[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
		exceedance of the 30-second threshold. 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: ▪ 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 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. 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. If cities choose not to implement and operate emergency vehicle priority treatments using construction funds provided by the Authority, impacts would be considered								

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementing Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		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: ▪ 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	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. The performance standards for noise mitigation are those established by the City of Brisbane General Plan as follows: ▪ Residential/Hotel: – 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) 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. **Noise Barriers** 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. 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	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
		in unacceptable noise levels for residential uses without additional measures. 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. 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. 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. **Install Building Sound Insulation** 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.							
LU-MM#2	Shoreline Access Improvements in Brisbane	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: ▪ 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
		then southward west of US 101 to just north of Brisbane Lagoon where it would connect with the new Lagoon Road bike/pedestrian path. These proposed shoreline access improvements may continue to be refined in coordination with BCDC throughout the environmental process. 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.							

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	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. 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.	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: ▪ 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	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: ▪ 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
		▪ 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	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 *Federal Register* 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. 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. The contractor will notify the Authority, who will notify the CSLC, if the find is a cultural resource on or in the	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
		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. 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). 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.							
CUL-MM#3	Other Mitigation for Effects on NRHP-Eligible Pre-Contact Archaeological Resources	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. 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	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
		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. 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.								
Regional Growth										
No mitigation measures required.										

APE	area of potential effects
ATC	automatic train control
ATP	archaeological treatment plan
Authority	California High-Speed Rail Authority
BAAQMD	Bay Area Air Quality Management District
BCDC	San Francisco Bay Conservation and Development Commission
BEMP	built environment monitoring plan
BETP	built environment treatment plan
BMP	best management practice
BRMP	biological resources management plan
C.F.R.	Code of Federal Regulations
CAA	Clean Air Act
Cal.	California
CCC	Central California coast
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
cm	centimeter
CMP	compensatory mitigation plan
CRHR	California Register of Historical Resources
CRPR	California Rare Plant Ranks
CSLC	California State Lands Commission
CWA	Clean Water Act
dB	decibel
dBA	A-weighted decibel
EFH	essential fish habitat
EIR	environmental impact report
EMMA	Environmental Mitigation Management and Assessment system
EO	Executive Order
ESA	environmentally sensitive area
FESA	federal Endangered Species Act
Foundation	Bay Area Clean Air Foundation
FRA	Federal Railroad Administration
GHG	greenhouse gas
GIS	geographic information system
HSR	high-speed rail
I-	Interstate
IAMF	impact avoidance and minimization feature
L_{eq}	equivalent sound level
LMF	light maintenance facility
LOS	level of service
MBTA	Migratory Bird Treaty Act
MLD	most likely descendant
MOA	memorandum of agreement
MOU	memorandum of understanding
mph	miles per hour
MUNI	San Francisco Municipal Railway
NAGPRA	Native American Grave Protection and Repatriation Act
NAHC	Native American Heritage Commission
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NO_X	nitrogen oxides
NRHP	National Register of Historic Places
NZE	near zero emissions
O_3	ozone
O&M	operations and maintenance
OCS	overhead contact system
PA	Programmatic Agreement
PCEP	Peninsula Corridor Electrification Project
PI	principal investigator
$PM_{2.5}$	particulate matter less than or equal to 2.5 microns in diameter
PM_{10}	particulate matter less than or equal to 10 microns in diameter
RHA	Rivers and Harbors Act
ROD	record of decision
ROG	reactive organic gases
RRP	restoration and revegetation plan
RSA	resource study area
RTP	regional transportation plan
RWQCB	Regional Water Quality Control Board
SamTrans	San Mateo County Transit District
SB	Senate Bill
SR	State Route
SCVHA	Santa Clara Valley Habitat Agency
SCVHP	Santa Clara Valley Habitat Plan
SFBAAB	San Francisco Bay Area Air Basin
SFO	San Francisco International Airport
SHPO	State Historic Preservation Officer
SJC	Norman Y. Mineta San Jose International Airport
SOI	Secretary of the Interior
SWRCB	State Water Resources Control Board
TOD	transit-oriented development
UPRR	Union Pacific Railroad
US	U.S. Highway
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
USFWS	U.S. Fish and Wildlife Service
VCP	vegetation control plan
VMT	vehicle miles traveled
VOC	volatile organic compound
VTA	Santa Clara Valley Transportation Authority
WCP	weed control plan
WEAP	worker environmental awareness program
WEF	wildlife exclusion fencing
ZE	zero emissions

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	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 *California Manual on Uniform Traffic Control Devices* sections on temporary traffic controls (Caltrans 2017c) and would include a traffic control plan that includes, at a minimum, the following elements: ▪ 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
		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. ▪ 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. CTPs will consider and account for the potential for overlapping construction projects.							
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	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 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
		chemical stabilizer/suppressant. 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 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	During construction, the contractor will use: ▪ 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	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.	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	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 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	Prior to issuance of construction contracts, the Authority will incorporate the following material-hauling truck fleet mix requirements into the contract specifications:	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	▪ 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	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: ▪ 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	*Technical Memorandum: CHSTP Implementation Stage EMC Program Plan* (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 *California High-Speed Rail Authority Design Criteria Manual* (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. 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. 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.	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	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: ▪ 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
		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. 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. During construction, the policy calls for implementing the following: ▪ 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	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.	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	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.	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	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. 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. 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	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
		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. 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.							
BIO-IAMF#4	Conduct Operation and Maintenance Period WEAP Training	Prior to initiating 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 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.	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	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: ▪ 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
		those responsible for notification and report of injury or death of federally or state-listed species. ▪ 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. The BRMP will be submitted to the Authority for review and approval prior to any ground-disturbing activity.							
BIO-IAMF#6	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 avoid potential impacts on wildlife.	Pre-construction	Compliance reporting	Monthly	Authority/ Contractor	Contractor	Monthly reporting	Condition of construction contract
BIO-IAMF#7	Prevent Entrapment in Construction Materials and Excavations	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. 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.	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	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,	Pre-construction	Compliance reporting	Monthly	Authority/ Contractor	Contractor	Monthly reporting	Condition of construction contract

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		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 *Suggested Practices for Raptor 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 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

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		Operation, Maintenance, and Decommissioning (USFWS 2018). ▪ 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. 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 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	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 *Hydraulics and Hydrology Guidelines* (Authority 2011a), HSR Design Criteria Manual, *Caltrans Stormwater Quality Handbook: Project Planning and Design Guide* (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 *Project Planning and Design Guide* 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	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	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: ▪ 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. The following design standards will minimize the impacts of pier placement on floodplains and floodways: ▪ 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	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: ▪ 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
		▪ Site map 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. 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: ▪ Erosion Controls ▪ Sediment Controls ▪ Nonstormwater Management ▪ Materials Management ▪ Waste Management Furthermore, site-specific SWPPP will include, but is not limited to, the following measures to address water pollution control: ▪ 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
		or absent. ▪ 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. 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.							
HYD-IAMF#4	Prepare and Implement an Industrial Stormwater Pollution Prevention Plan	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: 1. Protect existing water quality and comply with the industrial NPDES permit. 2. Identify activities that have the potential to cause surface water or groundwater contamination and the BMPs required to reduce, eliminate, or prevent contamination. The contractor will provide a fully trained and certified Qualified Industrial Storm Water Practitioner to assist with compliance and implementation of this permit.	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	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: a. 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
		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. 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. 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. 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. 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.							
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 *Caltrans Seismic Design Criteria* 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	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: ▪ 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: *Field Guide to Construction Dewatering* (Caltrans 2014), *Caltrans Construction Site Best Management Practices (BMP) Manual* (Caltrans 2017a), and *Construction Site Best Management*	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
		Practice (BMP) Field Manual and Troubleshooting Guide (Caltrans 2003). BMPs for dewatering options and management are discussed in Section 1.2 of the *Field Guide to Construction Dewatering*, erosion control and soil stabilization are discussed in Section 3-5 of the *Caltrans Construction Site Best Management Process Manual*, non-stormwater management is discussed in Section 7 of the *Caltrans Construction Site Best Management Practices Manual*, and waste management at construction sites is discussed in Section 8 of the *Caltrans Construction Site Best Management Practices*. ▪ 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	Prior to the 90 percent design milestone for each CP[5] within the Project Section, the contractor will retain a PRS responsible for: ▪ 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. 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. All PRS staff will meet or exceed the qualifications for a Principal Paleontologist as defined in Caltrans' current *Standard Environmental Reference*, Chapter 8 (Caltrans 2017b) will be subject to review and approval by the Authority.	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	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 SVP *Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources* (SVP Standard Procedures) (SVP 2010), the *SVP Conditions of Receivership for Paleontologic Salvage Collections* (SVP Conditions of Receivership) (SVP 1996), and relevant guidance from Chapter 8 of the current Caltrans *Standard Environmental Reference* (Caltrans 2017b). 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.	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	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. 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 *Caltrans Standard Environmental Reference* (Caltrans 2017b). As such, the PRMMP will provide for at least the following: ▪ Implementation of the PRMMP by qualified personnel, including the following positions: – PRS – The PRS will be required to meet or exceed Principal Paleontologist qualifications per Chapter 8 of the current *Caltrans Standard Environmental Reference* (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 Caltrans *Standard Environmental Reference* (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
		units as well as finds, if any, in geologic units identified as less sensitive, or non-sensitive, for paleontological resources. ▪ 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	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. At a minimum, paleontological resources WEAP training will include information on: ▪ 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 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. 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.	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	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	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
		needed, treatment) takes place, as long as the find can be adequately protected in the judgment of the PRS. 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. 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. The requirements of this IAMF will be detailed in the PRMMP and presented as part of the paleontological resources WEAP training.							
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	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. ▪ 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
		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. ▪ 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	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 *Collison Hazard Analysis Guide: Commuter and Intercity Passenger Rail Service* (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. ▪ 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
		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. ▪ During design and construction, the contractor will conduct site-specific PHA and TVA assessments to apply the programmatic work to specific project designs. The Authority's safety and security committees will be responsible for implementing the recommendations contained in the hazard analysis during HSR operation.							
Socioeconomics and Communities									
SOCIO-IAMF#1	Construction Management Plan	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.	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	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." 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. 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. 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	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
		(Code of Civil Procedure § 1263.320a). 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: ▪ 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	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. The relocation implementation plan will be designed to meet the following objectives: ▪ 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. The relocation implementation plan will include the following components: ▪ 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	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 *HST Station Area*	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	*Development: General Principles and Guidelines* (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 *HST Station Area Development: General Principles and Guidelines* (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	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: ▪ 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, *Draft Design Opportunities for Local Jurisdictions and Aesthetic Requirements* (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 *Aesthetics Manual for Non-Station Structures* (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 *Draft Design Opportunities for Local Jurisdictions and Aesthetic Requirements* guidance document will be provided to local jurisdictions to inform their understanding of aesthetic options to be selected. The *Aesthetics Manual for Non-Station Structures* 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	Prior to selecting the design-build contractor, in accordance with the aesthetic review process identified for non-station structures in the Authority's *Draft Design Opportunities for Local Jurisdictions and Aesthetic Requirements* guidance document, the Authority will: ▪ 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
		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. ▪ 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	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.	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	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. 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	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 *Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation*. 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	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. 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.	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	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.	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	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	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
		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. 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.						BETP	

AASHTO American Association of State Highway and Transportation Officials
ADA Americans with Disabilities Act
ASTM American Society for Testing and Materials
APE area of potential effects
APLIC Avian Power Line Interaction Committee
APTA American Public Transportation Association
AREMA American Railway Engineering and Maintenance-of-Way Association
ASCE American Society of Civil Engineers
ATP archaeological treatment plan
Authority California High-Speed Rail Authority
BCDC San Francisco Bay Conservation and Development Commission
BEMP built environment monitoring plan
BETP built environment treatment plan
BGEPA Bald and Golden Eagle Protection Act
BMP best management practice
BRMP biological resources management plan
C.F.R. Code of Federal Regulations
Cal-OSHA California Division of Occupational Safety and Health
Caltrans California Department of Transportation
CARB California Air Resources Board
CDFW California Department of Fish and Wildlife
CDPH California Department of Public Health
CDSM cement deep-soil-mixing
CEQA California Environmental Quality Act
CERCLA Comprehensive Environmental Response, Compensation, and Liability Act
CESA California Endangered Species Act
CMP compensatory mitigation plan
CMP construction management plan
CP construction package
CPUC California Public Utilities Commission
CRHR California Register of Historical Resources
CTP construction transportation plan
CWA Clean Water Act
DTSC California Department of Toxic Substances Control
EMC electromagnetic compatibility
EMF electromagnetic field
EMI electromagnetic interference
EMMA Environmental Mitigation Management and Assessment
ESA environmental site assessment
ESA environmentally sensitive areas
FESA federal Endangered Species Act
FHWA Federal Highway Administration
FRA Federal Railroad Administration
FTA Federal Transit Administration
HEPA high efficiency particulate air
HSR high-speed rail
IAMF impact avoidance and minimization feature
IBC International Building Code
IEEE Institute of Electrical and Electronics Engineers
ISEP Implementation Stage Electromagnetic Compatibility Program Plan
MBTA Migratory Bird Treaty Act
MOA Memorandum of Agreement
mph miles per hour
NMFS National Marine Fisheries Service
NPDES National Pollutant Discharge Elimination System
NRHP National Register of Historic Places
O&M operations and maintenance
OSHA Occupational Safety & Health Administration
PDDM Project Development and Design Manual
PHA preliminary hazard analysis
$PM_{2.5}$ particulate matter smaller than or equal to 2.5 microns in diameter
Porter-Cologne Act Porter-Cologne Water Quality Control Act
PRM paleontological resource monitor
PRMMP paleontological resources monitoring and mitigation plan
PRS paleontological resources specialist
QSP Qualified SWPPP Practitioner
RCRA Resource Conservation and Recovery Act
RRP restoration and revegetation plan
RWQCB Regional Water Quality Control Board
SFBAAB San Francisco Bay Area Air Basin
SHPO State Historic Preservation Officer
SOI Secretary of the Interior
SPCCP spill prevention, control, and countermeasure plan
SSP systems safety program
SWPPP stormwater pollution prevention plan
SVP Society of Vertebrate Paleontology
SWRCB State Water Resources Control Board
TVA threat and vulnerability assessment
Uniform Act Uniform Relocation Assistance and Real Property Acquisition Policies Act, as amended
USACE U.S. Army Corps of Engineers
USEPA U.S. Environmental Protection Agency
USFWS U.S. Fish and Wildlife Service
VFHS Valley Fever Health and Safety
VMT vehicle miles traveled
VOC volatile organic compound
WEAP Worker Environmental Awareness Program
WCP weed control plan

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