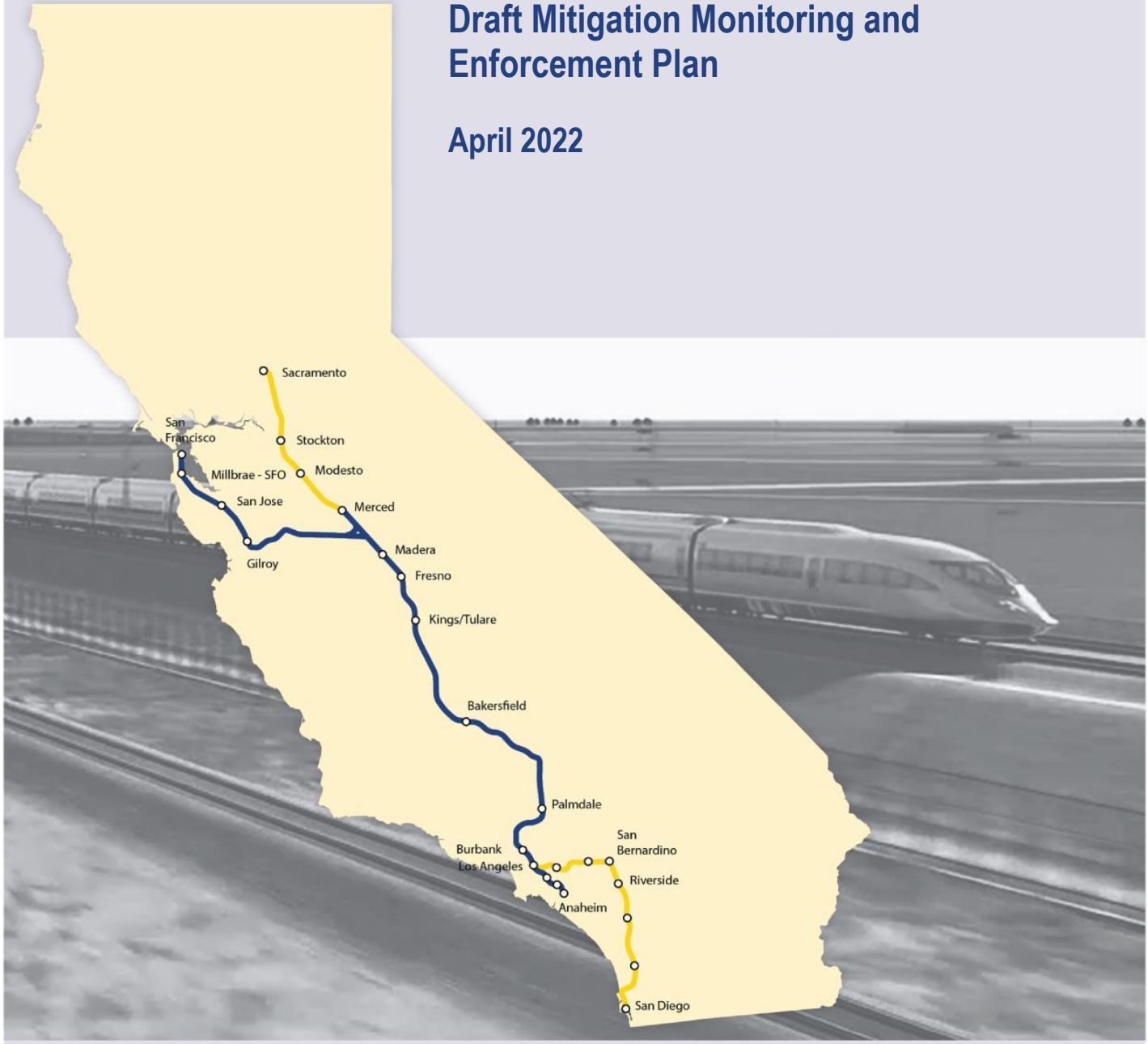
APPENDIX C: DRAFT MITIGATION MONITORING AND ENFORCEMENT PLAN

California High-Speed Rail Authority

San Jose to Merced Project Section

Draft Mitigation Monitoring and Enforcement Plan

April 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 Jose to Merced Project Section

DRAFT MITIGATION MONITORING AND ENFORCEMENT PLAN

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TABLE OF CONTENTS

Tables

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1 INTRODUCTION

In February 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 Jose to Merced Project Section of the California High-Speed Rail (HSR) Project.[1] 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 4 including a San Jose Diridon Station, a Downtown Gilroy Station, and a South Gilroy Maintenance-of-Way facility).

This Mitigation Monitoring and Enforcement Plan (MMEP)[2] has been prepared for the Preferred Alternative.

Table 1 of the MMEP describes mitigation measures from the Final EIR/EIS that will mitigate the adverse environmental impacts of the Preferred Alternative. These measures were developed by the Authority in consultation with appropriate agencies, as well as 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 impact avoidance and minimization features (IAMFs) including best management practices (BMPs) identified in the Final EIR/EIS and described in detail in the technical reports that support the environmental document. As a result of applying these IAMFs, the Preferred Alternative will avoid potential adverse environmental impacts in several resource areas, including electromagnetic fields/electromagnetic interference (EMF/EMI); public utilities and energy; geology, soils, seismicity, and paleontology; station planning, land use, and development; and regional growth. 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 will not occur. Three cooperating agencies are part of the NEPA review process: the U.S. Army Corps of Engineers; the U.S. Department of the Interior, Bureau of Reclamation; and the Surface Transportation Board. The following responsible agencies are included as part of the CEQA process:

- California Department of Fish and Wildlife
- California Department of Transportation
- California Department of Water Resources
- California Office of Historic Preservation
- California Public Utilities Commission
- California State Lands Commission
- Peninsula Corridor Joint Powers Board (Caltrain)
- Pajaro River Watershed Flood Prevention Authority
- Regional Water Quality Control Boards
- State Water Resources Control Board
- Santa Clara Valley Water District
- Central Valley Flood Protection Board
- Bay Area Air Quality Management District
- Monterey Bay Unified Air Pollution Control District
- San Joaquin Valley Unified Air Pollution Control District.

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[1] California High-Speed Rail Authority (Authority). 2022. *San Jose to Merced Project Section Final Environmental Impact Report/Environmental Impact Statement*. Sacramento, CA. https://hsr.ca.gov/programs/environmental-planning/project-section-environmental-documents-tier-2/san-jose-to-merced-project-section-draft-environmental-impact-report-environmental-impact-statement/.

[2] The MMEP is consistent with CEQA requirements for mitigation monitoring as set forth in Sections 15097 and 15091, subdivision (d) of the CEQA Guidelines (Title 14 California Code of Regulations, Division 6, Chapter 3). Where mitigation is for NEPA purposes only or CEQA purposes only, it is identified accordingly.

Like the mitigation measures listed in Table 1, the project IAMFs and compliance with regulatory requirements are a condition of approval and must be implemented by the Authority during design, construction, and operation of the Preferred Alternative. The IAMFs that are part of the Preferred Alternative are listed in Table 2 and described in Appendix 2-E, Project Impact Avoidance and Minimization Features, in Volume 2 of the Final EIR/EIS.

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 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 3.8.4.2
- Geology, Soils, Seismicity, and Paleontological Resources – Section 3.9.2
- Hazardous Materials and Waste – 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
- Agricultural Farmland – Section 3.14.2
- Parks, Recreation, and Open Space – Section 3.15.2
- Aesthetics and Visual Quality – Section 3.16.2
- Cultural Resources – Section 3.17.2
- Regional Growth – Section 3.18.2
- Cumulative Impacts – Section 3.19.2

The MMEP adheres to the Council on Environmental Quality's (CEQ) regulations (40 Code of Federal Regulations [C.F.R.] § 1505[3]) 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.

[3] The CEQ issued new regulations on July 14, 2020, effective September 14, 2020, updating the NEPA implementing procedures at 40 C.F.R. Part 1500. 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 will 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 Volume 1 of the Final EIR/EIS. The specific provisions contained in this MMEP are presented as tables 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 Measure(s):** Provides the mitigation measure and monitoring requirements 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/or conditions.
- **Reporting Schedule:** Identifies the stage of the project and the frequency that reporting is to occur, if reporting is required.
- **Implementing Party/Monitoring/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.

2.1 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 Contractors, 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 will be extended 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 shall implement the mitigation measures that are pertinent to its scope of work. The Contractor shall monitor construction activities to ensure that the mitigation measures are being properly implemented and accurately report its 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 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 Authority 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 their 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 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 Programmatic Agreement with the California State Historic Preservation Officer, and the San Jose to Merced 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 (EMMA) 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. 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 Jose to Merced Project Section: Mitigation Monitoring and Enforcement Plan

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
Transportation										
TR-MM#1c	Optimize Signal Coordination on West Santa Clara Street from Stockton Street to Autumn Street in San Jose (NEPA Effect Only)	Prior to HSR operations, the Contractor will modify the signal and optimize the signal timings and coordination for the traffic signals on West Santa Clara Street from Stockton Street to Autumn Street. This improvement includes the intersections of West Santa Clara Street with Stockton Street, Cahill Street, Montgomery Street, and Autumn Street. The Contractor will prepare all materials necessary for the approval of the City of San Jose for the implementation of 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#7: Continuous Permanent Delay/Congestion Consequences on Intersection Operations
TR-MM#1e	Monterey Road/Chynoweth Avenue–Roeder Road—Widen and Reconfigure (NEPA Effect Only)	Prior to HSR operations, the Contractor will widen and reconfigure the Monterey Road/Chynoweth Avenue–Roeder Road intersection. The specific improvements are limited to: widening the northbound Monterey Road approach to add an additional left turn pocket and a right turn pocket, modify the eastbound Chynoweth Avenue approach to provide one shared through-right and one left turn only lane and widen the westbound Roeder Road approach to provide for an additional left turn pocket. This will require acquisition of additional right-of-way from the northeast and southeast corners of the intersection. These parcels are currently occupied by gas pumps associated with two gas stations. The acquisition will result in displacement of some of the gas pumps, but the pumps could be relocated on the same property, and the business is not likely to be completely displaced.	Design/ construction	Contract requirements; compliance reporting	As needed	Authority/ Contractor	Authority	Final design and prior to construction	Condition of construction contract	Impact TR#7: Continuous Permanent Delay/Congestion Consequences on Intersection Operations Impact S&S#4: Continuous Permanent Impacts on Emergency Access and Response Times
TR-MM#1q	Monterey Road/Tilton Avenue—Various Improvements (NEPA Effect Only)	This measure will include reconfiguring the Monterey Road/Tilton Avenue intersection as follows: ▪ The mitigation is the interconnection of the Monterey Road/Tilton Avenue intersection with the Monterey Road/Burnett Avenue intersection, which will be accomplished within the roadway right-of-way.	Design/ construction	Contract requirements; compliance reporting	As needed	Authority/ Contractor	Authority	Final design and prior to construction	Condition of construction contract	Impact TR#7: Continuous Permanent Delay/Congestion Consequences on Intersection Operations
TR-MM#1t	Monterey Road/San Martin Avenue—Restripe Southbound Approach (NEPA Effect Only)	Prior to HSR operations, the Contractor will restripe the southbound Monterey Road approach to San Martin Avenue to provide additional capacity for the southbound left turn lane. This improvement will require the removal of the adjacent northbound left turn lane on Monterey Road into Burbank Avenue. This improvement will not require right-of way acquisition. The Contractor will prepare all materials necessary for the approval of Santa Clara County for the implementation of the modification. This mitigation measure will improve the operation at this intersection by providing additional vehicle capacity but will not avoid an adverse effect. Implementing TR-MM#1t will result in reduced vehicle capacity at an adjacent intersection (Monterey Road/Burbank Avenue).	Design/ construction	Contract requirements; compliance reporting	As needed	Authority/ Contractor	Authority	Final design and prior to construction	Condition of construction contract	Impact TR#7: Continuous Permanent Delay/Congestion Consequences on Intersection Operations Impact S&S#4: Continuous Permanent Impacts on Emergency Access and Response Times

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
TR-MM #1u	Monterey Road/IOOF Avenue—Widen and Reconfigure Southbound Approach (NEPA Effect Only)	Prior to HSR operations, the Contractor will widen the southbound approach of Monterey Road to IOOF Avenue to provide an additional southbound left turn pocket.	Design/ construction	Contract requirements; compliance reporting	As needed	Authority/ Contractor	Authority	Final design and prior to construction	Condition of construction contract	Impact TR#7: Continuous Permanent Delay/Congestion Consequences on Intersection Operations Impact S&S#4: Continuous Permanent Impacts on Emergency Access and Response Times
TR-MM#1w	Chestnut Street/Luchessa Street—Reconfigure Southbound Approach (NEPA Effect Only)	Prior to HSR operations, the Contractor will restripe the southbound approach of Chestnut Street to Luchessa Street to provide a southbound right turn pocket. This improvement will not require right-of-way acquisition.	Design/ construction	Contract requirements; compliance reporting	As needed	Authority/ Contractor	Authority	Final design and prior to construction	Condition of construction contract	Impact TR#7: Continuous Permanent Delay/Congestion Consequences on Intersection Operations Impact S&S#4: Continuous Permanent Impacts on Emergency Access and Response Times
TR-MM#1x	Install Traffic Signals at Various Locations (NEPA Effect Only)	Prior to HSR operations, the Contractor will install traffic signals at the following locations: ▪ TR-MM#1x.1: Cahill Street/Stover-Crandall Street) ▪ TR-MM#1x.2: Montgomery Street/Stover-Crandall Street ▪ TR-MM#1x.3: Cahill Street/West San Fernando Street ▪ TR-MM#1x.6: East Main Avenue/Depot Street ▪ TR-MM#1x.9: School Access/IOOF Avenue ▪ TR-MM#1x.10: SR 25/Bloomfield. The Contractor will prepare all materials necessary for the approval of the City of San Jose, the City of Morgan Hill, the City of Gilroy, and Caltrans (as applicable) for the implementation of this improvement.	Design/ construction	Contract requirements; compliance reporting	As needed	Authority/ Contractor	Authority	Final design and prior to construction	Condition of construction contract	Impact TR#4: Permanent Delay/Congestion Consequences on Intersections from Permanent Road Changes (for TR-MM#1x.10) Impact TR#7: Continuous Permanent Delay/Congestion Consequences on Intersection Operations (for all other mitigation measures listed in Mitigation Text column) Impact S&S#4: Continuous Permanent Impacts on Emergency Access and Response Times (for TR-MM#x.6, x.8, x.9, and x.10)
TR-MM#2	Install Transit Signal Priority	Prior to construction, the Contractor will install bus transit signal priority at all traffic signals in the following locations: ▪ San Jose Diridon Station Area – Cahill Street between West Santa Clara Street and Park Avenue – Montgomery Street between West Santa Clara Street and Park Avenue – Autumn Street between West Santa Clara Street and Park Avenue ▪ Gilroy Station Area Prior to operations, the Contractor will install bus transit signal priority at all traffic signals in the following locations: ▪ San Jose Diridon Station Area – Cahill Street between West Santa Clara Street and Park Avenue – Montgomery Street between West Santa Clara Street and Park Avenue – Autumn Street between West Santa Clara Street and Park Avenue ▪ Monterey Road from Capitol Expressway and Blossom Hill Road ▪ Gilroy Station Area ▪ Monterey Road between 7th Street and 10th Street	Pre-construction Pre-operation	Design Design	Prior to commencement of construction Prior to commencement of operation	Authority/ Contractor	Authority/ Contractor	Improvements to address traffic delay impacts	Condition of construction contract	Impact TR#10: Temporary Impacts on Bus Transit Impact TR#12: Permanent Impacts on Bus Transit Impact TR#13: Continuous Permanent Impacts on Bus Services

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		▪ Alexander Street between 7th Street and 10th Street The Contractor will prepare all materials necessary for the jurisdictional approvals for the implementation of this improvement.								
TR-MM#3	Railway Disruption Control Plan	Prior to construction, the Contractor will prepare a railway disruption control plan for Authority approval. During construction, the Contractor will implement the plan. 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 for an expeditious completion of construction. The construction Contractor will coordinate with passenger rail providers (Caltrain, ACE, Capitol Corridor, TAMC, and Amtrak) and with UPRR in advance and during any potential disruption to passenger or freight operations or passenger or UPRR facilities. The construction Contractor will maintain passenger rail and UPRR's emergency access 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 freight stakeholder 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	Pre-construction	Design	Prior to commencement of construction	Authority/ Contractor	Contractor	Develop and implement railway disruption control plan	Condition of construction contract	Impact TR#11: Temporary Impacts on Passenger Rail Operations Impact TR#20: Temporary Impacts on Freight Rail Operations

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		completion of construction. Measures that will be implemented throughout the course of project construction will include, but will 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. ▪ 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 facilitate 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 local and regional transit providers to support advance notice to transit riders of any temporary disruption in passenger rail service. The Authority will provide a bus bridge from the College Park Station to the Santa Clara Station and San Jose Diridon Station to maintain passenger access to Caltrain service during the 1 to 2 years that the station will be closed because of track work.							
Air Quality and Greenhouse Gases										
AQ-MM#1	Implement Additional On-Site Emissions Controls to Reduce Fugitive Dust	During construction, the Contractor shall employ the following measures to minimize and control fugitive dust emissions: ▪ 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 shall respond and take corrective action within 48 hours. The phone number for the local air district shall also be visible to ensure	Construction	Contract requirements; compliance report	As needed	Authority/ Contractor	Authority	Daily record keeping and report as needed.	Condition of construction contract	Impact AQ#1: Temporary Direct and Indirect Impacts on Air Quality within the SFBAAB Impact AQ#3: Temporary Direct and Indirect Impacts on Air Quality within the SJVAB Impact AQ#4: Temporary Direct Impacts on Implementation of an Applicable Air Quality Plan Impact AQ#5: Temporary Direct Impacts on Localized Air Quality—Criteria Pollutants

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		compliance with applicable regulations.								
AQ-MM#2	Construction Emissions Reductions – Requirements for use of Zero Emission (ZE) and/or Near Zero Emission (NZE) Vehicles and off-road equipment	This mitigation measure will reduce the impact of construction emissions from project related on-road vehicles and off-road equipment. All remaining emissions after implementation of this measure will be offset with emission credits required under Mitigation Measures AQ-MM#3 and AQ-MM#4. The Authority and all project construction contractors shall require that a minimum of 25%, with a goal of 100%, of all light-duty on-road vehicles (e.g., passenger cars, light-duty trucks) associated with the project (e.g., on-site vehicles, contractor vehicles) use zero emission (ZE) or near-zero emission (NZE) technology. The Authority and all project construction contractors shall have the goal that a minimum of 25% 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 shall have the goal that a minimum of 10% of off-road construction equipment use ZE or NZE vehicles. If local or state regulations mandate a faster transition to using ZE and/or NZE vehicles at the time of construction, the more stringent regulations will be applied. For example, Executive Order (EO) N-79-20, issued by California Governor Newsom September 23, 2020, currently states the following: ▪ Light duty and passenger car sales be 100% ZE V by 2035 ▪ Full transition to ZEV short haul/drayage trucks by 2035 ▪ Full transition to ZEV 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.	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 operating permit will be made available by the Authority at the time of mobilization of each piece of equipment	Impact AQ#1: Temporary Direct and Indirect Impacts on Air Quality within the SFBAAB Impact AQ#3: Temporary Direct and Indirect Impacts on Air Quality within the SJVAB Impact AQ#4: Temporary Direct Impacts on Implementation of an Applicable Air Quality Plan Impact AQ#5: Temporary Direct Impacts on Localized Air Quality—Criteria Pollutants
AQ-MM#3	Offset Project Construction Emissions in the San Francisco Bay Area Air Basin	Prior to issuance of construction contracts, the Authority will conduct an air quality analysis that evaluates the conditions that exist at that time. If the analysis determines that there will be exceedances of the VOC or NOx thresholds, even after the application of the mitigation in AQ-MM#2, the Authority will enter into an agreement with the BAAQMD, to reduce VOC and NO_X to the required levels by acquiring offsets. The required levels in the SFBAAB are as follows: 1. For emissions in excess of the General Conformity *de*	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 within the SFBAAB Impact AQ#4: Temporary Direct Impacts on Implementation of an Applicable Air Quality Plan

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		minimis thresholds (NO_X): net zero.[4] 2. For emissions not in excess of *de minimis* thresholds but above the BAAQMD's daily emission thresholds (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 the 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 commitment by BAAQMD to: (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 emission 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 emission reductions in the SFBAAB that are real, surplus, quantifiable, enforceable, and will 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 reductions necessary for GCD must be achieved (contracted and delivered) by the applicable year in question. Funding will need to be received by BAAQMD prior to contracting with offset participants and should allow enough time to receive and process applications to fund and implement offsite reduction projects prior to commencement of project activities being reduced. This will roughly equate to 1 year prior to the required mitigation; additional lead time may be necessary depending on the level of offsite emission reductions required for a specific year.							
AQ-MM#4	Offset Project Construction Emissions	On June 19, 2014, the SJVAPCD and the Authority entered an MOU that establishes the framework for fully	Pre-construction	Reporting; funding	Prior to construction	Authority/ Contractor	Authority/ Contractor	Offset project construction	Pursuant to the MOU, the Authority	Impact AQ#3: Temporary Direct and Indirect Impacts on Air Quality within the

[4] The project will implement measures and best practices to minimize emissions from project construction. After implementation of these measures, emission levels that still exceed thresholds will be offset to the extent necessary to satisfy General Conformity.

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
	in the San Joaquin Valley Air Basin	mitigating to net-zero construction emissions of NOx, VOC, PM_{10}, and $PM_{2.5}$ from the entire HSR project within the SJVAB (Authority and SJUVAPCD 2014). Emissions generated by construction of the portion of the project within the SJVAB are subject to this MOU and, therefore, must be offset to net zero. Pursuant to the MOU, the Authority and the SJVAPCD will enter into a Voluntary Emissions Reduction Agreement (VERA) to cover the portion of the project approved and funded for construction within the SJVAB. The project-level VERA must be executed prior to commencement of construction and the mitigation fees and offsets delivered and achieved according to the requirements of the VERA and MOU.						criteria air pollutant emissions through funding	shall enter into a VERA (or modify the existing VERA) with the SJVAPCD to cover the portion of the project approved and funded for construction within the SJVAB	SJVAB Impact AQ#4: Temporary Direct Impacts on Implementation of an Applicable Air Quality Plan
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} of 80 dBA during the day and 70 dBA at night for residential land use, 85 dBA for both day and night for commercial land use, and 90 dBA 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 required 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: ▪ Install a temporary construction site noise barrier near a noise source. ▪ Avoid nighttime construction in residential neighborhoods. ▪ Locate stationary construction equipment as far as possible from noise-sensitive sites. ▪ Reroute construction truck traffic along roadways that will cause the least disturbance to residents. ▪ During nighttime work, use smart backup alarms, which automatically adjust the alarm level based on the background noise level, or switch off backup 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	Pre-construction/ construction	Design/ reporting	Prior to construction/ weekly monitoring	Authority/ Contractor	Authority/Contractor	Placement of noise barriers and construction equipment to mitigate construction noise, operational noise mitigation measures, and weekly monitoring construction noise	Contract requirements and specifications	Impact NV#1: Temporary Exposure of Sensitive Receptors to Construction Noise Impact PK#1: Temporary Changes from Noise, Vibration, and Construction Emissions on Use and User Experience of Parks, Recreational Facilities, and Open Space Resources

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		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 movable 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 a pile driver to 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 31 of the following year documenting how it implemented the noise monitoring program.							
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 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#9: Temporary Exposure of Sensitive Receptors and Buildings to Construction Vibration Impact PK#1: Temporary Changes from Noise, Vibration, and Construction Emissions on Use and User Experience of Parks, Recreational Facilities, and Open Space Resources

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NV-MM#3	Implement Proposed California High-Speed Rail Project Noise Mitigation Guidelines	Various options exist to address any 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 guidance manual (FRA 2012): High-Speed Ground Transportation Noise and Vibration Impact Assessment, DOT/FRA/ORD-12/15. U.S. Department of Transportation, Office of Railroad Policy and Development. September 2012. The Noise and Vibration Mitigation Guidelines, included as Volume 2, Appendix 3.4-B, describe the following mitigation measures and approach: ▪ **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 receiver, (2) be of an impervious material with a minimum surface density of four 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. Depending on the situation, noise barriers can become visually intrusive. Typically, the noise barrier style is selected with input from the local jurisdiction to reduce the visual effect of barriers on adjacent lands uses (Authority 2014). For example, noise barriers could be solid or transparent, and made of various colors, materials, and surface treatments. Transparent materials will not be used in noise barriers located in Audubon Important Bird Areas or where noise barriers are being used to	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 Project noise and vibration mitigation guidelines	Impact NV#2: Intermittent Permanent Exposure of Sensitive Receptors to Noise from Train Operations Impact NV#5: Intermittent Permanent Human Annoyance from Onset of Passing HSR Trains Impact NV#6: Permanent Exposure of Sensitive Receptors to Vehicular Traffic Noise Increases Impact NV#8: Permanent Exposure of Sensitive Receptors to Traction Power Facility Noise Impact PK#7: Permanent Changes from Noise and Vibration on Parks, Recreation, and Open Space Resource Character and Use Impact PK#15: Permanent Changes from Noise and Vibration on School District Play Area Character and Use

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		attenuate bird startle effects. Pursuant to the 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 will consist of solid, semitransparent, or transparent materials, as defined in *Aesthetic Options for Non-Station Structures* (Authority 2014). Volume 2, Appendix 3.4-B, Noise and Mitigation Guidelines, provides additional details. ▪ **Install Building Sound Insulation**—If noise barriers are not proposed for receptors with severe impacts, or if proposed noise barriers do 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 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								

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		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 warning horns when 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 will 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; HSR cannot legally establish or require a Quiet Zone. However, HSR will assist local communities with this process through the installation of four-quad gates and channelization at all at-grade crossings that presently lack them, which will help cities to implement Quiet Zones, should they choose to do so. The Authority or its Contractor 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 FRA. Establishing Quiet Zones will eliminate train warning horns for all trains approaching at-grade highway and rail crossings under normal, nonemergency 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 Train Operations Impact PK#7: Permanent Changes from Noise and Vibration on Parks, Recreation, and Open Space Resource Character and Use Impact PK#15: Permanent Changes from Noise and Vibration on School District Play Area Character and Use
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. §§201.12/201.13) 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 Train Operations
NV-MM#6	Special Trackwork at Crossovers, Turnouts, and Insulated Joints	Prior to construction, the Contractor will provide the Authority with an HSR operations noise technical report for review and approval. The report will address minimization or elimination of rail gaps at crossovers and turnouts. Because the impacts of HSR wheels over rail gaps at turnouts increases 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 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 impact report.	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 Train Operations
NV-MM#7	Additional Noise Analysis during Final Design	Prior to construction, the contactor will provide the Authority with an HSR operations noise technical report for review and approval. If final design or final vehicle	Pre-construction	Design	Prior to Construction/ final vehicle	Authority/vehicle contractor	Authority/vehicle contractor	Reassessment of noise and vibration impacts	Submit assessment and if required, supplemental	Impact NV#2: Intermittent Permanent Exposure of Sensitive Receptors to Noise from Train Operations

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		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.			specification			and recommended mitigation following final design	environmental documentation	Impact NV#5: Intermittent Permanent Human Annoyance from Onset of Passing HSR Trains Impact NV#6: Permanent Exposure of Sensitive Receptors to Vehicular Traffic Noise Increases Impact NV#8: Permanent Exposure of Sensitive Receptors to 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. Table 3.4-22 in the Final EIR/EIS lists the mitigation procedures and their locations.	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 (Volume 2, Appendix 3.4-B)	Impact NV#10: Intermittent Permanent Exposure of Sensitive Receptors to Vibration from Operations Impact PK#7: Permanent Changes from Noise and Vibration on Parks, Recreation, and Open Space Resource Character and Use
Biological and Aquatic Resources										
BIO-MM#P1	Provide Compensatory Mitigation for Impacts onto the Grasslands Ecological Area	To fulfill a program-level commitment set out in the *Bay Area to Central Valley High-Speed Train Final Program EIR/EIS* (2008) to preserve habitat and open space values and offset impacts to wetlands, sensitive plant and wildlife species, and other biological resources in and around the Grasslands Ecological Area and other areas along the alignment, the Authority or entities acting on behalf of the Authority will acquire agricultural, conservation or open space easements on 10,000 acres of land generally located within or adjacent to the GEA. The Authority will provide this compensatory mitigation by initially implementing the requirements identified in BIO-MM#s 12, 16, 20, 22, 24, 28, 31, 33, 35, 40, 42, 47, 50, 55, 57, 58, 61, 63, 72, 74, 78, 79a, 79b, 84a, 84b, and 85. To the extent the compensatory mitigation for biological and aquatic resources required under the project-level mitigation measures results in less than 10,000 acres protected under easements, or by other means, on lands generally located within or adjacent to the GEA, the Authority will acquire agricultural, conservation, or open space easements to ensure a total of 10,000 acres of compensatory mitigation as follows: The easements will be acquired from willing sellers, and to the extent feasible, will be located generally within or adjacent to the GEA, with a focus on areas around Los Banos and Volta. To the extent it is not feasible to acquire easements on 10,000 acres in the vicinity of the GEA, easements will be acquired in other areas of the San Jose to Merced Project Section, including in the Diablo Range area located between South Santa Clara Valley and San Joaquin Valley and in and around the Central Valley Wye portion of the project section. The eventual locations of easements will be coordinated with USFWS, CDFW, and the Grassland Water District. Acquisition of easements will	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 compensatory mitigation	Condition of construction contract/condition of regulatory permits	Impact BIO#1: Permanent Conversion or Degradation of Habitat for Special-Status Plant Species Impact BIO#2a: Permanent Conversion or Degradation of Habitat for and Mortality of Bay Checkerspot Butterfly Impact BIO#3: Permanent Conversion or Degradation of Habitat for and Mortality of Vernal Pool Crustaceans Impact BIO#4: Removal or Pruning of Elderberry Plants Potentially Supporting Valley Elderberry Longhorn Beetle Impact BIO#5: Permanent Conversion or Degradation of Habitat for and Mortality of Crotch Bumble Bee Impact BIO#6: Permanent Conversion of Habitat for and Direct Mortality of Steelhead and Pacific Lamprey, and Permanent Conversion of Essential Fish Habitat for Pacific Coast Salmon Impact BIO#7: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Tiger Salamander Impact BIO#8: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Red-Legged Frog Impact BIO#9: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Foothill Yellow-Legged Frog Impact BIO#12: Permanent Conversion or Degradation of Habitat for and Direct

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		be completed within 5 years of the start of operations for the project section, to the extent feasible.								Mortality of Blunt-Nosed Leopard Lizard Impact BIO#14: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Giant Garter Snake Impact BIO#17: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Burrowing Owl Impact BIO#18: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Golden Eagle and Bald Eagle Impact BIO#21: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Swainson's Hawks Impact BIO#24: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Tricolored Blackbird and Yellow-Headed Blackbird Impact BIO#25: Permanent Conversion or Degradation of Habitat for and Disturbance of Sandhill Crane Impact BIO#26b: Loss of Denning and Dispersal Habitat for and Direct Mortality or Disturbance of San Joaquin Kit Fox Impact BIO#27: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Fresno Kangaroo Rat Impact BIO#35: Permanent Conversion or Degradation of Special-Status Plant Communities Impact BIO#37: Permanent Conversion or Degradation of Aquatic Resources Considered Jurisdictional under Section 404 of the Federal Clean Water Act or Regulated by the State Impact BIO#38: Permanent Conversion or Degradation of Resources Regulated under California Fish and Game Code Section 1600 et seq. Impact BIO#43: Permanent Impacts on Wildlife Movement Impact BIO#51: Permanent Conversion or Degradation of Conservation Areas Impact BIO#53: Conflict with Santa Clara Valley Habitat Plan
BIO-MM#1	Prepare and Implement a Restoration and Revegetation Plan	Prior to any ground-disturbing activity, the Project Biologist will prepare a restoration and revegetation plan (RRP) to address temporary impacts resulting from ground-	Pre-construction/ construction/ post-construction	Surveying/ monitoring/ reporting	In accordance with agency permit	Authority/ Contractor/ Project Botanist	Authority/ Contractor/ Project Botanist	Prepare and implement RRP/ report findings	Condition of construction contract/condition of	Impact BIO#1: Permanent Conversion or Degradation of Habitat for Special-Status Plant Species

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		disturbing activities within areas that potentially support special-status species, wetlands, and/or other aquatic resources. Restoration activities may include, but not be limited to: grading landform contours to approximate pre-disturbance conditions, stockpiling and spreading topsoil, removing invasive plant species (including host plants for butterflies), revegetating disturbed areas with native plant species, and using certified weed-free straw and mulch. The Authority will implement the RRP in all temporarily disturbed areas outside of the permanent right-of-way that potentially support special-status species, wetlands, and/or other aquatic resources. Consistent with Section 1415 of the Fixing America's Surface Transportation Act (FAST Act) restoration activities 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% 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/or quantitative data gathering. ▪ Maintenance, monitoring, and reporting schedules, including an annual report due to the Authority by January 31 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.			requirements				regulatory permits	Impact BIO#2: Permanent Conversion or Degradation of Habitat for and Mortality of Bay Checkerspot Butterfly Impact BIO#3: Permanent Conversion or Degradation of Habitat for and Mortality of Vernal Pool Crustaceans Impact BIO#4: Removal or Pruning of Elderberry Plants Potentially Supporting Valley Elderberry Longhorn Beetle Impact BIO#5: Permanent Conversion or Degradation of Habitat for and Mortality of Crotch Bumble Bee Impact BIO#6: Permanent Conversion of Habitat for and Direct Mortality of Steelhead and Pacific Lamprey, and Permanent Conversion of Essential Fish Habitat for Pacific Coast Salmon Impact BIO#7: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Tiger Salamander Impact BIO#8: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Red-Legged Frog Impact BIO#9: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Foothill Yellow-Legged Frog Impact BIO#10: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Western Spadefoot Impact BIO#11: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Western Pond Turtle Impact BIO#12: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Blunt-Nosed Leopard Lizard Impact BIO#13: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Joaquin Coachwhip, Northern California Legless Lizard, and Coast Horned Lizard Impact BIO#14: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Giant Garter Snake Impact BIO#15: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Short-Eared Owl and Grasshopper Sparrow Impact BIO#16: Permanent Conversion or Degradation of Habitat for Mountain Plover and Disturbance of Western

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										Snowy Plover (Interior Population) Impact BIO#17: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Burrowing Owl Impact BIO#23: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Least Bell's Vireo, Yellow Warbler, and Yellow-Breasted Chat Impact BIO#24: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Tricolored Blackbird and Yellow-Headed Blackbird Impact BIO#25: Permanent Conversion or Degradation of Habitat for and Disturbance of Sandhill Crane Impact BIO#26: Loss of Denning and Dispersal Habitat for and Direct Mortality or Disturbance of San Joaquin Kit Fox Impact BIO#27: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Fresno Kangaroo Rat Impact BIO#28: Permanent Conversion or Degradation of Habitat for and Direct Mortality of American Badger Impact BIO#29: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Francisco Dusky-Footed Woodrat and Ringtail Impact BIO#34: Removal or Degradation of Habitat for and Disturbance of Waterfowl and Shorebirds Impact BIO#35: Permanent Conversion or Degradation of Special-Status Plant Communities Impact BIO#37: Permanent Conversion or Degradation of Aquatic Resources Considered waters of the U.S. or waters of the State Impact BIO#38: Permanent Conversion or Degradation of Resources Regulated 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 weed control plan (WCP), subject to review and approval by the Authority. The purpose of the WCP is to establish approaches to minimize and avoid the spread of invasive weeds during ground-disturbing activities during	Design/pre-construction	Prepare plan/ reporting	Monthly	Authority/ Contractor	Authority	Monthly reporting	Condition of construction contract	Impact BIO#1: Permanent Conversion or Degradation of Habitat for Special-Status Plant Species Impact BIO#2: Permanent Conversion or Degradation of Habitat for and Mortality of

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		construction and O&M. The WCP will include, at a minimum, the following: ▪ A requirement to delineate environmentally sensitive areas (ESA) in the field prior to weed control activities. ▪ A schedule for weed surveys to be conducted in coordination with the BRMP. ▪ Success criteria for invasive weed control. The success criteria will be linked to the BRMP standards for on-site work during ground-disturbing activities. In particular, the criteria will establish limits on the introduction and spread of invasive species, as defined by the California Invasive Plant Council, to less than or equal to the pre-disturbance conditions in the area temporarily affected by ground-disturbing activities. If invasive species cover is found to exceed pre-disturbance conditions by greater than 10% or is 10% 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 and/or establishment of invasive species and reflects the same revegetation performance standards as the WCP. ▪ Identification of weed control treatments, including permitted herbicides and manual and mechanical removal methods. ▪ Timeframes for weed control treatment for each plant species. ▪ Identification of fire prevention measures.								Bay Checkerspot Butterfly Impact BIO#3: Permanent Conversion or Degradation of Habitat for and Mortality of Vernal Pool Crustaceans Impact BIO#4: Removal or Pruning of Elderberry Plants Potentially Supporting Valley Elderberry Longhorn Beetle Impact BIO#5: Permanent Conversion or Degradation of Habitat for and Mortality of Crotch Bumble Bee Impact BIO#7: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Tiger Salamander Impact BIO#8: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Red-Legged Frog Impact BIO#9: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Foothill Yellow-Legged Frog Impact BIO#10: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Western Spadefoot Impact BIO#11: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Western Pond Turtle Impact BIO#12: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Blunt-Nosed Leopard Lizard Impact BIO#13: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Joaquin Coachwhip, Northern California Legless Lizard, and Coast Horned Lizard Impact BIO#14: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Giant Garter Snake Impact BIO#15: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Short-Eared Owl and Grasshopper Sparrow Impact BIO#16: Permanent Conversion or Degradation of Habitat for Mountain Plover and Disturbance of Western Snowy Plover (Interior Population) Impact BIO#17: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Burrowing Owl Impact BIO#23: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Least Bell's Vireo, Yellow

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
										Warbler, and Yellow-Breasted Chat Impact BIO#24: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Tricolored Blackbird and Yellow-Headed Blackbird Impact BIO#25: Permanent Conversion or Degradation of Habitat for and Disturbance of Sandhill Crane Impact BIO#26: Loss of Denning and Dispersal Habitat for and Direct Mortality or Disturbance of San Joaquin Kit Fox Impact BIO#27: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Fresno Kangaroo Rat Impact BIO#28: Permanent Conversion or Degradation of Habitat for and Direct Mortality of American Badger Impact BIO#29: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Francisco Dusky-Footed Woodrat and Ringtail Impact BIO#34: Removal or Degradation of Habitat for and Disturbance of Waterfowl and Shorebirds Impact BIO#35: Permanent Conversion or Degradation of Special-Status Plant Communities Impact BIO#37: Permanent Conversion or Degradation of Aquatic Resources Considered waters of the U.S. or waters of the State Impact BIO#38: Permanent Conversion or Degradation of Resources Regulated 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. ESAs will be located around the perimeter of the special-status species or aquatic resources within the work area so that they are avoided during construction. The Project Biologist will also direct the installation of wildlife exclusion fencing (WEF) by the Contractor to prevent special-status wildlife species from entering work areas. The WEF will be installed below grade (e.g., 6–10 inches below grade) and will have exit doors to allow animals that may be inside an enclosed area to leave the area. The Project Biologist will delineate the ESAs and WEF based on the results of habitat	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	Impact BIO#1: Permanent Conversion or Degradation of Habitat for Special-Status Plant Species Impact BIO#2: Permanent Conversion or Degradation of Habitat for and Mortality of Bay Checkerspot Butterfly Impact BIO#3: Permanent Conversion or Degradation of Habitat for and Mortality of Vernal Pool Crustaceans Impact BIO#4: Removal or Pruning of Elderberry Plants Potentially Supporting Valley Elderberry Longhorn Beetle Impact BIO#5: Permanent Conversion or Degradation of Habitat for and Mortality of

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		mapping or modeling and any pre-construction surveys, and in coordination with the Authority. The Project Biologist will also direct the installation of construction exclusionary fencing (exclusionary fencing) at the boundary of the work area, as appropriate, to exclude special-status species or aquatic resources from the work area during the construction period. The Project Biologist will regularly inspect and maintain the ESA, WEF, and exclusionary fencing. ESA, WEF, and exclusionary fencing. 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.								Crotch Bumble Bee Impact BIO#6: Permanent Conversion of Habitat for and Direct Mortality of Steelhead and Pacific Lamprey, and Permanent Conversion of Essential Fish Habitat for Pacific Coast Salmon Impact BIO#7: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Tiger Salamander Impact BIO#8: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Red-Legged Frog Impact BIO#9: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Foothill Yellow-Legged Frog Impact BIO#10: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Western Spadefoot Impact BIO#11: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Western Pond Turtle Impact BIO#12: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Blunt-Nosed Leopard Lizard Impact BIO#13: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Joaquin Coachwhip, Northern California Legless Lizard, and Coast Horned Lizard Impact BIO#14: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Giant Garter Snake Impact BIO#15: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Short-Eared Owl and Grasshopper Sparrow Impact BIO#16: Permanent Conversion or Degradation of Habitat for Mountain Plover and Disturbance of Western Snowy Plover (Interior Population) Impact BIO#17: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Burrowing Owl Impact BIO#18: Permanent Conversion or Degradation of Habitat for and Disturbance of Golden Eagle and Bald Eagle Impact BIO#20: Permanent Conversion or Degradation of Habitat for and Disturbance of Special-Status Raptors

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
										(American Peregrine Falcon, Northern Harrier, White-Tailed Kite) and Other Raptors Impact BIO#21: Permanent Conversion or Degradation of Habitat for and Disturbance of Swainson's Hawks Impact BIO#22: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Purple Martin, Olive-Sided Flycatcher, and Loggerhead Shrike Impact BIO#23: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Least Bell's Vireo, Yellow Warbler, and Yellow-Breasted Chat Impact BIO#24: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Tricolored Blackbird and Yellow-Headed Blackbird Impact BIO#25: Permanent Conversion or Degradation of Habitat for and Disturbance of Sandhill Crane Impact BIO#26: Loss of Denning and Dispersal Habitat for and Direct Mortality or Disturbance of San Joaquin Kit Fox Impact BIO#27: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Fresno Kangaroo Rat Impact BIO#28: Permanent Conversion or Degradation of Habitat for and Direct Mortality of American Badger Impact BIO#29: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Francisco Dusky-Footed Woodrat and Ringtail Impact BIO#30: Loss of Roost Sites for and Direct Mortality or Disturbance of Special-Status Bats Impact BIO#34: Removal or Degradation of Habitat for and Disturbance of Waterfowl and Shorebirds Impact BIO#35: Permanent Conversion or Degradation of Special-Status Plant Communities Impact BIO#37: Permanent Conversion or Degradation of Aquatic Resources Considered waters of the U.S. or waters of the State Impact BIO#38: Permanent Conversion or Degradation of Resources Regulated under California Fish and Game Code

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
										Section 1600 et seq. Impact BIO#42: Temporary Disruption of Wildlife Movement 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 to direct the installation of WEF and construction exclusion fencing by the Contractor.	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	Impact BIO#1: Permanent Conversion or Degradation of Habitat for Special-Status Plant Species Impact BIO#2: Permanent Conversion or Degradation of Habitat for and Mortality of Bay Checkerspot Butterfly Impact BIO#3: Permanent Conversion or Degradation of Habitat for and Mortality of Vernal Pool Crustaceans Impact BIO#4: Removal or Pruning of Elderberry Plants Potentially Supporting Valley Elderberry Longhorn Beetle Impact BIO#5: Permanent Conversion or Degradation of Habitat for and Mortality of Crotch Bumble Bee Impact BIO#6: Permanent Conversion of Habitat for and Direct Mortality of Steelhead and Pacific Lamprey, and Permanent Conversion of Essential Fish Habitat for Pacific Coast Salmon Impact BIO#7: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Tiger Salamander Impact BIO#8: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Red-Legged Frog Impact BIO#9: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Foothill Yellow-Legged Frog Impact BIO#10: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Western Spadefoot Impact BIO#11: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Western Pond Turtle Impact BIO#12: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Blunt-Nosed Leopard Lizard Impact BIO#13: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Joaquin Coachwhip, Northern California Legless Lizard, and Coast Horned Lizard Impact BIO#14: Permanent Conversion or

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										Degradation of Habitat for and Direct Mortality of Giant Garter Snake Impact BIO#15: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Short-Eared Owl and Grasshopper Sparrow Impact BIO#16: Permanent Conversion or Degradation of Habitat for Mountain Plover and Disturbance of Western Snowy Plover (Interior Population) Impact BIO#17: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Burrowing Owl Impact BIO#18: Permanent Conversion or Degradation of Habitat for and Disturbance of Golden Eagle and Bald Eagle Impact BIO#20: Permanent Conversion or Degradation of Habitat for and Disturbance of Special-Status Raptors (American Peregrine Falcon, Northern Harrier, White-Tailed Kite) and Other Raptors Impact BIO#21: Permanent Conversion or Degradation of Habitat for and Disturbance of Swainson's Hawks Impact BIO#22: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Purple Martin, Olive-Sided Flycatcher, and Loggerhead Shrike Impact BIO#23: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Least Bell's Vireo, Yellow Warbler, and Yellow-Breasted Chat Impact BIO#24: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Tricolored Blackbird and Yellow-Headed Blackbird Impact BIO#25: Permanent Conversion or Degradation of Habitat for and Disturbance of Sandhill Crane Impact BIO#26: Loss of Denning and Dispersal Habitat for and Direct Mortality or Disturbance of San Joaquin Kit Fox Impact BIO#27: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Fresno Kangaroo Rat Impact BIO#28: Permanent Conversion or Degradation of Habitat for and Direct Mortality of American Badger

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										Impact BIO#29: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Francisco Dusky-Footed Woodrat and Ringtail Impact BIO#30: Loss of Roost Sites for and Direct Mortality or Disturbance of Special-Status Bats Impact BIO#34: Removal or Degradation of Habitat for and Disturbance of Waterfowl and Shorebirds Impact BIO#35: Permanent Conversion or Degradation of Special-Status Plant Communities Impact BIO#37: Permanent Conversion or Degradation of Aquatic Resources Considered waters of the U.S. or waters of the State Impact BIO#38: Permanent Conversion or Degradation of Resources Regulated under California Fish and Game Code Section 1600 et seq. Impact HYD#4: Temporary Impacts on Surface Water Quality during Construction
BIO-MM#5	Limit Vehicle Traffic and Construction Site Speeds	Prior to any ground-disturbing activities, the Project Biologist will check that appropriate measures have been instituted to restrict project vehicle traffic within the project footprint to established roads, construction areas, and other permissible areas. The Project Biologist will establish vehicle speed limits of no more than 15 mph for unimproved access roads and for temporary and permanent construction areas within the project footprint. The Project Biologist will also direct that access routes be flagged and marked and that measures be adopted to prevent off-road vehicle traffic.	Pre-construction	Compliance reporting	Monthly	Authority/ Contractor	Authority	Monthly reporting	Condition of construction contract	Impact BIO#1: Permanent Conversion or Degradation of Habitat for Special-Status Plant Species Impact BIO#2: Permanent Conversion or Degradation of Habitat for and Mortality of Bay Checkerspot Butterfly Impact BIO#3: Permanent Conversion or Degradation of Habitat for and Mortality of Vernal Pool Crustaceans Impact BIO#4: Removal or Pruning of Elderberry Plants Potentially Supporting Valley Elderberry Longhorn Beetle Impact BIO#5: Permanent Conversion or Degradation of Habitat for and Mortality of Crotch Bumble Bee Impact BIO#7: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Tiger Salamander Impact BIO#8: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Red-Legged Frog Impact BIO#9: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Foothill Yellow-Legged Frog Impact BIO#10: Permanent Conversion or Degradation of Habitat for and Direct

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
										Mortality of Western Spadefoot Impact BIO#11: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Western Pond Turtle Impact BIO#12: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Blunt-Nosed Leopard Lizard Impact BIO#13: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Joaquin Coachwhip, Northern California Legless Lizard, and Coast Horned Lizard Impact BIO#14: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Giant Garter Snake Impact BIO#15: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Short-Eared Owl and Grasshopper Sparrow Impact BIO#16: Permanent Conversion or Degradation of Habitat for Mountain Plover and Disturbance of Western Snowy Plover (Interior Population) Impact BIO#17: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Burrowing Owl Impact BIO#18: Permanent Conversion or Degradation of Habitat for and Disturbance of Golden Eagle and Bald Eagle Impact BIO#19: Injury or Disturbance of California Condor Impact BIO#20: Permanent Conversion or Degradation of Habitat for and Disturbance of Special-Status Raptors (American Peregrine Falcon, Northern Harrier, White-Tailed Kite) and Other Raptors Impact BIO#21: Permanent Conversion or Degradation of Habitat for and Disturbance of Swainson's Hawks Impact BIO#22: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Purple Martin, Olive-Sided Flycatcher, and Loggerhead Shrike Impact BIO#23: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Least Bell's Vireo, Yellow Warbler, and Yellow-Breasted Chat Impact BIO#24: Permanent Conversion or

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										Degradation of Habitat for and Direct Mortality of Tricolored Blackbird and Yellow-Headed Blackbird Impact BIO#25: Permanent Conversion or Degradation of Habitat for and Disturbance of Sandhill Crane Impact BIO#26: Loss of Denning and Dispersal Habitat for and Direct Mortality or Disturbance of San Joaquin Kit Fox Impact BIO#27: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Fresno Kangaroo Rat Impact BIO#28: Permanent Conversion or Degradation of Habitat for and Direct Mortality of American Badger Impact BIO#29: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Francisco Dusky-Footed Woodrat and Ringtail Impact BIO#30: Loss of Roost Sites for and Direct Mortality or Disturbance of Special-Status Bats Impact BIO#34: Removal or Degradation of Habitat for and Disturbance of Waterfowl and Shorebirds Impact BIO#35: Permanent Conversion or Degradation of Special-Status Plant Communities Impact BIO#37: Permanent Conversion or Degradation of Aquatic Resources Considered waters of the U.S. or waters of the State Impact BIO#38: Permanent Conversion or Degradation of Resources Regulated under California Fish and Game Code Section 1600 et seq.
BIO-MM#6	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, Assessor Parcel Number, and HST parcel number. ▪ Written description of the surveyed area. A figure of	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	Impact BIO#1: Permanent Conversion or Degradation of Habitat for Special-Status Plant Species Impact BIO#2: Permanent Conversion or Degradation of Habitat for and Mortality of Bay Checkerspot Butterfly Impact BIO#3: Permanent Conversion or Degradation of Habitat for and Mortality of Vernal Pool Crustaceans Impact BIO#4: Removal or Pruning of Elderberry Plants Potentially Supporting Valley Elderberry Longhorn Beetle Impact BIO#5: Permanent Conversion or

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		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 the Environmental Mitigation Management and Assessment system (EMMA) within 24 hours of each monitoring day. Noncompliance events will be reported to the Authority the day of the occurrence. 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 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 the Authority provides compensatory mitigation that has been disturbed during the reporting month, and – An accounting of the cumulative total number of acres of threatened and endangered species habitat that has been disturbed during the project period. ▪ Up-to-date GIS layers, associated metadata, and photodocumentation used to track acreages disturbed. ▪ Copies of all pre-activity survey reports, daily								Degradation of Habitat for and Mortality of Crotch Bumble Bee Impact BIO#6: Permanent Conversion of Habitat for and Direct Mortality of Steelhead and Pacific Lamprey, and Permanent Conversion of Essential Fish Habitat for Pacific Coast Salmon Impact BIO#7: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Tiger Salamander Impact BIO#8: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Red-Legged Frog Impact BIO#9: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Foothill Yellow-Legged Frog Impact BIO#10: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Western Spadefoot Impact BIO#11: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Western Pond Turtle Impact BIO#12: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Blunt-Nosed Leopard Lizard Impact BIO#13: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Joaquin Coachwhip, Northern California Legless Lizard, and Coast Horned Lizard Impact BIO#14: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Giant Garter Snake Impact BIO#15: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Short-Eared Owl and Grasshopper Sparrow Impact BIO#16: Permanent Conversion or Degradation of Habitat for Mountain Plover and Disturbance of Western Snowy Plover (Interior Population) Impact BIO#17: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Burrowing Owl Impact BIO#18: Permanent Conversion or Degradation of Habitat for and Disturbance of Golden Eagle and Bald Eagle Impact BIO#19: Injury or Disturbance of California Condor

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		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 and CDFW, and updated maps of all land disturbances and updated maps of identified habitat features suitable for threatened and endangered species within the project area. In addition to the compliance reporting requirements outlined above, the following items will be provided for compliance documentation purposes: ▪ If agency personnel visit the project footprint in accordance with BIO-IAMF#2, the Project Biologist will 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 the implementation of the WCP described in BIO-MM#2 – Compliance with BIO-MM#3 – Compliance with BIO-IAMF#6 – Compliance with BIO-IAMF#7 – Compliance with BIO-IAMF#8 – Compliance with BIO-IAMF#10 – Compliance with BIO-MM#5 – Compliance with BIO-IAMF#12								Impact BIO#20: Permanent Conversion or Degradation of Habitat for and Disturbance of Special-Status Raptors (American Peregrine Falcon, Northern Harrier, White-Tailed Kite) and Other Raptors Impact BIO#21: Permanent Conversion or Degradation of Habitat for and Disturbance of Swainson's Hawks Impact BIO#22: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Purple Martin, Olive-Sided Flycatcher, and Loggerhead Shrike Impact BIO#23: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Least Bell's Vireo, Yellow Warbler, and Yellow-Breasted Chat Impact BIO#24: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Tricolored Blackbird and Yellow-Headed Blackbird Impact BIO#25: Permanent Conversion or Degradation of Habitat for and Disturbance of Sandhill Crane Impact BIO#26: Loss of Denning and Dispersal Habitat for and Direct Mortality or Disturbance of San Joaquin Kit Fox Impact BIO#27: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Fresno Kangaroo Rat Impact BIO#28: Permanent Conversion or Degradation of Habitat for and Direct Mortality of American Badger Impact BIO#29: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Francisco Dusky-Footed Woodrat and Ringtail Impact BIO#30: Loss of Roost Sites for and Direct Mortality or Disturbance of Special-Status Bats Impact BIO#34: Removal or Degradation of Habitat for and Disturbance of Waterfowl and Shorebirds Impact BIO#35: Permanent Conversion or Degradation of Special-Status Plant Communities Impact BIO#37: Permanent Conversion or Degradation of Aquatic Resources Considered Waters of the U.S. or Waters of the State

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		– Compliance with BIO-IAMF#9 – BMP field manual implementation and any recommended changes to construction site housekeeping practices outlined in BIO-IAMF#11 ▪ Work stoppages and measures taken under BIO-MM#13 will be documented in a memorandum prepared by the Project Biologist and submitted to the Authority within 2 business days of the work stoppage.								Impact BIO#38: Permanent Conversion or Degradation of Resources Regulated under California Fish and Game Code Section 1600 et seq.
BIO-MM#7	Conduct Botanical Surveys for Special-Status Plant Species and Special-Status Plant Communities	Prior to any ground-disturbing activity, the Project Biologist will conduct protocol-level surveys for special-status plant species and special-status plant communities within each work area consistent with *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities* (CDFW 2018c) and *Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Plants* (USFWS 2000) in all potentially suitable habitats. The Project Biologist will flag and record in GIS the locations of any observed special-status plant species and special-status plant communities and establish a 50-foot buffer from the perimeter of the occupied habitat or the specific habitat type required by the special-status plant species (if the specific habitat types extend beyond the occupied habitat). If a smaller buffer is necessary due to other project constraints, the Authority will develop and implement a site-specific exclusion plan, in consultation with USFWS and CDFW.	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 plant species 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#35: Permanent Conversion or Degradation of Special-Status Plant Communities
BIO-MM#8	Prepare and Implement Plan for Salvage, Relocation, and/or Propagation of Special-Status Plant Species	Where relocation or propagation of special-status plant species is required by authorizations issued under FESA and/or CESA, the Project Biologist will collect seeds and plant materials and stockpile and segregate the top 4 inches of topsoil from locations within the work area prior to any ground-disturbing activities where special-status plant species were observed during surveys conducted under BIO-MM#1. Special-status plant species are those listed as threatened, endangered, or candidate under FESA; threatened, endangered, or candidate for listing under CESA; state-designated “Rare” species; and CRPR 1B and 2 species that were observed during surveys for use on off-site locations. Restoration locations will be chosen based on the *Policy on Mitigation Guidelines Regarding Impacts to Rare, Threatened, and Endangered Plants* (CNPS 1998). Suitable sites that may receive salvaged material include Authority mitigation sites, refuges, reserves, federal or state lands, and public/private mitigation banks. The Project Biologist will prepare a plant species salvage plan to address monitoring, salvage, relocation and/or seed banking of special-status 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,	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	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		and redistribution of topsoil and associated seed. The plan will also include requirements related to success criteria, such as the plant survival and percent absolute cover of invasive species rated as "high" by the California Invasive Plant Council to be equal to or less than documented baseline conditions as well as maintenance, monitoring, implementation, adaptive management, and 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#9	Prepare and Implement a Groundwater Adaptive Management and Monitoring Plan	To avoid, minimize and mitigate for potential impacts on wetlands, creeks, ponds, springs, riparian vegetation, special-status plant and wildlife species and protected trees as a result of hydrogeologic changes due to tunnel construction, the Authority will prepare and implement a groundwater adaptive management and monitoring plan (GAMMP) prior to, during, and after tunnel construction to implement the requirements described under HYD-MM#1 and as described below concerning biological resources. Prior to construction, the GAMMP will be submitted to the USFWS, CDFW, and Regional Water Quality Control Board (RWQCB) for review (and approval where applicable). The purpose of the GAMMP relative to biological resources is to monitor groundwater-dependent biological resources within the tunnel groundwater study area to detect and remediate adverse effects on habitat function in a timely manner. Implementation of the GAMMP will provide information and data to identify hydrological, hydrogeological, and biological effects that may arise during HSR construction, if any, and trigger actions to offset any such impacts. The GAMMP will include the following components, at a minimum, to avoid or minimize and address impacts on habitat for special-status species, aquatic resources, and protected trees: ▪ **Baseline inventory**—As allowed by private property owners, the Authority will establish baseline hydrologic conditions within the groundwater resource study area (approximately 1.1 miles north and south of the tunnel alignment) through baseline data collection. Baseline surveys will characterize potential aquatic resources, including but not limited to mapping of wetland and riparian vegetation; hydroperiod (the duration of inundation); flow rates; area of feature; pond depth; the potential for special-status plant and animal species (e.g., California tiger salamander, California red-legged frog, foothill yellow-legged frog, western pond turtle, least Bell's vireo, tricolored blackbird, and yellow-headed blackbird) and steelhead to occur; and potential groundwater dependent protected trees (e.g., oaks).	Design/ pre-construction/ construction/ post-construction	Reporting and monitoring/ design Prepare and implement plan/ report compliance	Follow reporting requirements as established by regulatory compliance permits	Authority/ Contractor	Authority/ Contractor	Follow reporting requirements as established by regulatory compliance permits	Reporting contract requirements/ specifications	Impact BIO#1: Permanent Conversion or Degradation of Habitat for Special-Status Plant Species Impact BIO#6: Permanent Conversion of Habitat for and Direct Mortality of Steelhead and Pacific Lamprey, and Permanent Conversion of Essential Fish Habitat for Pacific Coast Salmon Impact BIO#7: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Tiger Salamander Impact BIO#8: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Red-Legged Frog Impact BIO#9: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Foothill Yellow-Legged Frog Impact BIO#10: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Western Spadefoot Impact BIO#11: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Western Pond Turtle Impact BIO#23: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Least Bell's Vireo, Yellow Warbler, and Yellow-Breasted Chat Impact BIO#24: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Tricolored Blackbird and Yellow-Headed Blackbird Impact BIO#35: Permanent Conversion or Degradation of Special-Status Plant Communities Impact BIO#37: Permanent Conversion or Degradation of Aquatic Resources Considered waters of the U.S. or waters of the State Impact BIO#38: Permanent Conversion or

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		▪ **Groundwater modeling**—The Authority will model groundwater hydrologic conditions and potential tunnel infiltration to further identify specific areas of probable effect on the water table, facilitate selection of appropriate monitoring locations, and prepare for the potential need to provide supplemental water infrastructure in advance of tunneling. ▪ **Pre-tunneling supplemental water infrastructure provision**—To maintain baseline water supply, the Authority will install water storage tanks or water lines in advance of tunneling on or near properties with wetlands, creeks, ponds, and springs subject to landowner approval. Water infrastructure may also be provided for upland protected trees susceptible to groundwater lowering in areas of predicted groundwater effects, but direct watering of protected trees may be utilized instead. ▪ **Construction monitoring**—The Authority will designate monitoring locations and methodologies for monitoring water levels, vegetation cover, special-status species habitat, and protected trees most likely to be affected by tunnel construction as indicated by hydrologic modeling. The Authority will monitor representative locations during periods when effects are most likely to occur. If effects (e.g., lowering water levels resulting in reduced habitat) are observed, the Authority will implement contingency plans that expand monitoring beyond the representative locations and increase monitoring frequency to capture the extent of potential effects on groundwater-dependent biological resources. ▪ **Supplemental water**—The Authority will prepare contingency plans to provide supplemental water as necessary to support riparian/aquatic vegetation, wildlife breeding cycles, aquatic wildlife, or protected tree health within the area of predicted effects determined through modeling or monitoring to be potentially affected by groundwater lowering. Seasonal variation as documented during the preconstruction baseline monitoring will be considered in establishing the amount of supplemental water. For all features, supplemental water will provide minimum flows and periods of inundation to match baseline conditions. The periods of supplemental water, in general, will likely be in periods of baseflow, which occurs in late spring, summer, and early fall outside of rain periods. For breeding habitats, the Authority will, at a minimum, supplement breeding habitat where necessary to maintain adequate depths for completion of the reproduction cycle (defined as the time by which juveniles are viable and mobile such that they can feasibly leave the breeding location). However, where breeding habitat is perennial or long-seasonal, then supplemental water will be provided as necessary to								Degradation of Resources Regulated under California Fish and Game Code Section 1600 et seq. Impact BIO#40: Removal or Mortality of Trees Protected under Municipal Tree Ordinances Impact BIO#51: Permanent Conversion or Degradation of Conservation Areas

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		maintain the entire wetted period as determined through baseline monitoring. For nonbreeding movement and foraging habitat in creeks and streams, water will be provided to maintain seasonal flow similar to baseline conditions. Water will be provided as needed to sustain habitat conditions up to the point of baseline conditions until the qualified biologist determines it is appropriate to cease its provision. If supplemental water is provided from wells, the effects on water supply and habitat features will be managed to avoid and minimize potential disruption by the selection of well location, depth, flow rate, and the use of alternative supplies. Plans for supplemental water will also consider best practices related to supplemental water near oak trees. For example, oaks will be irrigated only outside their root zone (i.e., beyond the dripline to a distance that is half the distance between the trunk and the dripline). ▪ **Contingency plan for supplemental water in areas outside of predicted area of effect**—The Authority will establish contingency procedures to provide supplemental water to wetlands, creeks, ponds, and springs to support riparian/aquatic vegetation, wildlife breeding cycles, and aquatic wildlife as well as supplemental water to protected trees outside the area of predicted effects, if warranted by monitoring. ▪ **Temporary relocation**—The Authority will relocate aquatic species (e.g., California tiger salamander, California red-legged frog, foothill yellow-legged frog, western pond turtle) where unavoidable drying of aquatic breeding habitat will occur before salamanders and frogs have been able to metamorphose and maintaining the habitat with supplemental water is not feasible. The Authority will relocate these species, as allowed by USFWS and CDFW. If holding facilities are used, the Authority will return affected wildlife to affected aquatic areas after recovery of baseline hydrologic conditions. ▪ **Post-construction monitoring**—After construction, the Authority will monitor water levels and aquatic resource conditions of affected features twice annually (spring and summer) and affected protected trees for at least 5 years or as determined through consultation with USFWS and CDFW. As long as groundwater levels are demonstrated to be recovering, monitoring will continue until baseline conditions return or 5 years, whichever is longer. In the event that supplementary water is not successful at restoring aquatic resources and/or protected trees to baseline conditions in the post-construction period and off-site compensation is triggered, then monitoring may be waived for certain features if it is determined that there is no further utility for monitoring the specific feature. Once the Authority determines that conditions have returned to baseline								

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		conditions, monitoring will no longer be required. ▪ **Post-construction riparian or wetland restoration**—The Authority will restore any lost riparian or wetland vegetation that is not recovering on its own within 1 year of construction and is determined to be the result of tunnel construction through comparison to baseline conditions. Subject to landowner approval, such restoration will occur on site or at a suitable location nearby if not feasible on site. The Authority will implement restoration of riparian or wetland restoration, as applicable, as defined in Mitigation Measures BIO-MM#71 and BIO-MM#73. ▪ **Post-construction compensation**—If the Authority determines through direct monitoring or data interpretation that substantial disruption (i.e., loss of 0.5 acre or greater) to habitat supporting special-status species has likely occurred during or after construction and that habitat restoration efforts did not achieve success criteria or that restoration was determined unfeasible, the Authority will compensate for this loss of habitat. In addition, if affected protected trees demonstrate substantial impairment to health or mortality after 5 years of monitoring, the Authority will compensate for affected protected trees with replacement on at least a 1:1 basis. The Authority will implement the compensation of suitable habitat, as applicable, as defined in Mitigation Measures BIO-MM#10, BIO-MM#12, BIO-MM#28, BIO-MM#31, BIO-MM#33, BIO-MM#35, BIO-MM#57, BIO-MM#72, BIO-MM#74 and BIO-MM#75.								
BIO-MM#10	Prepare and Implement a Habitat Mitigation Plan for Species and Species Habitat	The Authority will prepare an HMP that sets out the compensatory mitigation that will be provided to offset permanent and temporary impacts on federal and state-listed species and their habitat, fish and wildlife resources regulated under Section 1600 et seq. of the Cal. Fish and Game Code, and special-status species. Mitigation implemented under this measure will be consistent with and will be credited towards the 10,000-acre mitigation commitment in BIO-MM#P1 to preserve habitat and open space values and offset impacts on wetlands, sensitive plant and wildlife species, and other biological resources in and around the GEA and other areas along the alignment, and will help advance mitigation commitments at the program level, including mitigation intended to address impacts in the GEA. Mitigation for temporary effects will be located on site and in-kind whenever feasible, and mitigation for permanent effects will be in-kind and located as close to the location of impact as feasible, especially where those impacts occur in natural areas, near areas known or likely to support wildlife movement, or near wildlife crossings that will be constructed as part of the rail (to contribute to the long-term function of the crossing). The Authority could	Pre-construction/ construction/ post-construction	Design/ final design/ surveying/ compensatory mitigation/ reporting	In accordance with reporting schedule established by agency permit requirements	Authority/ Contractor/ Project Biologist/ Mitigation Manager	Authority/ Contractor/ Project Biologist/ Mitigation Manager	Prepare and implement HMP for temporary and permanent impacts on biological resources/ report findings/ compliance memos	Condition of construction contract/condition of regulatory permits	Impact BIO#1: Permanent Conversion or Degradation of Habitat for Special-Status Plant Species Impact BIO#2: Permanent Conversion or Degradation of Habitat for and Mortality of Bay Checkerspot Butterfly Impact BIO#3: Permanent Conversion or Degradation of Habitat for and Mortality of Vernal Pool Crustaceans Impact BIO#4: Removal or Pruning of Elderberry Plants Potentially Supporting Valley Elderberry Longhorn Beetle Impact BIO#6: Permanent Conversion of Habitat for and Direct Mortality of Steelhead and Pacific Lamprey, and Permanent Conversion of Essential Fish Habitat for Pacific Coast Salmon Impact BIO#7: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Tiger Salamander Impact BIO#8: Permanent Conversion or

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		also mitigate in other locations farther from the location of the impact, if the mitigation sites are more appropriate or higher quality than those closer to the location of the impact. The HMP 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 the most suitable landowner/manager in the region, which will be determined in coordination with conservation agencies and organizations, including CDFW. 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 coordination with local conservation agencies and organizations to ensure that the mitigation options promote and do not conflict with the conservation goals in the region. ▪ 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 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 will 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)								Degradation of Habitat for and Direct Mortality of California Red-Legged Frog Impact BIO#9: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Foothill Yellow-Legged Frog Impact BIO#12: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Blunt-Nosed Leopard Lizard Impact BIO#14: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Giant Garter Snake Impact BIO#17: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Burrowing Owl Impact BIO#21: Permanent Conversion or Degradation of Habitat for and Disturbance of Swainson's Hawks Impact BIO#24: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Tricolored Blackbird and Yellow-Headed Blackbird Impact BIO#25: Permanent Conversion or Degradation of Habitat for and Disturbance of Sandhill Crane Impact BIO#26: Loss of Denning and Dispersal Habitat for and Direct Mortality or Disturbance of San Joaquin Kit Fox Impact BIO#27: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Fresno Kangaroo Rat Impact BIO#34: Removal or Degradation of Habitat for and Disturbance of Waterfowl and Shorebirds Impact BIO#51: Permanent Conversion or Degradation of Conservation Areas Impact BIO#53: Conflict with Santa Clara Valley Habitat Plan

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		– The habitat is determined to be unoccupied based on negative species surveys – Impacts initially categorized as permanent qualify as temporary impacts ▪ Adjustments to compensatory mitigation requirements through this process will not result in a reduction of the commitment in BIO-MM#P1 to ensure acquisition of agricultural, conservation, or open space easements on a total of 10,000 acres of land. ▪ An overview of the strategy for mitigating effects on species. The overview will indicate the ratios set forth in the specific species and habitat compensatory mitigation measures and the total amount of habitat that will be protected pursuant to those ratios (noting that if a permitting agency requires a higher ratio than this document, the future permit condition ratio will apply in implementation). The overview will also set out the process for ensuring implementation of BIO-MM#P1 (the program-level commitment to acquire easements on 10,000 acres of land generally located within or adjacent to the GEA after accounting for compensatory mitigation achieved through project-level mitigation measures). ▪ A description of habitat restoration or enhancement projects, if any, as provided by the habitat restoration mitigation measure, 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#11	Implement Measures to Minimize Impacts during Off-Site Habitat Restoration, or Enhancement, or Creation on Mitigation Sites	Prior to ground-disturbing activities associated with habitat restoration, enhancement, and/or creation actions at a mitigation site, the Authority 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 and/or creation activities, including authorization under the FESA	Pre-construction/ construction/ post-construction	Design/ final design/ surveying/ compensatory mitigation/ reporting	Yearly or as established by regulatory compliance permits	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Implement measure to avoid and minimize impacts during off-site habitat restoration, enhancement, and creation/ report findings	Condition of construction contract/condition of regulatory permits	Impact BIO#1: Permanent Conversion or Degradation of Habitat for Special-Status Plant Species Impact BIO#4: Removal or Pruning of Elderberry Plants Potentially Supporting Valley Elderberry Longhorn Beetle

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		or CESA, Cal. Fish and Game Code Section 1600 et seq., the CWA, and the Porter-Cologne Act. Restoration, enhancement, and/or creation of aquatic resources may result in the permanent conversion of grassland to wetland or riparian habitat. While such activities will be beneficial for vernal pool, riparian, and aquatic-breeding species, they will result in a small but measurable loss of upland habitat for other species (e.g., foraging habitat for tricolored blackbird, non-breeding habitat for California tiger salamander and California red-legged frog). Permanent impacts on grassland habitat from aquatic resource restoration, enhancement, and creation will be mitigated at a minimum ratio of 1:1 (acres preserved, enhanced, or restored: acres affected).								
BIO-MM#12	Provide Compensatory Mitigation for Impacts on Listed Plant Species	The Authority will provide compensatory mitigation for direct impacts on federally and state-listed plant species based on the number of acres of occupied plant habitat directly affected. Such mitigation will include the following measures: ▪ Compensatory mitigation will be provided at a 1:1 ratio to offset direct impacts on occupied federally listed plant species habitat, unless a higher ratio is required pursuant to regulatory authorizations issued under FESA. ▪ Compensatory mitigation will be provided at a 1:1 ratio to offset direct impacts on occupied state-listed plant species habitat, unless a higher ratio is required pursuant to regulatory authorizations issued under CESA. Compensatory mitigation will be provided using one or more of the methods described in BIO-MM#10.	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 Impact BIO#5: Permanent Conversion or Degradation of Habitat for and Mortality of Crotch Bumble Bee
BIO-MM#13	Implement 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 in accordance with authorizations issued under FESA and CESA. Any such work stoppages and the measures taken to facilitate the removal of the species, if any, 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#2: Permanent Conversion or Degradation of Habitat for and Mortality of Bay Checkerspot Butterfly Impact BIO#3: Permanent Conversion or Degradation of Habitat for and Mortality of Vernal Pool Crustaceans Impact BIO#4: Removal or Pruning of Elderberry Plants Potentially Supporting Valley Elderberry Longhorn Beetle Impact BIO#6: Permanent Conversion of Habitat for and Direct Mortality of Steelhead and Pacific Lamprey, and Permanent Conversion of Essential Fish Habitat for Pacific Coast Salmon Impact BIO#7: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Tiger Salamander Impact BIO#8: Permanent Conversion or Degradation of Habitat for and Direct

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
										Mortality of California Red-Legged Frog Impact BIO#9: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Foothill Yellow-Legged Frog Impact BIO#10: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Western Spadefoot Impact BIO#11: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Western Pond Turtle Impact BIO#12: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Blunt-Nosed Leopard Lizard Impact BIO#13: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Joaquin Coachwhip, Northern California Legless Lizard, and Coast Horned Lizard Impact BIO#14: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Giant Garter Snake Impact BIO#15: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Short-Eared Owl and Grasshopper Sparrow Impact BIO#16: Permanent Conversion or Degradation of Habitat for Mountain Plover and Disturbance of Western Snowy Plover (Interior Population) Impact BIO#17: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Burrowing Owl Impact BIO#18: Permanent Conversion or Degradation of Habitat for and Disturbance of Golden Eagle and Bald Eagle Impact BIO#19: Injury or Disturbance of California Condor Impact BIO#20: Permanent Conversion or Degradation of Habitat for and Disturbance of Special-Status Raptors (American Peregrine Falcon, Northern Harrier, White-Tailed Kite) and Other Raptors Impact BIO#21: Permanent Conversion or Degradation of Habitat for and Disturbance of Swainson's Hawks Impact BIO#22: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Purple Martin, Olive-Sided

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
										Flycatcher, and Loggerhead Shrike Impact BIO#23: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Least Bell's Vireo, Yellow Warbler, and Yellow-Breasted Chat Impact BIO#24: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Tricolored Blackbird and Yellow-Headed Blackbird Impact BIO#25: Permanent Conversion or Degradation of Habitat for and Disturbance of Sandhill Crane Impact BIO#26: Loss of Denning and Dispersal Habitat for and Direct Mortality or Disturbance of San Joaquin Kit Fox Impact BIO#27: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Fresno Kangaroo Rat Impact BIO#28: Permanent Conversion or Degradation of Habitat for and Direct Mortality of American Badger Impact BIO#29: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Francisco Dusky-Footed Woodrat and Ringtail Impact BIO#30: Loss of Roost Sites for and Direct Mortality or Disturbance of Special-Status Bats
BIO-MM#14	Avoid Direct Impacts on Bay Checkerspot and Monarch Butterfly Host Plants	Prior to construction, the Project Biologist will survey for Bay checkerspot and monarch butterfly larval host plants—dwarf plantain and purple owl's-clover for Bay checkerspot and native milkweed species for monarch — within suitable habitat. If host plants are found, the Project Biologist will conduct surveys for adult butterflies during the peak of the flight/migration/breeding periods to determine presence/absence. If surveys are not possible due to the timing of the survey relative to the presence of the species, presence may be assumed. Where adult butterflies are present, or assumed to be present, construction personnel will avoid host plants outside permanent impact areas.	Pre-construction/ construction	Surveying/ monitoring/ reporting	Monthly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Pre-construction surveys of monarch and Bay checkerspot butterfly larval host plants and maintain no-work buffer/ report findings	Condition of construction contract/condition of regulatory permits	Impact BIO#2a: Permanent Conversion or Degradation of Habitat for and Mortality of Bay Checkerspot Butterfly Impact BIO#2b: Permanent Conversion or Degradation of Habitat for and Mortality of Monarch Butterfly
BIO-MM#15	Prepare and Implement Bay Checkerspot Butterfly Protection Plan	Prior to final design, the Authority will incorporate features to minimize impacts on Bay checkerspot butterfly dispersal consistent with regulatory authorizations issued under the FESA. Actions may include: ▪ Plant shrubs or trees along the east side of the viaduct, the predominant direction from which dispersing butterflies are likely to originate. Trees and shrubs will provide a more natural transition over the viaduct. ▪ Place lighting under the viaduct in strategic locations to	Pre-construction	Reporting	Final design	Authority/ Contractor	Authority/ Contractor	Pre-construction surveys of Bay checkerspot butterfly larval host plants and maintain no-work buffer/ report findings	Condition of construction contract/condition of regulatory permits	Impact BIO#2a: Permanent Conversion or Degradation of Habitat for and Mortality of Bay Checkerspot Butterfly 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	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		minimize shadows. ▪ Create vegetated “stepping stones” to attract butterflies under the viaduct and along a path that is the shortest distance between the Coyote Ridge core population and the Tulare Hill sub-population. If monitoring indicates that dispersal is affected by viaduct shadows, the Authority will develop a translocation project to facilitate Bay checkerspot butterfly dispersal between the core and sub-population. The project may include: ▪ Conservation of land near the alignment to improve survival conditions for dispersing butterflies. ▪ A monitoring and adaptive management process that will detail how the performance criteria of "no net change in dispersal" will be defined and maintained.								
BIO-MM#16	Provide Compensatory Mitigation for Impacts on Bay Checkerspot Butterfly Habitat	The Authority, in accordance with authorizations issued under the FESA, will determine the compensatory mitigation required to offset impacts on habitat, including critical habitat, for Bay checkerspot butterfly. Compensatory mitigation could include one or more of the following: ▪ Purchase of credits from an agency-approved conservation bank. ▪ Acquisition in fee title of USFWS-approved property ▪ Purchase or establishment of a conservation easement with an endowment for long-term management of the property-specific conservation values. ▪ An in-lieu fee contribution determined through negotiation and consultation with the USFWS ▪ Contribution to SCVHA habitat protection, restoration, or management efforts. Mitigation for Bay checkerspot butterfly will first prioritize measures within the San Martin critical habitat unit and, to the extent feasible, that contribute to regional conservation efforts (i.e., habitat protection efforts underway by the SCVHA). The second priority will be to implement measures in another critical habitat unit. If mitigation within designated critical habitat is not feasible, the Authority will implement mitigation outside critical habitat that provides an equivalent contribution to Bay checkerspot butterfly recovery. 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: ▪ Habitat restoration and management will be needed on many Bay checkerspot butterfly habitat areas. Appropriate grazing management should verify that habitats are neither overgrazed nor overgrown. Weeding, biological control, mowing, herbicides, and fire should also be considered as possible tools to	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#2a: Permanent Conversion or Degradation of Habitat for and Mortality of Bay Checkerspot Butterfly 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	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		control nonnative plant species. ▪ Monitoring of populations will serve to identify, on an ongoing basis, populations that are in trouble and in need of recovery efforts, as well as populations that are healthy and suitable as sources of individuals for reintroduction efforts. Several factors are important in deciding which habitat areas to protect: (1) habitat size and quality, including habitat diversity; (2) location in relation to other habitat patches and to core populations; (3) presence, current or historic, of Bay checkerspot butterflies; and (4) ease and cost of protection. Habitat protection should include buffer zones as necessary. Bay checkerspot butterfly habitat areas considered for mitigation can be ranked in approximate order of priority as follows: ▪ Core habitat areas a) Kirby (3,900 acres) b) Metcalf (1,100 acres) c) San Felipe (780 acres) d) Silver Creek Hills (1,000 acres) ▪ Potential core areas—Santa Teresa Hills (1,100 acres) ▪ Larger, good-quality habitat areas near core populations a) Tulare Hill (300 acres) b) North of Llagas Avenue (420 acres), c) West hills of Santa Clara Valley (74 acres) ▪ Stepping stones—Tulare Hill, Santa Teresa Hills, Redwood City ▪ Other current or historic localities or suitable habitat areas, generally larger than 1 hectare (2.5 acres), within the historic range of the butterfly, identified for their habitat value, function as dispersal corridors, proximity to other habitat, or other biological value. The Authority will submit a memorandum to the USFWS to document compliance with this measure.							
BIO-MM#17	Conduct Pre-Construction Surveys for Vernal Pool Wildlife Species	Prior to any ground-disturbing activities, the Project Biologist will conduct an aquatic habitat assessment and survey for vernal pool wildlife species in seasonal wetlands and vernal pools that overlap with the work area or occur within both the work area and the area extending 250 feet from the outer boundary of the work area where access is available, consistent with the USFWS *Survey Guidelines for the Listed Large Brachiopods* (USFWS 2015) vernal pool survey protocols. The Project Biologist will visit these areas after the first rain event of the season to determine whether seasonal wetlands and vernal pools have been inundated. A seasonal wetland/vernal pool will be considered to be inundated when it holds more than 3 cm of standing water 24 hours after a rain event. Approximately 2 weeks after the pools have been	Pre-construction/ construction	Aquatic assessment and sampling; reporting	Monthly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Presence-absence surveys of species within the construction footprint conducted 30 days prior to ground disturbance Report findings at least 30 days prior to ground disturbance	Condition of construction contract/condition of regulatory permits	Impact BIO#3: Permanent Conversion or Degradation of Habitat for and Mortality of Vernal Pool Crustaceans

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		determined to be inundated, the Project Biologist will conduct surveys in appropriate seasonal wetland and vernal pool habitats. The Project Biologist will submit a report to the Authority within 30 days of completing the work.								
BIO-MM#18	Implement Seasonal Vernal Pool Work Restriction	To the extent feasible, ground-disturbing activities will not occur within 250 feet of vernal pools or seasonal wetlands during the rainy season (October 15 to April 15). In the event ground-disturbing activities are to occur within the 250-foot buffer area during the rainy season, such activities should, to the extent feasible, will be undertaken when the aquatic features are not inundated. For any work occurring within 250 feet of vernal pools during the rainy season, the Contractor (under the direction of the Project Biologist) will install erosion control measures in those areas where construction activities need to be completed and ESA fencing between the work area and vernal pools.	Pre-construction/ construction	Exclusion fencing; compliance reporting	Follow reporting requirements as established by regulatory compliance permits	Authority/ Contractor	Authority/ Contractor	Follow reporting requirements as established by regulatory compliance permits	Condition of construction contract/condition of regulatory permits	Impact BIO#3: Permanent Conversion or Degradation of Habitat for and Mortality of Vernal Pool Crustaceans
BIO-MM#19	Implement and Monitor Vernal Pool Avoidance and Minimization Measures within Temporary Impact Areas	To the extent feasible, impacts on vernal pools in work areas outside of the permanent right-of-way will be avoided. The Project Biologist will install and maintain exclusionary fencing to prevent impacts on vernal pools from construction activities. When avoidance of impacts on vernal pools is not feasible, the construction activity will be scheduled to occur in the dry season, where feasible. Prior to the initiation of a ground-disturbing activity during the dry season, the Project Biologist will collect a representative sampling of soils from the affected vernal pools to obtain viable plant seeds and vernal pool branchiopod cysts. After collecting the soil, the Project Biologist may also put rinsed gravel in the vernal pools and cover with geotextile fabric to minimize damage to the soils and protect the pools' contours, as provided by regulatory authorizations issued under the FESA. The soils containing seeds and cysts may later be returned to the affected pool after work has been completed or incorporated into other vernal pools, as provided by regulatory authorizations under the FESA.	Pre-construction/ construction	Exclusion fencing; collection of soil material; off-site compensatory mitigation; compliance reporting	Monthly or reporting requirements as established by regulatory compliance permits	Authority/ Contractor	Authority/ Contractor	Monthly or reporting requirements as established by regulatory compliance permits	Condition of construction contract/condition of regulatory permits	Impact BIO#3: Permanent Conversion or Degradation of Habitat for and Mortality of Vernal Pool Crustaceans
BIO-MM#20	Provide Compensatory Mitigation for Impacts on Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp Habitat	The Authority will provide compensatory mitigation for direct and indirect impacts, including both temporary and permanent impacts, on vernal pool branchiopod habitat at a 1:1 ratio, unless a higher ratio is required by the FESA. Compensatory mitigation will be provided using one or more of the methods described in BIO-MM#10.	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	Prepare and implement HMP for temporary and permanent impacts on biological resources/ report findings/ compliance memos	Condition of construction contract/condition of regulatory permits	Impact BIO#3: Permanent Conversion or Degradation of Habitat for and Mortality of Vernal Pool Crustaceans
BIO-MM#21	Implement Avoidance Measures for Elderberry Shrubs outside Permanent	To avoid direct impacts on elderberry shrubs potentially occupied by valley elderberry longhorn beetle that are inside the project footprint but outside permanent impact areas (and where feasible), a biologist with demonstrated	Pre-construction/ construction	Surveying/ monitoring/ compliance reporting	Follow reporting requirements as established by regulatory	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Exclusion fencing/marking	Condition of construction contract/condition of regulatory permits	Impact BIO#4: Removal or Pruning of Elderberry Plants Potentially Supporting Valley Elderberry Longhorn Beetle

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
	Impact Areas	experience identifying elderberry shrubs will survey areas modeled as potentially suitable riparian habitat within the project footprint for elderberry no less than 30 days before ground disturbance or vegetation removal. The biologist will mark all elderberry shrubs with bright-colored flagging and record geospatial information using a handheld GPS or mobile device (i.e., smartphone or tablet). Elderberry shrubs outside permanent and temporary impact areas will be included on grading plans, and contractors will comply with the following avoidance and minimization measures from the USFWS' *Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle* (USFWS 2017b): ▪ All areas to be avoided during construction activities will be fenced, flagged, or both as close to construction limits as feasible. ▪ Activities that may damage or kill an elderberry shrub (e.g., trenching, paving) may need an avoidance area of at least 20 feet from the drip line, depending on the type of activity. ▪ A qualified biologist will provide training for all contractors, work crews, and any on-site personnel on the status of the valley elderberry longhorn beetle, its host plant and habitat, the need to avoid damaging elderberry shrubs, and the possible penalties for noncompliance. ▪ A qualified biologist will monitor the work area at project-appropriate intervals to verify that all avoidance and minimization measures are implemented. ▪ To the extent feasible, all activities that could occur within 65 feet of an elderberry shrub will be conducted outside the flight season of the valley elderberry longhorn beetle (March–July). ▪ Trimming of elderberry shrubs will occur between November and February and will avoid the removal of any branches or stems that are 1 inch or more in diameter. ▪ Herbicides will not be used within the drip line of elderberry shrubs. All chemicals will be applied using a backpack sprayer or similar direct application method. ▪ Mechanical weed removal within the drip line of elderberry shrubs will be limited to the season when adults are not active (August–February) and will avoid damaging elderberry shrubs.			compliance permits					
BIO-MM#22	Provide Compensatory Mitigation for Impacts on Valley Elderberry Longhorn Beetle Habitat	The Authority will provide compensatory mitigation for impacts on valley elderberry longhorn beetle habitat, including through transplantation and replacement of elderberry shrubs and maintenance of replacement shrubs, consistent with the USFWS' *Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle* (USFWS 2017b), as follows: ▪ Suitable riparian habitat will be replaced at a minimum of 3:1 (acres of mitigation to acres of impact).	Pre-construction/ construction/ post-construction	Surveying/ monitoring/ reporting	Follow reporting requirements as established by regulatory compliance permits	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Transplant pre-construction; compensation prior to operation	Condition of construction contract/condition of regulatory permits	Impact BIO#4: Removal or Pruning of Elderberry Plants Potentially Supporting Valley Elderberry Longhorn Beetle

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		▪ Suitable nonriparian habitat will be replaced at a minimum of 1:1 (acres of mitigation to acres of impact). ▪ Individual elderberry shrubs in riparian areas will be replaced through a purchase of two credits at a USFWS-approved bank for each shrub that will be trimmed or removed regardless of the presence of exit holes. ▪ Individual elderberry shrubs in nonriparian areas will be replaced through a purchase of one credit at a USFWS-approved bank for each shrub that will be trimmed if exit holes have been found in any shrub in or within 165 feet of the work area. ▪ If an elderberry shrub is to be completely removed by the activity, the entire shrub will be transplanted to a USFWS-approved location in addition to the specified credit purchase. For transplanted elderberry plants, a survival rate of at least 60% of the elderberry plants and 60% of the associated native plants must be maintained throughout the 10-year monitoring period. If survival rates drop below 60% during the monitoring period, failed plantings will be replaced and maintained until the 60% survival rate is achieved.								
BIO-MM#23	Conduct Surveys and Implement Avoidance Measures for Crotch Bumble Bee	Surveys for Crotch bumble bee habitat (as identified by species habitat suitability modeling) in the project footprint will be conducted by qualified biologists within 1 year prior to the start of construction. Surveys will be conducted during four evenly spaced sampling periods during the flight season (March through September) (Thorp et al. 1983). For each sampling event, the biologist(s) will survey suitable habitat using nonlethal netting methods for 1 person-hour per 3 acres of the highest quality habitat or until 150 bumble bees are sighted, whichever comes first. If initial sampling of a given habitat area indicates that the habitat is of low quality or nonexistent, no further sampling of that area will be required. General guidelines and best practices for bumble bee surveys will follow USFWS' *Survey Protocols for the Rusty Patched Bumble Bee* (*Bombus affinis*) (USFWS 2019), which are consistent with other bumble bee survey protocols used by The Xerces Society (Hatfield et al. 2017; Washington Department of Fish and Wildlife et al. 2019). If surveys identify occupied Crotch bumble bee habitat within the project footprint, the project biologist will then conduct additional pre-construction surveys of such habitat for active bee nest colonies and associated floral resources (i.e., flowering vegetation on which bees from the colony are observed foraging) no more than 30 days prior to any ground disturbance between March and September. The purpose of this pre-construction survey will be to identify active nest colonies and associated floral resources outside of permanent impact areas that could be avoided by	Pre-construction/ construction	Surveying/ monitoring/ reporting	Weekly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist	Authority Contractor/ Project Biologist	Pre-construction surveys of Crotch bumble bee habitat/establish and maintain no-work buffer/ report findings	Condition of construction contract; Condition of regulatory permits	Impact BIO#5: Permanent Conversion or Degradation of Habitat for and Mortality of Crotch Bumble Bee

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		construction personnel. The project biologist will establish, monitor, and maintain no-work buffers around nest colonies and floral resources identified during surveys. The size and configuration of the no-work buffer will be based on best professional judgment of the project biologist. At a minimum, the buffer will provide at least 50 feet of clearance around nest entrances and maintain disturbance-free airspace between the nest and nearby floral resources. Construction activities will not occur within the no-work buffers until the colony is no longer active (i.e., no bees are seen flying in or out of the nest for three consecutive days indicating the colony has completed its nesting season and the next season's queens have dispersed from the colony).								
BIO-MM#24	Provide Compensatory Mitigation for Impacts on Crotch Bumble Bee	The Authority will provide compensatory mitigation for impacts on occupied habitat for Crotch bumble bee. Impacts on occupied habitat (confirmed through surveys as described in BIO-MM#23) will be compensated for at a ratio of 3:1, unless a higher ratio is required pursuant to an authorization issued under CESA, through the purchase of CDFW-approved bank credits or through preservation of habitat in perpetuity, including suitable habitat currently preserved by the Authority.	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 Crotch bumble bee/ report findings	Condition of construction contract/condition of regulatory permits	Impact BIO#5: Permanent Conversion or Degradation of Habitat for and Mortality of Crotch Bumble Bee
BIO-MM#25	Prepare Plan for Dewatering and Water Diversions	Prior to initiating any construction activity that occurs within open or flowing water, or streamside activities, the Authority will prepare a dewatering plan, which will be subject to the 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 and/or water diversion sites, including collection of water quality data, as applicable. Prior to the dewatering or diverting of water from a site, the Project Biologist 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 Project Biologist will relocate the species (unless the species is fully protected under state law), consistent with any regulatory authorizations applicable to the species.	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#6: Permanent Conversion of Habitat for and Direct Mortality of Steelhead and Pacific Lamprey, and Permanent Conversion of Essential Fish Habitat for Pacific Coast Salmon Impact BIO#37: Permanent Conversion or Degradation of Aquatic Resources Considered Waters of the U.S. or Waters of the State Impact BIO#38: Permanent Conversion or Degradation of Resources Regulated under California Fish and Game Code Section 1600 et seq. Impact BIO#42: Temporary Disruption of Wildlife Movement Impact HYD#4: Temporary Impacts on Surface Water Quality during Construction
BIO-MM#26	Prepare and Implement a Fish Rescue Plan	If temporary stream dewatering is required, the Authority or a contractor on behalf of the Authority will develop a fish rescue plan. Fish rescue operations will occur at any in-water construction site that occurs in modeled steelhead habitat or habitat identified by project biologists during pre-construction surveys where dewatering and resulting isolation of fish may occur. The fish rescue plan will include detailed procedures for fish rescue and salvage to minimize the number of individuals of listed fish species subject to stranding during dewatering. The plan will identify the appropriate procedures for removing fish from construction zones and preventing fish from reentering	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#6: Permanent Conversion of Habitat for and Direct Mortality of Steelhead and Pacific Lamprey, and Permanent Conversion of Essential Fish Habitat for Pacific Coast Salmon

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		construction zones prior to dewatering and other construction activities. All fish rescue and salvage operations will be conducted under the guidance of a qualified fish biologist (as defined by NMFS) and in accordance with required permits. At each crossing of modeled steelhead habitat, the fish rescue plan will identify the appropriate procedures for excluding fish from the construction zone and for removing fish from areas subject to dewatering. The primary procedure will be to block off the construction area and use seines (nets) or dip nets to collect and remove fish, although electrofishing techniques may also be authorized under certain conditions. It is critical that fish rescue and salvage operations begin as soon as possible and be completed within 48 hours after isolation of a construction area to minimize potential predation and adverse water quality impacts (high water temperature, low dissolved oxygen) associated with confinement. Block nets, sandbags, or other temporary exclusion methods could be used to exclude fish or isolate the construction area prior to the fish removal process. The appropriate fish exclusion or collection method will be determined by a qualified fish biologist, in consultation with a designated NMFS biologist, based on site-specific conditions and construction methods. Capture, release, and relocation measures will be consistent with the general guidelines and procedures set forth in Part IX of the most recent edition of the *California Salmonid Stream Habitat Restoration Manual* (CDFG 2004) to minimize impacts on listed species of fish and their habitat. A draft plan will be submitted to NMFS at least 48 hours prior to fish rescue and relocation.							
BIO-MM#27a	Implement General Protection Measures for Fish	The Authority or a contractor on behalf of the Authority will implement several general protection measures to protect and minimize effects on steelhead and their habitat during construction. The following measures will be implemented during design: ▪ Design temporary night lighting of overwater structures (if needed) such that illumination of the surrounding water is avoided. ▪ Locate temporary construction areas (e.g., staging, storage, parking, and stockpiling areas) outside of channels and riparian areas wherever feasible. ▪ Minimize, to the extent feasible, the placement of footings and columns within the active channel (between top of bank) of steelhead critical habitat. ▪ Use low-impact development methods for stormwater treatment, including locations that could otherwise contribute polluted stormwater to streams that provide habitat for fish listed under the ESA. Such measures may consist of pervious hardscapes (for pollutant-generating areas such as parking lots), bioswales,	Pre-construction/ construction	Implement general protection measures	During construction	Authority/ Contractor/ Project Biologist	Authority/. Contractor/ Project Biologist	During construction	Condition of construction contract/condition of regulatory permits	Impact BIO#6: Permanent Conversion of Habitat for and Direct Mortality of Steelhead and Pacific Lamprey, and Permanent Conversion of Essential Fish Habitat for Pacific Coast Salmon

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		infiltration basins, rain gardens, and other design measures that will capture and treat polluted runoff before it reaches sensitive natural waterways. ▪ The following bank stabilization and erosion control measures will be implemented during design and construction to minimize habitat disturbance: ▪ Temporarily fence areas of natural riparian vegetation that can be avoided with high-visibility ESA fencing to enforce avoidance. ▪ Use "soft" approaches to bank erosion control to the extent possible (e.g., vegetative plantings, placement of large woody debris). Avoid hard bank protection methods (e.g., revetment) wherever feasible. ▪ Avoid the use of wood treated with creosote or copper-based chemicals in bank stabilization efforts. ▪ Use quarry stone, cobblestone, or their equivalent for erosion control along rivers and streams, complemented with native riparian plantings or other natural stabilization alternatives that will maintain a natural riparian corridor, where feasible. Cobble size types and spacing of riparian plantings and other details on riparian restoration activities will be provided in the restoration and revegetation plan described in BIO-MM#1. ▪ Revegetate temporarily disturbed areas with native plants to resemble the existing vegetation.								
BIO-MM#27b	Work Windows for Fish	Near-water and in-water work will be conducted within specified work windows based on date, channel inundation, and water temperature. Work windows will include the general time periods when effects on migrating juvenile and adult steelhead will be minimal. Additionally, in-water work will be allowed when salmonid use is temperature limited (defined as 1 week of average water temperature of 75°F or more); and work will be allowed in the channel and on the floodplain when channels are dry or ponded: ▪ During work windows, work will only be allowed in the channel and on the floodplain from 1 hour after sunrise until 1 hour before sunset. ▪ Near-water or over-water work is defined as construction activities occurring within the floodplain but not in the wetted channel (e.g., located between the wetted channel and the landside toe of the bordering levees or over the wetted channel). In-water work is defined as work within the wetted channel. ▪ The near-water construction work window will be April 30 through December 1. For in-water work, the construction work window will be June 15 through October 15. These periods may be extended subject to receipt of written authorization from NMFS that incidental take limits will not be exceeded. ▪ If channels are dry or ponded (i.e., lack continuous flow), or water temperatures average 75°F or more for	Pre-construction/ construction	Establish work windows	During construction	Authority/ Contractor	Authority/ Contractor	During construction	Condition of construction contract/condition of regulatory permits	Impact BIO#6: Permanent Conversion of Habitat for and Direct Mortality of Steelhead and Pacific Lamprey, and Permanent Conversion of Essential Fish Habitat for Pacific Coast Salmon

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		7 consecutive days, in-water and near-water work can proceed outside the work windows stated above. NMFS will be consulted to verify work can proceed if these conditions are present during construction.								
BIO-MM#27c	Prepare and Implement an Underwater Sound Control Plan	The Authority or a contractor on behalf of 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 salmonid species. Effects will be minimized by limiting the period during which impact pile driving may occur and by limiting or abating underwater noise generated during impact pile driving. The underwater sound control plan will be provided to NMFS for review and approval prior to in-water impact pile driving on steelhead in the context of the following underwater noise thresholds established for disturbance and injury of fish: ▪ Injury threshold for fish of all sizes includes a peak sound pressure level of 206 decibels relative to 1 micropascal. ▪ Injury threshold for fish less than 2 grams is 183 decibels relative to 1 micropascal cumulative sound exposure level and 187 decibels relative to 1 micropascal cumulative sound exposure level for fish greater than or equal to 2 grams. ▪ Disturbance threshold for fish of all sizes is 150 decibels root mean square relative to 1 micropascal. The underwater sound control plan will restrict in-water work to the in-water work window specified in permits issued by the fish and wildlife agencies (including NMFS) and to daylight hours between 1 hour after sunrise and 1 hour before sunset with a 12-hour break between pile driving sessions. The underwater noise generated by impact pile driving will be abated using the best available and practicable technologies. Examples of such technologies include, but are not limited to, the use of cast-in-drilled-hole rather than driven piles; use of vibratory rather than impact pile driving equipment; using an impact pile driver to proof piles initially placed with a vibratory pile driver; noise attenuation using pile caps (e.g., wood or Micarta), bubble curtains, air-filled fabric barriers, or isolation piles; and installation of piling-specific cofferdams. Specific techniques to be used will be selected based on site conditions. In addition to primarily using vibratory pile driving methods and establishing protocols for attenuating underwater noise levels produced during in-water construction activities, the Authority will develop and implement operational protocols for when impact pile driving is necessary. These operational protocols will be used to minimize the effects of impact pile driving on steelhead. These protocols may include, but not be limited to, the following: monitoring the in-water work area for fish that	Pre-construction/ construction	Implement underwater sound control plan measures and monitoring, if required	During construction	Authority/ Contractor	Authority/ Contractor	During construction	Condition of construction contract/condition of regulatory permits	Impact BIO#6: Permanent Conversion of Habitat for and Direct Mortality of Steelhead and Pacific Lamprey, and Permanent Conversion of Essential Fish Habitat for Pacific Coast Salmon

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		may be showing signs of distress or injury as a result of pile-driving activities and stopping work when distressed or injured fish are observed; initiating impact pile driving with a "soft-start," such that pile strikes are initiated at reduced impact and increase to full impact over several strikes to provide fish an opportunity to move out of the area; restricting impact pile-driving activities to specific times of the day and for a specific duration to be determined through coordination with the fish and wildlife agencies; and, when more than one pile-driving rig is employed, initiating pile-driving activities in a way that provides an escape route and avoids "trapping" fish between pile drivers in waters exposed to underwater noise levels that could potentially cause injury.								
BIO-MM#28	Provide Compensatory Mitigation for Permanent Impacts on Steelhead Habitat and Essential Fish Habitat for Pacific Coast Salmon	The Authority will provide compensatory mitigation for permanent impacts on habitat for CCC and SCCC steelhead and designated freshwater EFH for Pacific Coast salmon that is commensurate with the type (spawning, rearing, migratory, or critical habitat) and amount of habitat lost as follows: ▪ Spawning aquatic and riparian habitat within critical habitat will be protected and restored or protected and enhanced at a minimum of 3:1 (protected:affected) unless different ratios are specified in authorizations issued under the FESA. ▪ All rearing and migratory aquatic and riparian habitat within critical habitat will be protected and restored or protected and enhanced at a minimum of 2:1 (protected:affected) or as specified in authorizations issued under the FESA. ▪ All other rearing and migratory aquatic and riparian habitat outside of critical habitat will be protected and restored or protected and enhanced at a minimum of 1:1 (protected:affected) or as specified in authorizations issued under the FESA. Unless agreed upon in coordination with NMFS, compensation will occur within the same distinct population segment domain as the impact was incurred. Where feasible, on-site, in-kind mitigation will be prioritized. Off-site mitigation will prioritize actions recommended in local or regional conservation plans where there is coordination and approval by NMFS. Other options include the purchase of riparian and aquatic habitat credits at an NMFS-approved anadromous fish conservation bank, or through another NMFS-approved conservation option, for the areal extent of riparian and suitable aquatic habitat affected by the action. In the event the Authority chooses not to utilize existing mitigation banks, it will propose other approaches to the applicable regulatory agencies for consideration. Any such approaches will take into account the following: ▪ Habitat complexity such as floodplain backwaters	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 will provide compensatory mitigation for steelhead/ salmon impacts	Condition of construction contract/condition of regulatory permits	Impact BIO#6: Permanent Conversion of Habitat for and Direct Mortality of Steelhead and Pacific Lamprey, and Permanent Conversion of Essential Fish Habitat for Pacific Coast Salmon

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		(designed to limit stranding); refugia habitat such as deep pools, root wads, undercut banks or boulders; feeding and spawning habitat (riffles and runs); and connectivity with migratory habitat ▪ Riparian habitat conditions that are consistent with the existing flow regime and maintain and improve habitat characteristics (e.g., shade, formation and maintenance of refugia) ▪ Local and regional conservation goals ▪ Long-term access for monitoring and maintenance ▪ Upstream and downstream conditions Conservation options developed to offset impacts on steelhead habitat and EFH will be considered in the development of the HMP (BIO-MM#10), Restoration and Revegetation Plan (BIO-MM#1), and Flood Protection Plan (HYD-IAMF#2).								
BIO-MM#29	Conduct Pre-Construction Surveys for California Tiger Salamander	Prior to any ground-disturbing activity scheduled to occur during the dry season (June 1–October 15), the Project Biologist will conduct a pre-construction survey of suitable upland habitat within the work area and extending out 100 feet from the boundary of the work area, where access is available, to determine whether California tiger salamanders are present. Such surveys will be conducted no earlier than 30 days prior to ground-disturbing activities in the work area. The Project Biologist may employ the use of conservation dogs (scent dogs) to augment focused species surveys using methods described in Wasser et al. (2004), Smith et al. (2006), and/ or Filazzola et al. (2017). The Project Biologist will coordinate with USFWS and CDFW before using conservation dogs. In the event that ground-disturbing activities are scheduled to occur during the rainy season (October 15–June 1), in addition to upland surveys, the Project Biologist will survey potential breeding habitat in the work area for the presence of California tiger salamanders using methods from the *Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander* (CDFG and USFWS 2003) or other more recent guidelines, if available.	Pre-construction/ construction	Surveying/ monitoring/ reporting	Weekly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Presence-absence surveys of species within the construction footprint conducted 30 days prior to ground disturbance/ report findings	Condition of construction contract/condition of regulatory permits	Impact BIO#7: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Tiger Salamander
BIO-MM#30	Implement Avoidance and Minimization Measures for California Tiger Salamander	Prior to any ground-disturbing activity, the Contractor, under the direction of the Project Biologist will install WEF along the boundary of the work area containing California tiger salamander suitable habitat or will implement similar measures as otherwise required pursuant to regulatory authorizations issued under the FESA or CESA. WEF must be trenched into the soil at least 4 inches in depth, with the soil compacted against both sides of the fence for its entire length to prevent tiger salamanders from passing under the fence, and must have intermittent exit points. During the dry season (June 1–October 15), the Project Biologist will inspect the WEF at least twice weekly on nonconsecutive days and on a daily basis between	Pre-construction/ construction	Surveying/ monitoring/ reporting	Daily or twice per week inspections (nonconsecutive days)	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Establish WEF	Condition of construction contract/condition of regulatory permits	Impact BIO#7: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Tiger Salamander

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		October 15 and June 1 or following any rain event. WEF will be installed with turn-arounds at access points to direct California tiger salamander away from gaps in the fencing. To the extent feasible, construction activities will not be conducted within 250 feet of areas identified as occupied California tiger salamander breeding habitat during the rainy season (October 15–June 1). However, construction activities may begin within such areas after April 15 if the breeding habitat is no longer inundated.								
BIO-MM#31	Provide Compensatory Mitigation for Impacts on California Tiger Salamander Habitat	The Authority will provide compensatory mitigation to offset the loss of modeled California tiger salamander habitat. Compensatory mitigation will be provided for impacts on habitat occupied or presumed occupied by California tiger salamander at a ratio of 3:1, unless higher ratios are required through regulatory authorizations issued under the FESA or CESA. Compensatory mitigation will be provided using one or more of the methods described in BIO-MM#10.	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 for California tiger salamander affected by the project	Condition of construction contract/condition of regulatory permits	Impact BIO#7: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Tiger Salamander
BIO-MM#32	Conduct Pre-Construction Surveys and Implement Avoidance and Minimization Measures for California Red-Legged Frog	Prior to any ground-disturbing activity scheduled to occur during the dry season (June 1–October 15), the Project Biologist will conduct a pre-construction survey of modeled suitable potential breeding habitat within the work area and extending out 100 feet from the boundary of the work area, where access is available, to determine whether California red-legged frogs are present using methods from the *Revised Guidance on Site Assessments and Field Surveys for The California Red-legged Frog* (USFWS 2005), or other more recent guidelines, if available. Such surveys will be conducted no earlier than 30 days prior to ground-disturbing activities in the work area. Appropriate avoidance and minimization measures, including moving individuals to nearby ponds, or other appropriate measures, will be implemented based on authorizations issued under the 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	Condition of construction contract/condition of regulatory permits	Impact BIO#8: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Red-Legged Frog
BIO-MM#33	Provide Compensatory Mitigation for Impacts on California Red-Legged Frog Habitat	The Authority, in accordance with authorizations issued under the FESA, will compensate for impacts on habitat, including critical habitat, for California red-legged frog. Compensatory mitigation could include one or more of the following: ▪ Purchase of credits from an agency-approved conservation bank ▪ Acquisition in fee title of USFWS-approved property ▪ Purchase or establishment of a conservation easement with an endowment for long-term management of the property-specific conservation values ▪ An in-lieu fee contribution determined through negotiation and consultation with the USFWS Compensatory mitigation for red-legged frog will prioritize lands that will contribute to the recovery of the species	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#8: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Red-Legged Frog

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		and, to the extent feasible, to regional conservation efforts. The recovery plan for the California red-legged frog (USFWS 2002) describes tasks that will contribute to the recovery of the California red-legged frog. To the extent feasible, the compensatory mitigation for California red-legged frog will incorporate one or more of the following conservation needs identified by the recovery plan for the core recovery areas: ▪ East San Francisco Bay Core Recovery Area: protect existing populations; control nonnative predators; study effects of grazing in riparian corridors, ponds, and uplands (e.g., on East Bay Regional Park District lands); reduce impacts associated with livestock grazing; protect habitat connectivity; minimize impacts of recreation and off-road vehicle use (e.g., Corral Hollow watershed); avoid and reduce impacts of urbanization; protect habitat buffers from nearby urbanization (Recovery Task 1.16) ▪ Santa Clara Valley Core Recovery Area: protect existing populations and control nonnative predators (Recovery Task 1.17) The first priority will be to implement compensatory mitigation within the Wilson Peak Critical Habitat Unit. The second priority will be to implement compensatory mitigation in another designated critical habitat unit. If mitigation within designated critical habitat is not feasible, the Authority will implement compensatory mitigation outside critical habitat that provides an equivalent contribution to California red-legged frog recovery. Compensatory mitigation will be provided for impacts on California red-legged frog breeding and refugia/foraging habitat at a ratio of 3:1 and 2:1, respectively.								
BIO-MM#34	Conduct Pre-Construction Surveys and Implement Avoidance and Minimization Measures for Foothill Yellow-Legged Frog	Prior to any ground-disturbing activity scheduled to occur during the dry season (June 1–October 15), the Project Biologist will survey potential breeding habitat (as identified by species modeling) in the project footprint for the presence of foothill yellow-legged frogs using methods outlined in the *Considerations for Conserving the Foothill Yellow-Legged Frog* (CDFW 2018d), the *Visual Encounter Survey Protocol for* Rana boylii *in Lotic Environments* (Peek et al. 2017), or other more recent guidelines, if available. Surveys will be conducted no more than 30 days before the start of ground-disturbing activities and will be spatially phased to precede construction activities. Appropriate avoidance and minimization measures, including moving individuals to nearby ponds or other appropriate measures, will be implemented with authorizations issued under the CESA.	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#9: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Foothill Yellow-Legged Frog
BIO-MM#35	Provide Compensatory Mitigation for Impacts on Foothill Yellow-Legged Frog Habitat	The Authority, in keeping with the state incidental take permit, will provide compensatory mitigation for impacts on habitat for foothill yellow-legged frog. Impacts on occupied or presumed occupied aquatic habitat will be	Pre-construction/ construction/ post-construction	Design/ final design/ compensatory mitigation/	Monthly or as established by regulatory compliance	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Authority to provide compensation based on	Condition of construction contract/condition of regulatory permits	Impact BIO#9: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Foothill Yellow-Legged Frog

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		compensated for at a ratio of 3:1 for primary breeding and foraging habitat through the purchase of CDFW-approved bank credits or through preservation of occupied habitat in perpetuity.		reporting	agencies			amount suitable habitat affected by the project; prior to operation		
BIO-MM#36	Conduct Pre-Construction Surveys for Special-Status Reptiles and Amphibians	Prior to any ground-disturbing activities, the Project Biologist will conduct pre-construction surveys in suitable habitat to determine the presence or absence of special-status reptile and amphibian species within the work area. Surveys will be conducted no more than 30 days before the start of ground-disturbing activities in a work area. The results of the pre-construction survey will be used to guide the placement of ESAs or conduct species relocation.	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#10: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Western Spadefoot Impact BIO#11: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Western Pond Turtle Impact BIO#13: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Joaquin Coachwhip, Northern California Legless Lizard, and Coast Horned Lizard
BIO-MM#37	Implement Avoidance and Minimization Measures for Special-Status Reptiles and Amphibians	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 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 federally or state-listed species, relocations will be undertaken in accordance with regulatory authorizations issued under the FESA or CESA.	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 amphibians/ avoidance or relocation of such species/ report findings	Condition of construction contract/condition of regulatory permits	Impact BIO#10: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Western Spadefoot Impact BIO#11: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Western Pond Turtle Impact BIO#13: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Joaquin Coachwhip, Northern California Legless Lizard, and Coast Horned Lizard
BIO-MM#38	Conduct Surveys for Blunt-Nosed Leopard Lizard	In accordance with authorizations issued under the FESA, a USFWS-approved biologist will conduct a habitat assessment of the project footprint within 1 year prior to the start of construction to identify all habitat suitable for blunt-nosed leopard lizard within the project footprint. Within 1 year of any ground-disturbing activity, the Project Biologist will conduct surveys for the blunt-nosed leopard lizard in suitable habitats (e.g., areas containing burrows) within the project footprint. These surveys will be conducted in accordance with the *Approved Survey Methodology for the Blunt-Nosed Leopard Lizard* (CDFW 2019), or other more recent guidelines, if available. The biologist(s) will also document burrows likely used by a lizard or with egg clutches, where feasible.	Pre-construction/ construction	Surveying/ monitoring/ reporting	Within 1 year prior to construction or as required in Survey Methodology	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Within 1 year prior to construction or as required in Survey Methodology	Condition of construction contract/condition of regulatory permits	Impact BIO#12: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Blunt-Nosed Leopard Lizard
BIO-MM#39	Implement Avoidance	For work areas where surveys confirm that blunt-nosed	Pre-construction/	Surveying/	Daily monitoring	Authority/	Authority/	Install WEF	Condition of	Impact BIO#12: Permanent Conversion or

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
	Measures for Blunt-Nosed Leopard Lizard	leopard lizards are absent, the Project Biologist may install WEF along the perimeter of the work area to prevent individual animals from entering the work area. The WEF will be monitored daily and maintained. During the non-active season for blunt-nosed leopard lizards (October 16–April 14), to the extent feasible, ground-disturbing activities will not occur in areas where blunt-nosed leopard lizards or sign of the species have been observed and that contain burrows suitable for blunt-nosed leopard lizards. If ground-disturbing activities are scheduled during the non-active season, suitable burrows identified during the surveys will be avoided through establishment of 50-foot no-work buffers. The Project Biologist may reduce the size of the no-work buffers if information indicates that the extent of the underground portion of burrows is less than 50 feet. During the active season when blunt-nosed leopard lizards are moving aboveground (April 15–October 15), the following measures will be implemented in areas where blunt-nosed leopard lizards or signs of blunt-nosed leopard lizards have been observed: ▪ **Establishment of no-work buffers**—The Project Biologist will establish, monitor, and maintain 50-foot no-work buffers around burrows and egg clutch sites identified during surveys. The 50-foot no-work buffers will be established around burrows in a manner that allows for a connection between the burrow site and the suitable natural habitat adjacent to the construction footprint so that blunt-nosed leopard lizards or hatchlings may leave the area after eggs have hatched. Construction activities will not occur within the 50-foot no-work buffers until such time as the eggs have hatched and blunt-nosed leopard lizards have left the area. ▪ **Fencing of work areas**—Prior to installing WEF, the Project Biologist will confirm that no blunt-nosed leopard lizards are present within a work area by conducting focused blunt-nosed leopard lizard observational surveys for 12 days over the course of a 30- to 60-day period. At least one survey session will occur over 4 consecutive days. These observational surveys may be paired with scent detection dog surveys for blunt-nosed leopard lizard scat. Within 3 days of completing these surveys with negative results, WEF will be installed in a configuration that accounts for burrow locations and enables blunt-nosed leopard lizards to leave the work area. The following day, the Project Biologist will conduct an observational survey. If no blunt-nosed leopard lizards are observed, the Project Biologist will install additional WEF to further enclose the work area. This work area will be monitored daily while the WEF is in place.	construction	monitoring/ reporting		Contractor/ Project Biologist	Contractor/ Project Biologist	where surveys confirm blunt-nosed leopard lizard is absent/ monitor WEF daily/ establish no-work buffers/ report findings	construction contract	Degradation of Habitat for and Direct Mortality of Blunt-Nosed Leopard Lizard

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		If blunt-nosed leopard lizards are observed prior to installing the last of the WEF, the Project Biologist will continue observational surveys until the lizard is observed leaving the work area or until 30 days elapse with no blunt-nosed leopard lizard observations within the work area. The Project Biologist may use conservation dogs to assist with this determination.								
BIO-MM#40	Provide Compensatory Mitigation for Impacts on Blunt-Nosed Leopard Lizard Habitat	The Authority will provide compensatory mitigation to offset the permanent and temporary loss of potentially suitable habitat for the blunt-nosed leopard lizard. Mitigation will be provided at a ratio of 1:1 unless a higher ratio is required by authorizations issued under the FESA. Compensatory mitigation will be provided using one or more of the methods described in BIO-MM#10.	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 for blunt-nosed leopard lizard affected by the project; prior to operation	Condition of construction contract/condition of regulatory permits	Impact BIO#12: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Blunt-Nosed Leopard Lizard
BIO-MM#41	Conduct Pre-Construction Surveys and Implement Avoidance and Minimization Measures for Giant Garter Snake	Prior to any ground-disturbing activity that occurs within 200 feet of suitable giant garter snake aquatic habitat, the Project Biologist will conduct a pre-construction survey for giant garter snake no earlier than 24 hours before the commencement of the activity. The Project Biologist will remain on-site for the duration of the ground-disturbing activity. If a giant garter snake is encountered during construction, the Project Biologist will direct that work that has the potential to injure the snake be stopped until it is determined that work can continue without potential harm to the snake, or the snake moves out of the immediate work area on its own volition. Pre-construction surveys in work areas will be repeated whenever construction activity lapses for 2 weeks or more. To the extent feasible, WEF will be installed along the upper bank of suitable aquatic habitat located within 200 feet of the boundary of the work area (provided access to such areas is available) or at the boundary of the work area to prevent snakes from moving into upland areas within the work area. The biological monitor will regularly inspect fencing. In addition, the Contractor will maintain all construction equipment to prevent leaks of fuels, lubricants, or other fluids and will conduct service and refueling procedures in uplands at least 100 feet away from wetlands or waterways. To the extent feasible, construction activities within 200 feet of giant garter snake habitat will be conducted between May 1 and October 1, the active period for this species. Conducting construction activities during this period reduces the likelihood of mortality because snakes are expected to actively move and avoid danger. If dewatering of giant garter snake habitat is necessary, any dewatered habitat must remain dry for at least 15 consecutive days after April 15 and prior to excavating or filling of the dewatered habitat.	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; install WEF	Condition of construction contract/condition of regulatory permits	Impact BIO#14: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Giant Garter Snake

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
BIO-MM#42	Provide Compensatory Mitigation for Impacts on Giant Garter Snake Habitat	The Authority will provide compensatory mitigation, in accordance with authorizations issued under the FESA and CESA, for direct and indirect impacts including both temporary and permanent impacts on giant garter snake habitat. Compensatory mitigation will be provided at a minimum ratio of 1:1 for potentially suitable aquatic and upland habitat. Compensatory mitigation will be provided using one or more of the methods described in BIO-MM#10.	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 area of habitat for giant garter snake affected by the project; prior to operation	Condition of construction contract/condition of regulatory permits	Impact BIO#14: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Giant Garter Snake
BIO-MM#43	Conduct Pre-Construction Surveys and Delineate Active Nest Buffers for Breeding Birds	No more than 10 days 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 the work area for nesting birds and active nests (nests with eggs or young) of non-raptor species protected under the MBTA and/or the Cal. Fish and Game Code. In the event that active bird nests are observed during the pre-construction survey, the Project Biologist will delineate no-work buffers and monitor the nests. No-work buffers will be set at a distance of 75 feet, unless a larger buffer is required pursuant to regulatory authorizations issued under the FESA or CESA, or if required by the Project Biologist to ensure the nest is not disturbed. 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 monitors the active nest during the construction activity to ensure that the nesting birds do not become agitated. Additional measures that may be used when no-work buffers are reduced include visual screens and noise barriers.	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#15: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Short-Eared Owl and Grasshopper Sparrow Impact BIO#16: Permanent Conversion or Degradation of Habitat for Mountain Plover and Disturbance of Western Snowy Plover (Interior Population) Impact BIO#22: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Purple Martin, Olive-Sided Flycatcher, and Loggerhead Shrike Impact BIO#23: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Least Bell's Vireo, Yellow Warbler, and Yellow-Breasted Chat
BIO-MM#44	Implement Avoidance and Minimization Measures for Mountain Plover and Sandhill Crane	The Authority will implement the following measures to avoid or minimize disturbance of flocks of wintering mountain plovers and sandhill cranes potentially occurring in the San Joaquin Valley Subsection: • To avoid disturbance of wintering mountain plovers and sandhill cranes in the San Joaquin Valley Subsection, no construction activities involving heavy equipment or loud noise (e.g., pile driving) will be permitted within 250 feet of modeled habitat for mountain plover or within 0.75 mile of sandhill crane roost sites from October 1 to March 15, when large concentrations of both species are most likely to be present. • Alternatively, the Authority or its contractor may conduct surveys for and avoid mountain plover wintering sites and sandhill	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; install WEF	Condition of construction contract/condition of regulatory permits	Impact BIO#16: Permanent Conversion or Degradation of Habitat for Mountain Plover and Disturbance of Western Snowy Plover (Interior Population) Impact BIO#25: Permanent Conversion or Degradation of Habitat for and Disturbance of Sandhill Crane

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		crane roost sites prior to construction activities in or adjacent to modeled habitat between January and March 15 (no work could occur from October to December to allow surveys to be conducted). A minimum of four surveys will be conducted from October 1 to December 31 by a qualified biologist (or team of biologists) experienced with observing both species (preferably in the regional RSA) within 0.75 mile of the portion of the project footprint where construction will occur. The Authority or its contractor may also identify mountain plover wintering sites and sandhill crane roost sites to be avoided by contacting local birders or biologists familiar with mountain plover and sandhill crane habitat use within 0.75 mile of the project footprint. – Biologists will collect geospatial data on mountain plover (flocks of 30 birds or more) and sandhill crane (roost sites) observations in the field using handheld tablets, smartphones, or GPS units that enable drawing of points and multipoint polygons. After surveys are completed, all observations will be digitized into a single file and shared with the Authority and Contractor. – Contractors will avoid disturbance of mountain plovers by siting all activities between January 1 and March 15 more than 250 feet from observed mountain plover wintering sites. – Contractors will avoid disturbance of observed sandhill crane roost sites by not conducting any nighttime (1 hour before sunset to 1 hour after sunrise) work within 0.75 mile of observed roost sites between January 1 and March 15.								
BIO-MM#45	Conduct Surveys for Burrowing Owl	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 located in the work area and/or 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 CDFW *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#17: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Burrowing Owl
BIO-MM#46	Implement Avoidance and Minimization Measures for Burrowing Owl	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:	Pre-construction	Surveying/ monitoring/ reporting	Weekly or as established by regulatory compliance	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Establish no-work buffers around occupied burrowing owl	Condition of construction contract/condition of regulatory permits	Impact BIO#17: 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	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		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 survey. Construction may proceed outside the 250-foot nondisturbance zone. Construction may proceed inside the 250-foot nondisturbance no-work buffer zone during the breeding season if the season-specific criteria (nesting season: February 1–August 31; non-nesting season: September 1–January 31) described in the SCVHP are met.			agencies			burrows/ relocation as needed/ report findings		
BIO-MM#47	Provide Compensatory Mitigation for Loss of Active Burrowing Owl Burrows and Habitat	To compensate for permanent impacts on occupied burrowing owl breeding habitat, the Authority will provide compensatory mitigation at a minimum 1:1 ratio for occupied breeding and foraging habitat. Lands proposed as compensatory mitigation will meet one of the following criteria: • Support at least two breeding adult owls for every breeding adult owl displaced by construction of the project • Support at least 1 acre of burrowing owl breeding habitat for every acre of habitat affected (i.e., 1:1 mitigation ratio). For the purposes of this measure, burrowing owl breeding habitat is defined as any land cover type with all of the following attributes: – Open terrain with well-drained soils – Short, sparse vegetation with few shrubs and no trees – Underground burrows or burrow surrogates (e.g., debris piles, culverts, pipes) for nesting and shelter from predators or weather. Burrows in earthen levees, berms, or canal banks within or along the margins of agricultural fields can be counted as compensatory breeding habitat as long as adjacent fields or pastures are suitable for foraging. – Abundant and accessible prey (arthropods, small rodents, amphibians, lizards)	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#17: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Burrowing Owl
BIO-MM#48	Conduct Pre-Construction Surveys for Eagles	At least 1 year prior to the start of any ground-disturbing activities and construction, the Project Biologists will conduct nesting season surveys for eagles. Surveys for bald and golden eagle nests will be conducted within 4 miles of any construction areas supporting suitable nesting habitat and important eagle roost sites and foraging areas. Surveys will be conducted in accordance with the USFWS *Interim* Golden *Eagle Inventory and Monitoring Protocols* (Pagel et al. 2010), CDFW's *Bald Eagle Breeding Survey Instructions* (CDFW 2017), or current guidance. A nesting	Pre-construction/ construction	Surveying/ monitoring/ reporting	Weekly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Pre-construction nesting surveys for eagles/ report findings	Condition of construction contract/condition of regulatory permits	Impact BIO#18: Permanent Conversion or Degradation of Habitat for and Disturbance of Golden Eagle and Bald Eagle

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		territory or inventoried habitat will be considered unoccupied by golden eagles only after completing at least two full surveys in a single breeding season. Prior to initial construction activities, the Project Biologist will conduct a pre-construction sweep of the project site for golden eagle use.								
BIO-MM#49	Implement Avoidance Measures for Active Eagle Nests	Prior to the start of any ground-disturbing activity, if an occupied nest (as defined by Pagel et al. 2010) is detected within 4 miles of the work areas, the Authority will implement a 1-mile line-of-sight and 0.5-mile no-line-of-sight no-work buffer during the breeding season (January 1 through August 31) so that construction activities do not result in injury or disturbance to eagles. The no-work buffer will be maintained throughout the breeding season or until the young have fledged and are no longer dependent on the nest or parental care that includes nest use for survival. Buffers around occupied nests may be reduced if the Project Biologist determines that smaller buffers will be sufficient to avoid impacts on nesting eagles. Factors to be considered for determining buffer size will include the presence of natural buffers provided by vegetation or topography, nest height, locations of foraging territory, and baseline levels of noise and human activity. Buffers will be maintained and nests monitored until the Project Biologist has determined that young have fledged and are no longer reliant on the nest or parental care that includes nest use for survival. Eagle nest exclusion zones may be removed if monitoring reveals the nest not to be in use as determined by the Project Biologist. An in-use eagle nest is one that is "a bald or golden eagle nest characterized by the presence of one or more eggs, dependent young, or adult eagles on the nest in the past ten days during the breeding season" (USFWS 2016d). Monitoring to demonstrate whether or not eagle nests are in use will follow observational procedures described by Pagel et al. (2010). In bald and golden eagle nesting territories, the Project Biologist will examine debris piles and determine if there is a potential to attract prey species. If the Project Biologist determines debris piles may attract prey species and pose a danger to eagles, the debris piles will be removed or moved.	Pre-construction/ construction	Surveying/ monitoring/ reporting	Weekly or established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Implement and maintain no line-of-sight no-work buffer during the breeding season/ report findings	Condition of construction contract/condition of regulatory permits	Impact BIO#18: Permanent Conversion or Degradation of Habitat for and Disturbance of Golden Eagle and Bald Eagle
BIO-MM#50	Provide Compensatory Mitigation for Loss of Eagle Nests	If pre-construction surveys identify in-use or alternate eagle nests in the permanent impact area, the Authority, in consultation with the USFWS, will develop a nest relocation or replacement plan for the affected nest(s). The plan will describe why there is no practicable alternative to nest removal while enabling project construction. Any relocation or replacement of eagle nests will be in accordance with the BGEPA and subject to the following minimum requirements:	Pre-construction/ construction/ post-construction	Design/ final design/ surveying/ monitoring/ compensatory mitigation/ reporting	Weekly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist/ Mitigation Manager	Authority/ Contractor/ Project Biologist/ Mitigation Manager	Authority to provide compensation based on area of habitat affected by the project; prior to operation	Condition of construction contract/condition of regulatory permits	Impact BIO#18: Permanent Conversion or Degradation of Habitat for and Disturbance of Golden Eagle and Bald Eagle

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		▪ The nest will be relocated, or a suitable nest will be provided, within the same nesting territory to provide a viable nesting option for the affected eagle pair. ▪ Post-construction monitoring to confirm continued nesting within the affected nesting territory will be conducted for a minimum of 3 years using observation procedures described by Pagel et al. (2010).								
BIO-MM#51	Implement Avoidance Measures for California Condor	During any ground-disturbing activities within the range of the California condor, as delineated in the USFWS database, the Authority will implement the following avoidance measures: ▪ The Project Biologist will be present for construction activities occurring within 2 miles of known California condor roosting sites. ▪ If USFWS informs the Authority or if the Authority is otherwise made aware that California condors are roosting within 0.5 mile of a work area, no construction activity will occur during the period between 1 hour before sunset and 1 hour after sunrise. ▪ All construction materials located within work areas, including items that could pose a risk of entanglement, such as ropes and cables, will be properly stored and secured when not in use. ▪ Littering of trash and food waste is prohibited. All litter, small artificial items (e.g., screws, washers, nuts, bolts), and food waste will be collected and disposed of from work areas on at least a daily basis. ▪ All fuels and components with hazardous materials or wastes will be handled in accordance with applicable regulations. These materials will be kept in segregated, secured, or secondary containment facilities as necessary. Any spills of liquid substances that could harm condors will be immediately addressed. ▪ The project will avoid the exposure of wildlife to antifreeze containing ethylene glycol by keeping vehicles/equipment free of leaks, particularly antifreeze, and immediately cleaning up any spills or discharges that arise from leaks. ▪ Polychemical lines will not be used or stored on site to preclude condors from obtaining and ingesting pieces of them. ▪ If a California condor lands in any work area, the Project Biologist will assess construction activities occurring at the time and determine whether those activities present a potential hazard to the individual condor. Activities determined by the Project Biologist to present a potential hazard to the condor will be stopped until the bird has abandoned the area. Methods approved by the USFWS for hazing California condors to encourage abandonment of the construction site, *Guidance on Hazing California Condors* (USFWS 2014), may be used as necessary. ▪ Prior to construction-related uses of helicopters, the	Pre-construction/ construction/ post-construction	Compliance report	Prior to operation	Authority/ Contractor	Authority	Prior to operation	Condition of construction contract/condition of regulatory permits	Impact BIO#19: Injury or Disturbance of California Condor

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		Project Biologist will coordinate with the USFWS to establish that no California condors are present in the area. If California condors are observed in the area in which helicopters will operate (i.e., the helicopter's flight pattern from its point of origin, during construction use, and on its return flight), helicopter use will not be permitted until the Project Biologist has determined that the California condors have left the area. ▪ Nighttime light disturbance will be minimized in and adjacent to suitable habitat where California condors may be present. In the event that nighttime lighting is required, it will be focused, shielded, and directed away from adjacent suitable habitat, including nighttime roost areas. The Project Biologist will be on-site during nighttime light use to determine if the lighting poses a risk or otherwise disturbs or harms condors.								
BIO-MM#52	Conduct Pre-Construction Surveys and Monitoring for Raptors	If construction or other vegetation removal activities are scheduled to occur during the breeding season for raptors (January 1–September 1), no more than 14 days before the start of the activities, the Project Biologist will conduct pre-construction surveys for nesting raptors in areas where suitable habitat is present. Specifically, such surveys will be conducted in habitat areas within the work area and, where access is available. Surveys for all raptors will be conducted within 500 feet of the boundary of the work area, or within 0.5 mile of the boundary of the work area for fully protected raptors, where access is available. If breeding raptors with active nests are found, the Project Biologist will delineate a 500-foot buffer (or as modified by regulatory authorizations for species listed under the FESA or CESA) around the nest to be maintained until the young have fledged from the nest and are no longer reliant on the nest or parental care for survival or until such time as the Project Biologist determines that the nest has been abandoned. If fully protected raptors (e.g., white tailed-kite, golden eagle, American peregrine falcon, bald eagle) with active nests are found, the Project Biologist in conjunction with the Contractor will establish a 0.5-mile buffer around the nest to be maintained until the young have fledged from the nest or the nest fails (as determined by the Project Biologist). Nest buffers may be adjusted if the Project Biologist determines that smaller buffers will be sufficient to avoid impacts on nesting raptors.	Pre-construction/ construction	Surveying/ monitoring/ reporting	Weekly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Pre-construction surveys in suitable habitats for nesting raptors/establish no-work buffers/ monitor active raptor nests/ report findings	Condition of construction contract/condition of regulatory permits	Impact BIO#20: Permanent Conversion or Degradation of Habitat for and Disturbance of Special-Status Raptors (American Peregrine Falcon, Northern Harrier, White-Tailed Kite) and Other Raptors
BIO-MM#53	Conduct Surveys for Swainson's Hawk Nests	Surveys must be performed no more than 1 year prior to the commencement of construction activities. The Project Biologist will conduct surveys for Swainson's hawk during the nesting season (March 1–August 31) within both the work area and a 0.5-mile buffer surrounding the work area, provided access to such areas is available. No sooner than 30 days prior to any ground-disturbing activity, the Project Biologist will conduct pre-construction	Pre-construction	Surveying/ monitoring/ reporting	Weekly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Pre-construction surveys for nesting Swainson's hawks/ monitor active nests/ report findings	Condition of construction contract/condition of regulatory permits	Impact BIO#21: Permanent Conversion or Degradation of Habitat for and Disturbance of Swainson's Hawks

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		surveys of nests identified during the earlier surveys to determine if any are occupied. The initial nesting season surveys and subsequent pre-construction nest surveys will follow the protocols set out in the *Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley* (SHTAC 2000).								
BIO-MM#54	Implement Avoidance and Minimization Measures for Swainson's Hawk Nests	Any active Swainson's hawk nests (defined as a nest used one or more times in the last 5 years) found within 0.5-mile of the boundary of the work area during the nesting season (March 1–August 31) will be monitored daily by the Project Biologist to assess whether the nest is occupied. If the nest is occupied, the Project Biologist will establish no-work buffers following CDFW's *Staff Report Regarding Mitigation for Impacts to Swainson's Hawks (*Buteo swainsoni) *in the Central Valley of California* (CDFG 1994), and the status of the nest will be monitored until the young fledge or for the length of construction activities, whichever occurs first. If ground-disturbing activities or other construction activities may cause nest abandonment or forced fledging within the specified buffer area, the biological monitor will monitor the nest site to determine if the nest is abandoned. If an occupied Swainson's hawk nest tree is to be removed as a result of construction, or nest abandonment is observed during construction, an incidental take permit under CESA will be obtained and impacts will be minimized and fully mitigated.	Construction	Surveying/ monitoring/ reporting	Weekly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Monitor active Swainson's hawk nests/ establish nest avoidance buffer zones/ report findings	Condition of construction contract/condition of regulatory permits	Impact BIO#21: Permanent Conversion or Degradation of Habitat for and Disturbance of Swainson's Hawks
BIO-MM#55	Provide Compensatory Mitigation for Loss of Swainson's Hawk Nesting Trees and Habitat	To compensate for permanent impacts on active Swainson's hawk nest trees (i.e., trees in which Swainson's hawks were observed building nests during protocol-level surveys described in BIO-MM#53) or recently active nest trees (i.e., trees in which Swainson's hawks have been documented as nesting within any of the previous 5 years) and foraging habitat, the Authority will provide compensatory mitigation that replaces affected nest trees and provides foraging habitat. Lands proposed as compensatory mitigation for Swainson's hawk will meet the following minimum criteria: ▪ Support at least three mature native riparian trees suitable for Swainson's hawk nesting (i.e., valley oak, Fremont cottonwood, or willow) for each Swainson's hawk nest tree removed by construction of the project extent ▪ Support at least one Swainson's hawk nesting territory in the last 5 years ▪ Contribute to regional conservation goals for agricultural and wildlife movement preservation where possible. To compensate for impacts on Swainson's hawk foraging habitat, the Authority will contribute to the project's mitigation commitment for Swainson's hawk foraging habitat, which will be calculated based on the following	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	Compensatory mitigation that replaces Swainson's hawk nesting trees and provides natural lands for foraging/ report findings	Condition of construction contract/condition of regulatory permits	Impact BIO#21: Permanent Conversion or Degradation of Habitat for and Disturbance of Swainson's Hawks

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		ratios: ▪ 1:1 for impacts on Primary Active Foraging Habitat • 0.75:1 for impacts on Secondary Active Foraging Habitat ▪ 0.5:1 for impacts on Tertiary Active Foraging Habitat								
BIO-MM#56	Conduct Surveys and Implement Avoidance Measures for Active Tricolored Blackbird Nest Colonies	Prior to initiation of construction at any location within 300 feet of suitable nesting habitat, the Project Biologist with experience surveying for and observing tricolored blackbird will conduct pre-construction surveys to establish use of nesting habitat by tricolored blackbird colonies. Surveys will be conducted in suitable habitat within 300 feet of proposed construction areas, where access allows, during the nesting season (generally March 15–July 31). If construction is initiated near suitable habitat during the nesting season, three surveys will be conducted within 15 days prior to construction, with one of the surveys within 5 days prior to the start of construction. If active tricolored blackbird nesting colonies are identified, construction activities must avoid the nesting colonies and associated habitat during the breeding season (generally March 15–July 31) to the extent practicable within 300 feet of the colony, consistent with the CDFW's *Staff Guidance Regarding Avoidance of Impacts to Tricolored Blackbird Breeding Colonies on Agricultural Fields in 2015* (CDFW 2015). This minimum buffer may be reduced in areas with dense forest, buildings, or other habitat features between the construction activities and the active nest colony, or where there is sufficient topographic relief to protect the colony from excessive noise or visual disturbance as determined by a Project Biologist experienced with tricolored blackbird. If tricolored blackbirds colonize habitat adjacent to construction after construction has been initiated, the Authority will reduce disturbance through establishment of buffers or sound curtains, as determined by the Project Biologist.	Pre-construction/ construction	Surveying/ monitoring/ compensatory mitigation/ reporting	Weekly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist/ Mitigation Manager	Authority/ Contractor/ Project Biologist/ Mitigation Manager	Pre-construction surveys for tricolored blackbird colonies/ establish no-disturbance buffer/ report findings	Condition of construction contract/condition of regulatory permits	Impact BIO#24: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Tricolored Blackbird and Yellow-Headed Blackbird
BIO-MM#57	Provide Compensatory Mitigation for Impacts on Tricolored Blackbird Habitat	The Authority will provide compensatory mitigation required to offset impacts on tricolored blackbird. Compensatory mitigation will replace permanent loss of habitat with habitat that is commensurate with the type (nesting, roosting, and foraging) and amount of habitat lost. Suitable tricolored blackbird nesting habitat will be permanently protected or restored and managed at a ratio of 3:1 (protected or restored:affected) at a location subject to CDFW approval, and in proximity to the nearest breeding colony observed within the past 15 years, if possible. Suitable breeding season foraging habitat will be protected and managed at a ratio of 1:1 (protected:affected) at a location subject to CDFW approval. Suitable nonbreeding season foraging habitat will be protected or restored at a ratio of 1:1 (protected:affected). Compensatory mitigation will be provided using one or more of the methods described in	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	Compensatory mitigation to replace permanent loss of tricolored blackbird nesting habitat/ report findings	Condition of construction contract/condition of regulatory permits	Impact BIO#24: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Tricolored Blackbird and Yellow-Headed Blackbird

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		the HMP.								
BIO-MM#58	Provide Compensatory Mitigation for Impacts on Waterfowl, Shorebird, and Sandhill Crane Habitat	The Authority will provide compensatory mitigation required to offset impacts on waterfowl and shorebirds in the UPR and GEA IBAs. Compensatory mitigation will replace permanent loss of habitat with habitat that is commensurate with the type (nesting, roosting, or foraging) and amount of habitat lost as follows: ▪ Suitable waterfowl and shorebird nesting and foraging habitat will be permanently protected and enhanced at a suitable location at a ratio of 1:1 (protected:affected) for permanent habitat loss; 1:1 (protected:affected) for habitat where hearing damage could result during operations (residual noise of 93 dBA or greater, as measured outside the HSR right-of-way); and 0.5:1 for habitat where arousal, visual disturbance, or masking effects result from operations (residual noise of 77 dBA or greater, as measured outside of the HSR right-of-way). Protection and enhancement of habitat will be implemented within the GEA and UPR IBAs or a suitable alternative location if locations with the IBAs are found to be infeasible in coordination with local stakeholders. ▪ Enhancement activities could include improved water management (to increase food supplies); improvement or replacement of water management infrastructure; vegetation control and management; contouring to increase topographic heterogeneity (to increase habitat diversity); or levee repair, maintenance, and replacement.	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	Compensatory mitigation based on amount of habitat lost and methods described in Compensatory Mitigation Plan	Condition of construction contract/condition of regulatory permits	Impact BIO#25: Permanent Conversion or Degradation of Habitat for and Disturbance of Sandhill Crane Impact BIO#34: Removal or Degradation of Habitat for and Disturbance of Waterfowl and Shorebirds Impact BIO#44: Intermittent Noise Disturbance of Wildlife Using Corridors during Operations Impact BIO#46: Intermittent Visual Disturbance of Wildlife Using Corridors during Operations
BIO-MM#59	Conduct Pre-Construction Surveys for San Joaquin Kit Fox	Within 30 days prior to the start of any ground-disturbing activity, the Project Biologist will conduct pre-construction surveys in suitable kit fox habitat in the work area. The Project Biologist will conduct the surveys in accordance with USFWS' *San Joaquin Kit Fox Survey Protocol for the Northern Range* (USFWS 1999) between May 1 and September 30 for the purpose of identifying potential San Joaquin kit fox dens. All dens will be mapped and their type and status determined. Den types will be identified as defined in Exhibit A (Definitions) of the USFWS' *Standardized Recommendations for Protection of the Endangered San Joaquin Kit Fox prior to or during Ground Disturbance* (USFWS 2011). If any occupied or potential dens are found during pre-construction surveys, they will be flagged and a 50-foot no-work buffer will be established around the den until the den type is identified cleared, in accordance with regulations under the FESA and CESA, if necessary to allow construction activities to proceed. The Project Biologist may employ the use of conservation dogs (scent dogs) to augment focused species surveys using methods described in Smith et al. (2006). The Project Biologist will coordinate with USFWS and CDFW before using conservation dogs.	Pre-construction	Surveying/ monitoring/ reporting	Weekly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Conduct pre-construction surveys for San Joaquin kit fox dens/ report findings	Condition of construction contract/condition of regulatory permits	Impact BIO#26: Loss of Denning and Dispersal Habitat for and Direct Mortality or Disturbance of San Joaquin Kit Fox

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
BIO-MM#60	Implement San Joaquin Kit Fox Avoidance and Minimization Measures	The Authority will implement USFWS' *Standardized Recommendations for Protection of the San Joaquin Kit Fox Prior to or During Ground Disturbance* (USFWS 2011) to minimize impacts on this species, including: ▪ Disturbance of all kit fox dens will be avoided to the extent feasible. ▪ Construction activities that occur within 200 feet of any occupied dens will cease within one-half hour after sunset and will not begin earlier than one-half hour before sunrise, to the extent feasible. ▪ All construction pipes, culverts, or similar structures with a diameter of 4 inches or greater that are stored within the construction footprint for one or more overnight period will be thoroughly inspected for kit foxes before the pipe is subsequently buried, capped, or otherwise used or moved. ▪ If a San Joaquin kit fox is detected within a work area during construction, the Project Biologist will request approval from the USFWS and CDFW to capture and relocate the kit fox if it does not safely leave the area by its own volition. ▪ To minimize the temporary impacts of WEF and construction exclusion fencing on kit fox and their movement/migration corridors during construction, artificial escape dens will be installed along the outer perimeter of WEF and construction exclusion fencing. Artificial escape dens or similar escape structures will also be installed at the entrances to temporary wildlife crossing structures to provide escape cover and protection against predation. The artificial escape dens will be located on parcels owned by the Authority or at locations where access is available outside of work areas. The artificial escape dens will be removed at the same time as the WEF and construction exclusion fencing, once construction is complete.	Pre-construction/ construction	Surveying/ monitoring/ reporting	Weekly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist/ Mitigation Manager	Authority/ Contractor/ Project Biologist/ Mitigation Manager	Implement USFWS's *Standardized Recommenda-tions for Protection of the San Joaquin Kit Fox Prior to or During Ground Disturbance* (USFWS 2011)/ report findings	Condition of construction contract/condition of regulatory permits	Impact BIO#26: Loss of Denning and Dispersal Habitat for and Direct Mortality or Disturbance of San Joaquin Kit Fox
BIO-MM#61	Provide Compensatory Mitigation for Impacts on San Joaquin Kit Fox Habitat	The Authority will provide compensatory mitigation for impacts on San Joaquin kit fox habitat through the acquisition of suitable habitat that is acceptable to USFWS and CDFW. Habitat will be replaced at a minimum ratio of 1:1 for high- or moderate-value suitable habitat (natural lands) and at a ratio of 0.5:1 for low-value suitable habitat (urban or agricultural lands), unless a higher ratio is required by regulatory authorizations issued under the FESA and CESA. Compensatory mitigation will be provided using one or more of the methods described in BIO-MM#10.	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/ Mitigation Manager	Mitigate for impacts on San Joaquin kit fox habitat/ report findings	Condition of construction contract/condition of regulatory permits	Impact BIO#26: Loss of Denning and Dispersal Habitat for and Direct Mortality or Disturbance of San Joaquin Kit Fox
BIO-MM#62	Implement Avoidance and Minimization Measures for Fresno Kangaroo Rat	Prior to any ground-disturbing activity, the Project Biologist will assess suitable habitat within the work area to determine whether kangaroo rat burrows or signs of kangaroo rats are present. If no burrows or signs of kangaroo rats are detected and kangaroo rats are determined to be absent from the work area, the Project	Pre-construction/ construction	Surveying/ monitoring/ reporting	Weekly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Establish no-work buffers if burrows or signs of special-status small mammal species are	Condition of construction contract/condition of regulatory permits	Impact BIO#27: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Fresno Kangaroo Rat

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		Biologist will oversee the installation, maintenance, and monitoring of WEF along the perimeter of the work area where adjacent to potentially suitable habitat. If kangaroo rat individuals, burrows, or signs of the presence are found within the work area during the habitat assessment, the Project Biologist will conduct protocol-level surveys for Fresno kangaroo rat in accordance with the USFWS *Survey Protocol for Determining Presence of San Joaquin Kangaroo Rats* (USFWS 2013b), or as otherwise provided pursuant to authorizations issued under the FESA and CESA. In the unlikely event that Fresno kangaroo rat is confirmed present in the work area through the protocol-level surveys, all project activities in the work area will cease and USFWS and CDFW will be notified within 2 business days or as required under authorizations issued under the FESA or CESA. The Project Biologist will install WEF in areas where Fresno kangaroo rats are present and will establish 50-foot no-work buffers to avoid impacts on occupied habitat, unless a different buffer distance is specified under authorizations issued under the FESA and CESA.						detected/ relocation as needed/ report findings		
BIO-MM#63	Provide Compensatory Mitigation for Impacts on Fresno Kangaroo Rat Habitat	Impacts on habitat occupied by Fresno kangaroo rat will be compensated for in accordance with authorizations issued under FESA and CESA through a HMP prepared in accordance with BIO-MM#10, at a minimum 1:1 ratio for potentially suitable habitat through the purchase of agency-approved bank credits or through preservation of suitable habitat (i.e., alkali sink scrub or grassland on the San Joaquin Valley floor) in perpetuity.	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	Compensate for permanent and temporary loss of suitable habitat for Fresno kangaroo rat/ report findings	Condition of construction contract/condition of regulatory permits	Impact BIO#27: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Fresno Kangaroo Rat
BIO-MM#64	Conduct Pre-Construction Surveys for American Badger Den Sites and Implement Avoidance and Minimization Measures	Prior to any ground-disturbing activity, the Project Biologist will conduct pre-construction surveys for American Badger den sites within suitable habitat located within the work area. These surveys will be conducted no less than 14 days and no more than 30 days prior to the start of ground-disturbing activities in a work area. The Project Biologist will establish a 100-foot no-work buffer around occupied maternity dens throughout the pup-rearing season (February 15–July 1) and a 50-foot no-work buffer around occupied dens during other times of the year. If nonmaternity dens are found and cannot be avoided during construction activities, they will be monitored for badger activity. If the Project Biologist determines that dens may be occupied, passive den exclusion measures will be implemented for 3–5 days to discourage the use of these dens prior to project disturbance activities.	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 for American badger den sites in suitable habitats/ establish no-work buffer around occupied dens/conduct passive den exclusion for non-maternity dens/ report findings	Condition of construction contract/condition of regulatory permits.	Impact BIO#28: Permanent Conversion or Degradation of Habitat for and Direct Mortality of American Badger
BIO-MM#65	Conduct Pre-Construction Surveys for Ringtail and Ringtail Den Sites and Implement Avoidance	Prior to any ground-disturbing activity, the Project Biologist will conduct pre-construction surveys for ringtail and ringtail den sites in suitable habitat within the work area. These surveys will be conducted no more than 30 days before the start of ground-disturbing activities in a work	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 for ringtail den sites in suitable	Condition of construction contract/condition of regulatory permits	Impact BIO#29: 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	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
	Measures	area. The Project Biologist will establish 100-foot no-work buffers around occupied maternity dens throughout the pup-rearing season (May 1–June 15) and a 50-foot no-work buffer around occupied dens during other times of the year.						habitats/ establish no-work buffer around occupied dens/conduct passive den exclusion for non-maternity dens/ report findings		
BIO-MM#66	Conduct Pre-Construction Surveys for Dusky-Footed Woodrat and Implement Avoidance Measures	Prior to any ground-disturbing activity, the Project Biologist will conduct pre-construction surveys for woodrat stick houses within suitable habitat located within the work area. These surveys will be conducted no more than 14 days before the start of ground-disturbing activities in a work area. The Project Biologist will establish a 50-foot no-work buffer around each stick house using ESA fencing. If stick houses are found within temporary or permanent impact areas and cannot be avoided, the following condition will be implemented: ▪ Removal of woodrat stick houses will not occur between March and May when nesting is most likely. Outside this period, the Contractor, under supervision of the Project Biologist, may dismantle stick houses by hand or using small construction machinery (e.g., Bobcat or similar) and move nesting material to suitable habitat outside the project footprint so that woodrats may rebuild new houses.	Pre-construction	Surveying/ monitoring/ reporting	Weekly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Conduct habitat assessment surveys for special-status small mammal species/ report findings Establish no-work buffers if burrows or signs of special-status small mammal species are detected/ relocation as needed/ report findings	Condition of construction contract/condition of regulatory permits	Impact BIO#29: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Francisco Dusky-Footed Woodrat and Ringtail
BIO-MM#67	Conduct Pre-Construction Surveys for Special-Status Bat Species	No more than 1 year before the replacement or modification of any bridges or removal of other structures modeled as bat habitat and where access is available, the Project Biologist will conduct a survey of the bridge looking for evidence of roosting bats. If bat sign is detected, biologists will conduct an evening visual emergence survey of the bridge or structure, from a half hour before sunset to 1–2 hours after sunset for a minimum of 2 nights within the season that construction will be taking place. If a potentially active bat roost is in the bridge or structure, passive monitoring with full-spectrum bat detectors will be used to assist in determining species present. 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 that will be submitted to the Authority, including an assessment of the significance of the roost for local bat populations.	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#30: Loss of Roost Sites for and Direct Mortality or Disturbance of Special-Status Bats

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
BIO-MM#68	Implement Bat Avoidance and Relocation Measures	If active hibernacula or maternity roosts are identified in the work area or 500 feet extending from the work area during pre-construction surveys, they will be avoided to the extent feasible. If avoidance of a hibernacula is not feasible, the Project Biologist will prepare a relocation plan to remove the hibernacula and provide for construction of an alternative bat roost outside of the work area. The relocation plan will be provided to CDFW for review and input. The Project Biologist will implement the relocation plan before the commencement of any ground-disturbing activities that will occur within 500 feet of the hibernacula. Removal of roosts will be guided by accepted exclusion and deterrent techniques.	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#30: Loss of Roost Sites for and Direct Mortality or Disturbance of Special-Status Bats
BIO-MM#69	Implement Bat Exclusion and Deterrence Measures	If nonbreeding or nonhibernating individuals or groups of bats are found roosting within the work area, the Project Biologist 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 and/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. If a relocation plan is necessary, the Authority will develop it in consultation with CDFW and/or other experts as necessary.	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#30: Loss of Roost Sites for and Direct Mortality or Disturbance of Special-Status Bats
BIO-MM#70	Prepare and Implement an Annual Vegetation Control Plan	Prior to O&M of the HSR, the Authority will prepare an annual vegetation control plan (VCP) to address vegetation removal for the purpose of maintaining clear areas around facilities, reducing the risk of fire, and controlling invasive weeds during the operational phase. The Authority will generally follow the procedures established in Chapter C2 of the California Department of Transportation (Caltrans) Maintenance Manual to manage vegetation on Authority property (Caltrans 2014). Vegetation 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, as outlined below: ▪ Chemical vegetation control methods ▪ Mowing program consistent with Section 1415 of the FAST Act ▪ Other nonchemical vegetation control ▪ Other chemical pest control methods (e.g., insects, snail, rodent)	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#31: Intermittent Disturbance of Habitat for Special-Status Plants during Operations Impact BIO#32: Intermittent Disturbance of Habitat for and Direct Mortality of Special-Status Wildlife during Operations Impact BIO#36: Intermittent Disturbance or Degradation of Special-Status Plant Communities during Operations Impact BIO#39: Intermittent Disturbance or Degradation of Aquatic Resources during Operations

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		Only Caltrans-approved herbicides may be used in the vegetation control program. Pesticide application will be conducted by certified pesticide applicators in accordance with all requirements of the California Department of Pesticide Regulation and County Agricultural Commissioners. Noxious/invasive weeds will be treated where requested by County Agricultural Commissioners. The Authority will cooperate in area-wide efforts to control noxious/invasive weeds if such programs have been established by local agencies. To the extent feasible and consistent with the Caltrans (2014) Maintenance Manual requirements, the Authority will also include pollinator conservation measures in the VCP from the *Xerces Society Best Management Practices for Pollinators on Western Rangelands* (Xerces Society 2018), conservation measures in the *Nationwide Candidate Conservation Agreement for Monarch Butterfly on Energy and Transportation Lands* (Cardno 2020), or other applicable sources.								
BIO-MM#71	Restore Temporary Riparian Impacts	Within 90 days of completing construction in a work area, the Project Biologist will direct the revegetation of any riparian areas temporarily disturbed as a result of the construction activities, using appropriate native plants and seed mixes. Native plants and seed mixes will be obtained from stock originating from local sources, to the extent feasible. The Project Biologist will monitor restoration activities consistent with provisions in the RRP (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#35: Permanent Conversion or Degradation of Special-Status Plant Communities Impact BIO#37: Permanent Conversion or Degradation of Aquatic Resources Considered waters of the U.S. or waters of the State Impact BIO#38: Permanent Conversion or Degradation of Resources Regulated under California Fish and Game Code Section 1600 et seq. Impact HYD#4: Temporary Impacts on Surface Water Quality during Construction
BIO-MM#72	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 (mixed riparian and palustrine forested wetland) or 4:1 (California sycamore woodland), unless a higher ratio is required by agencies with regulatory jurisdiction over the resource. Compensatory mitigation may occur through habitat restoration, the acquisition of credits from an approved mitigation bank, participation in an in-lieu fee program or habitat preservation or enhancement at a permittee responsible mitigation site. Mitigation nearest the location of impact will be prioritized, as feasible, unless the conservation value will be greatest in another location.	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#23: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Least Bell's Vireo, Yellow Warbler, and Yellow-Breasted Chat Impact BIO#35: Permanent Conversion or Degradation of Special-Status Plant Communities Impact BIO#37: Permanent Conversion or Degradation of Aquatic Resources Considered waters of the U.S. or waters of the State Impact BIO#38: Permanent Conversion or Degradation of Resources Regulated under California Fish and Game Code Section 1600 et seq. Impact HYD#5: Permanent Impacts on Surface Water Quality during Construction

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
BIO-MM#73	Restore Aquatic Resources Subject to Temporary Impacts	Within 90 days of the completion of construction activities in a work area, the Authority will begin to restore aquatic resources that were temporarily affected by the construction. 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 will be restored. The Authority will revegetate affected aquatic resources using appropriate native plants and seed mixes (from local sources 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#37: Permanent Conversion or Degradation of Aquatic Resources Considered waters of the U.S. or waters of the State Impact BIO#38: Permanent Conversion or Degradation of Resources Regulated under California Fish and Game Code Section 1600 et seq. Impact HYD#4: Temporary Impacts on Surface Water Quality during Construction
BIO-MM#74	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/or waters of the state under the Porter-Cologne Act. The compensatory mitigation for state- and federally protected wetlands will meet the federal and state policy for no net loss of functions and values. Mitigation implemented under this measure will be consistent with and will help advance mitigation commitments at the program level, including mitigation intended to address impacts in the GEA. Compensatory mitigation may involve the restoration, establishment, enhancement, and/or preservation of aquatic resources through one or more of the following methods: ▪ Purchase of credits from an agency-approved mitigation bank ▪ Preservation of aquatic resources through acquisition of property ▪ Establishment, restoration, or enhancement of aquatic resources ▪ In-lieu fee contribution determined through consultation with the applicable regulatory agencies The following ratios will be used for compensatory mitigation for permanent impacts, unless a higher ratio is required pursuant to regulatory authorizations issued under Section 404 of the CWA and the Porter-Cologne Act: ▪ Vernal pools: 2:1 ▪ Seasonal wetlands: between 1.1:1 and 1.5:1 based on impact type, function and values lost – 1:1 off-site for permanent impacts – 1:1 on-site and 0.1:1 to 0.5:1 off-site for temporary impacts ▪ All other wetland types: 1:1 ▪ All non-wetland types: mitigated onsite at 1:1 or offsite 1:1 if onsite mitigation is not possible.	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#37: Permanent Conversion or Degradation of Aquatic Resources Considered waters of the U.S. or waters of the State Impact BIO#38: Permanent Conversion or Degradation of Resources Regulated under California Fish and Game Code Section 1600 et seq. Impact HYD#4: Temporary Impacts on Surface Water Quality during Construction Impact HYD#5: Permanent Impacts on Surface Water Quality during Construction

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		For permittee-responsible mitigation involving establishment, restoration, enhancement, or preservation of aquatic resources by the Authority, the CMP will contain, but will not be limited to 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 to support success of the compensatory mitigation Additional information required in a CMP as outlined in 33 C.F.R. 332.4(c), as deemed appropriate and necessary by the 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#75	Implement Transplantation and Compensatory Mitigation 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 Contractor, under the direction of the Project Biologist, will install ESA fencing within the root protection zone. The root protection zone extends beyond the dripline to a distance that is half the distance between the trunk and the dripline. 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	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#40: Removal or Mortality of Trees Protected under Municipal Tree Ordinances

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		ratio not to exceed 3:1 for native trees (except for native oak trees, which will be replaced at a ratio not to exceed 6:1) or 1:1 for ornamental trees, unless higher ratios are required by local government ordinances or regulations. ▪ Contribution to a tree-planting fund. The Authority will develop a native oak/protected tree mitigation plan for oak and other protected trees that are transplanted or replaced. The oak/protected tree mitigation plan will include the following: ▪ The number of affected oak trees and the number of transplanted and replaced native oak trees. ▪ A description of the mitigation site and reference site locations. ▪ A planting plan that includes planting acorns and understory species. ▪ A description of the success criteria that will be used to evaluate performance. Success criteria will be defined to achieve approximate baseline conditions at a minimum. ▪ A description of the types of monitoring that will be used to verify that such criteria have been met. Monitoring will occur for a minimum of 10 years by the Project Biologist. ▪ 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 remedial actions that will be used if the success criteria are not met. ▪ A description of financial assurances that will be provided to demonstrate that the funding to implement mitigation is assured.								
BIO-MM#76a	Minimize Impacts on Wildlife Movement during Construction	During construction, all known wildlife crossing structures, such as underpasses and culverts, will be maintained unobstructed; no equipment storage, staging, or unnecessary operations will be conducted in such areas. Where an existing underpass or culvert must be closed or obstructed, a temporary crossing structure or an alternative movement corridor will be created. Construction will be timed to minimize impacts on movement by providing at least one crossing feature in a region. For example, to minimize impacts on wildlife using the Fisher Creek culvert, construction at Fisher Creek will not commence until the construction of the Tulare Swale undercrossing is complete. Directional fencing will be placed to funnel individuals to temporary or alternative crossing structures or movement corridors. The Authority will avoid placing fencing, either temporarily or permanently, within known movement routes for wildlife (e.g., the Fisher Creek underpass or culverts and bridges that provide passage under SR 152 in western Pacheco Pass) in those portions of the alignment where the tracks	Pre-construction/ construction	Final design/ surveying/ monitoring/ reporting	Yearly or at other appropriate intervals	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Avoid placement of fencing adjacent to wildlife movement corridors/ report findings	Condition of construction contract	Impact BIO#42: Temporary Disruption of Wildlife Movement

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		are elevated (e.g., viaducts or bridges). The Authority will avoid conducting ground-disturbing activities within known wildlife movement routes during nighttime hours, to the extent feasible, and will shield nighttime lighting to avoid illuminating wildlife movement corridors in circumstances where feasible. The Authority will also avoid conducting ground-disturbing activities within known wildlife movement routes during nighttime hours (1 hour before sunset to 1 hour after sunrise), to the extent feasible. Where nighttime work is necessary, the Authority will minimize impacts on adjacent lands by preparing a site-specific lighting information plan. The plan will provide the number of lights to be utilized, the type of lights to be used (i.e., LED, incandescent, or halide), the lumens of the lights, how the lights will be shielded and directed downward, as well as a map that shows the work area, lighting locations, and the orientation of how lighting will be directed. Lighting will use the minimum levels approved by OSHA (29 C.F.R. § 1926.56) for general construction (i.e., 5 foot-candles or 54 lux). Additionally, the plan will include instructions to minimize the direction of construction vehicle headlights toward off-site locations and using low beams or turning off headlights when safety considerations permit. The plan will require minimizing the duration of lighting by using methods other than lighting to ensure security of the construction site during hours it is not in use. To avoid impeding movement of aquatic species, the Authority will employ the use of vibratory (rather than impact) pile driving for work in or within 200 feet of waterbodies that provide habitat for steelhead or giant garter snake. To allow for movement of steelhead and other fish species around dewatered sites, the capture and translocation of fish around the job site to a downstream location will be undertaken on consultation with the NMFS and CDFW. Additionally, the Authority will establish wildlife-friendly fencing at soil stabilization areas and tunnel portals (which occur through the Pacheco Pass region) where a large right-of-way will be required. While access restriction fencing directly adjacent to the rail, tunnel portals, and HSR facilities will still be necessary for human safety and security, it will not be necessary around the larger construction footprints necessary for soil stabilization areas and tunnel portal work areas. Within these areas, a wildlife-friendly fence will be used with the following attributes (Paige 2012): ▪ Three- or four-strand wire design ▪ No more than 40 inches tall (to allow adult mammals to jump over) ▪ Bottom 18 inches off the ground (to allow animals to crawl under) (changes in topography such as gullies or								

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		dips can be used to provide this clearance distance) ▪ At least 12 inches between the top two wires ▪ Smooth top and bottom wires ▪ No vertical stays between posts; if stays are necessary, consider stiff plastic or composite stays ▪ Wood or steel posts at 16.5-foot intervals ▪ Gates, drop-downs, or other passage where wildlife can concentrate and cross ▪ Flagging or other measure to increase fence visibility (especially important for low-flying birds)								
BIO-MM#76b	Minimize Impacts on Wildlife Movement in the Western Pacheco Pass Region	The Authority will implement measures within the western Pacheco Pass region (e.g., the Pacheco Creek Reserve and adjacent areas) to facilitate wildlife movement during construction. To offset noise, visual, lighting, and ground disturbance effects during construction, the Authority will identify, create, and maintain at least two wildlife movement routes through and/or around the construction area to facilitate continued wildlife movement. Wildlife movement areas will be established between natural lands to the east, west, and south of the construction area and existing wildlife crossing location under SR 152. The routes will be fenced on one or both sides to help funnel animals through or around the construction area, will be as wide as possible, and will include predator avoidance cover as well as open areas that provide line of sight. Noise walls will be used, where needed, to create the minimum noise conditions possible. The Authority will consult with SCVHA, Pathways for Wildlife, and other subject matter experts as necessary to identify existing bridges, culverts, and undercrossings under features such as SR 152 that will be suitable crossing locations for this measure. The wildlife movement routes will be established prior to construction, adjusted if necessary, and will be maintained and monitored (using camera stations or other appropriate methods) during construction to ensure that, at any one time, at least two routes are maintained. The corridors will be maintained in a dark state (i.e., shielded from construction-related lighting) if possible. The Authority will work with agency and stakeholder partners—CDFW, USFWS, NMFS, the SCVOSA, SCVHA, Peninsula Open Space Trust, and The Nature Conservancy—to site and design the temporary movement routes.	Pre-construction/ construction	Final design/ surveying/ monitoring/ reporting	Yearly or at other appropriate intervals	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Avoid placement of fencing adjacent to wildlife movement corridors/ report findings	Condition of construction contract	Impact BIO#42: Temporary Disruption of Wildlife Movement
BIO-MM#77a	Design Wildlife Crossings to Facilitate Wildlife Movement	The Authority will design all wildlife crossings created specifically for terrestrial species consistent with the guidelines and recommendations in the WCA (Authority 2020a: Appendix C). The design of wildlife crossings will include the following features: ▪ To improve use of wildlife crossings, install directional fencing for the maximum feasible distance from each side of wildlife crossing entrances/exits along Monterey Road between Metcalf Road and Tilton Avenue (i.e.,	Design/ pre-construction/ construction	Design/ final design/ monitoring/ reporting	Weekly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Establish wildlife crossings/ report findings	Condition of construction contract/condition of regulatory permits	Impact BIO#43: Permanent Impacts on Wildlife Movement Impact BIO#48: Mortality Resulting from Train Strike during Operations Impact BIO#55: Conflict with Coyote Valley Linkage

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		within Coyote Valley). Directional fencing will be designed to benefit the greatest number of movement guilds feasible. ▪ Wildlife crossing width and height will be maximized and length minimized to the extent feasible. ▪ Native earthen bottom ▪ Avoid metal walls ▪ Unobstructed entrances (e.g., no riprap, energy dissipaters, grates), although vegetative cover, adjacent to and near the entrances of crossings, is permissible ▪ Openness and a clear line of sight from end to end ▪ Design entrances to minimize light reflection from train lights ▪ Cover materials within the crossing such as rock or brush piles where smaller animals can take cover ▪ Year-round absence of water for a portion of the width of the crossing (i.e., no flowing water) ▪ Where water is likely to be present within a crossing as a result of a high groundwater table or proximity to an existing floodplain, wildlife crossing design will include features to minimize water entry into the crossing (e.g., impermeable groundwater barriers, berms) and to maximize drainage and drying time (e.g., slopes, sump pumps or permeable soils) ▪ Where hydrologic flow balancing features (culverts) provide wildlife connectivity, "shelves" will be constructed, where feasible, to allow small and medium animals to pass through the structure when it is flooded ▪ Slight grade at approaches to prevent flooding ▪ Hydrologic designs (ledges, cross slopes, water detention features, infiltration features, water proofing, or other features) to maintain crossing functionality (a dry crossing path) up to and including 100-year storm events for 95% of the year (347 days) ▪ Limited open space distance and absence of permanent physical obstacles between crossing and cover/habitat ▪ Separation from human use areas (e.g., trails, multiuse undercrossings, development) ▪ Avoidance of artificial light at approaches to wildlife crossings ▪ The addition of directional fencing in other important wildlife corridors (e.g., the western Pacheco Pass region) to funnel wildlife to crossing structures ▪ Consideration of habitat modification and/or habitat restoration at crossings to facilitate cover for crossing animals Because land use and other factors could change prior to construction of the project, the Authority will work with agency and stakeholder partners (e.g., CDFW, USFWS, NMFS, SCVOSA, SCVHA, Peninsula Open Space Trust, and The Nature Conservancy) to validate and optimize								

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		wildlife crossing locations at the 75% to 90% design phase. The adjustment of some crossing locations, and the spacing of crossings, up to approximately 0.1 mile, may be necessary to orient crossings most advantageously to protected and natural lands, which is likely to improve the potential for use. In addition, the Authority will plan and prioritize species and wetland and natural community (e.g., sycamore alluvial wetland) mitigation land acquisition—in coordination with the agencies and stakeholders listed above—at or near wildlife crossing entrances to minimize future development and maintain the natural and rural land cover types surrounding wildlife crossing entrances and exits. Further, the Authority will prepare and submit for review a Wildlife Crossing Design, Inspection, and Maintenance Plan. The plan will include the following minimum components: ▪ A list of movement guild focal species for each wildlife crossing and hydrologic balancing features along the alignment ▪ Based on the focal species, identification of which of the above-listed design features (e.g., vegetation at the entrance, cover within the crossing, artificial dens for San Joaquin kit fox, critter shelves) will be included in each crossing's design ▪ A funnel fencing plan for wildlife crossing entrances/exits on the east side of Monterey Road in Coyote Valley ▪ Frequency of crossing design inspection ▪ A list of features to be inspected, criteria for passing inspection, and the response for failed inspection ▪ A description of how maintenance decisions will be informed by the wildlife crossing monitoring and adaptive management plan described below in BIO-MM#77b The Wildlife Crossing Design, Inspection, and Maintenance Plan will be developed in coordination with wildlife agencies—CDFW, USFWS, and NMFS—and local wildlife movement stakeholders (e.g., SCVOSA, SCVHA, Peninsula Open Space Trust, and The Nature Conservancy).							
BIO-MM#77b	Monitoring and Adaptive Management of Wildlife Crossings	The Authority will develop a monitoring and adaptive management plan to monitor the effectiveness and use of crossing designs. The plan will include the following minimum components: ▪ Monitoring methods—Consistent with local monitoring efforts, which primarily use camera stations and other remote sensing equipment to document use and passage rates, monitoring will be focused on crossings within defined wildlife movement corridors. To the extent feasible, the Authority could also contribute funding to local organizations currently conducting	Post-construction	Design/final design/ monitoring/ reporting	Weekly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Establish wildlife crossings/ report findings	Condition of construction contract/condition of regulatory permits	Impact BIO#43: Permanent Impacts on Wildlife Movement Impact BIO#55: Conflict with Coyote Valley Linkage

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		wildlife movement monitoring to meet monitoring requirements outlined in the measure, provided the efforts are occurring within the same defined wildlife movement corridors. ▪ Monitoring—Monitoring will start following construction, and total initial monitoring period will not exceed 5 years following construction. Additional monitoring associated with adaptive management will be confined to the location triggering the adaptive management and will not exceed 5 years. ▪ Success criteria—Wildlife crossings have been designed with minimum dimensions and design criteria for the different movement guilds, as considered in the WCA. Crossings will be considered successful if they are documented during monitoring as having use by one or more of the species guilds they are designed for. The adaptive management plan will outline species and species guild targets for each size and type of wildlife crossing constructed, based on the design criteria and associated expected use of each crossing as outlined in the WCA. ▪ Adaptive management—Adaptive management will include modifications to design features, if feasible, such as cover and substrate; use of new technologies to attract animals to the crossing; fencing; adjacent land management changes, if feasible; or other measures that may be determined to be feasible in the future. The monitoring and adaptive management plan will be developed in coordination with wildlife agency staff and local wildlife movement stakeholders such as SCVHA, SCVOSA, The Nature Conservancy, and Peninsula Open Space Trust.								
BIO-MM#78	Establish Wildlife Crossings at Embankment in West Slope of Pacheco Pass	The Authority will create dedicated wildlife crossings to accommodate wildlife movement across permanently fenced infrastructure in the western portion of the Pacheco Pass Subsection near Casa de Fruta, where wildlife movement will be significantly reduced. Dedicated wildlife crossings will be implemented using one or more methods. The Authority will either construct short segments of open-span bridge/viaduct or will install dedicated wildlife undercrossings. The area proposed for the crossings is known to be geologically unstable, and the Authority has committed to evaluating the area through detailed geotechnical analysis. The wildlife crossing type used will prioritize the use of open-span bridge/viaducts; however, the methods used will depend on the results of detailed geotechnical analysis to ensure safety and security of the rail is considered first. Wildlife undercrossings, if used, will be placed approximately every 0.3 mile and will be no longer than 120 feet, as feasible, where the alignment is at grade, on	Pre-construction/ construction	Design/ final design/ monitoring/ reporting	Weekly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Establish wildlife crossings/ report findings	Condition of construction contract/condition of regulatory permits	Impact BIO#43: Permanent Impacts on Wildlife Movement

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		embankment, or trenched at the following locations: ▪ Crossing A: B3161+34: 120 feet long by 40 feet wide by 23 feet high. ▪ Crossing B: B3174+00: 120 feet long by 40 feet wide by 38 feet high ▪ Crossing C: B3197+00: 120 feet long by 40 feet wide by 38 feet high ▪ Crossing D: B3209+98: 120 feet long by 40 feet wide by 38 feet high Undercrossings will conform to the minimum spacing and dimensions set forth in the WCA (Authority 2020a: Appendix C) with the exception of length, which will be limited to no more than 120 feet where feasible, unless different dimensions or frequencies are specified in authorizations issued under the FESA or CESA. Additionally, to the extent feasible, specific designs will incorporate the features outlined under BIO-MM#77a to facilitate wildlife movement through dedicated crossings. Open-span bridge/viaducts, if used, will also be placed approximately every 0.3 mile, in the locations noted above, and will be at least 100 feet long. Additionally, to the extent feasible, the bridge/viaducts will be at least 15 feet in height. The Authority may also use some combination of wildlife undercrossings and open-span bridges/viaducts, if the geotechnical analysis indicates some areas are more suitable for a certain type of structure than others.								
BIO-MM#79a	Provide Wildlife Movement between the Santa Cruz Mountains and Diablo Range	The Authority will address effects of permeability reduction caused by construction of the MOWF, HSR guideway, and secured right-of-way, an impact that could not feasibly be avoided. Within 2 years of the start of construction at the MOWF, the Authority will conserve or improve wildlife movement within the Santa Cruz Mountain to the Diablo Range, Santa Cruz Mountain to Gabilan Range, or the Diablo to Gabilan Range wildlife linkages (Penrod et al. 2013) by conserving natural or agricultural lands that provide for wildlife movement, enhancing wildlife movement between the Santa Cruz Mountains and the Diablo Range, or both. The extent of preservation or enhancement will provide for one of the following: ▪ An increase in permeability of the Santa Cruz Mountains to Diablo Range Wildlife Linkage (as mapped by Penrod et al. 2013) and the Soap Lake 100-year floodplain equivalent to the decrease in permeability at the MOWF in its combination of magnitude and affected area ▪ Protection of 238 acres of lands prioritized for their importance to wildlife movement in the Santa Cruz Mountains to Diablo Range Wildlife Linkage and the Soap Lake 100-year floodplain, which corresponds to a 1-to-1 ratio of protected land to project footprint at the	Post-construction	Compliance report	Prior to operation	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Authority to provide compensation based on area of habitat affected by the project	Condition of regulatory permits	Impact BIO#42: Temporary Disruption of Wildlife and Wildlife Movement Impact BIO#43: Permanent Impacts on Wildlife Movement Impact BIO#51: Permanent Conversion or Degradation of Conservation Areas Impact BIO#53: Conflict with Santa Clara Valley Habitat Plan Impact BIO#55: Conflict with Coyote Valley Linkage

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		MOWF ▪ A combination of enhancement and protection where the implemented percentages of the above enhancement and preservation combine to 100% Acquisition and enhancement efforts listed above will prioritize lands in either the Santa Cruz Mountains to Diablo Range Wildlife Linkage or the Soap Lake 100-year floodplain, particularly along known wildlife movement routes or corridors, especially those adjacent to or near wildlife crossing structures under UPRR, Monterey Road, and the HSR. The protection of open space corridors between wildlife under crossings and the nearest conserved open space, floodplain, passive recreation, or open agricultural properties will be prioritized when necessary to maintain and facilitate the permanent functionally of wildlife crossings. The prioritization of lands for protection will be developed in coordination with local stakeholders, such as the SCVHA, the SCVOSA, The Nature Conservancy, the Peninsula Open Space Trust, and with wildlife agency staff. Preservation of natural or agricultural lands will be in perpetuity through either fee title acquisition or conservation easement. Enhancement efforts may include enhancement of movement on lands protected by the Authority, or it may entail funding projects that will enhance movement on other protected lands, reduce or eliminate existing barriers to movement, or construct structures to improve wildlife movement.								
BIO-MM#79b	Provide Wildlife Movement between the Diablo Range and Inner Coast Range	Under this measure within the western Pacheco Pass Region, the Authority will design, permit, and construct a wildlife overcrossing, or will contribute funds to the SCVHA for the design, permitting, and construction of a wildlife overcrossing under an agreement with SCVHA (i.e., a Mitigation Credit Agreement or another appropriate funding mechanism that would ensure that a wildlife overcrossing is constructed). To facilitate the implementation of this measure, the Authority will establish a Pacheco Wildlife Movement Working Group, focused on the funding, design, permitting, and construction of a wildlife overcrossing in the region. The wildlife overcrossing would be located and designed through coordination with the working group which will include representatives from Caltrans, wildlife agencies (CDFW, USFWS) and local wildlife movement stakeholders (e.g., SCVOSA, SCVHA, Peninsula Open Space Trust, and The Nature Conservancy). The wildlife overcrossing design and characteristics would be consistent with, and meet the minimum requirements outlined in the *Wildlife Crossing Structure Handbook* (Clevenger and Huijser 2011), and consistent with guidelines within the *Innovative Strategies to Reduce the Costs of Effective Wildlife Overpasses*	Post-construction	Compliance report	Weekly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Authority to provide funding or ensure that a funding mechanism is in place prior to operation	Condition of regulatory permits	Cumulative impacts to wildlife movement

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		(McGuire et al. 2021), or other published applicable wildlife overcrossing design or construction guidance. To the extent consistent with the coordination and guidance described above, the wildlife overcrossing will be located east of the Pacheco Creek Reserve and west of the Santa Clara County boundary (the Authority in consultation with wildlife agencies and local wildlife movement stakeholders may adjust the location to the most appropriate location within the Pacheco Pass region). Preliminary evaluations of suitable and efficient site locations indicate a wildlife overcrossing structure in the region would require a one or two span structure with a length of up to 300 feet and a width of up to 130 feet. Preliminary evaluations also indicate that a pre-cast concrete arch approach is the least-cost solution, but the design requires additional validation in terms of site requirements and constructability. If a pre-cast arch bridge is infeasible the Authority assumes a typical reinforced concrete bridge would be used, as described below. Funding for the wildlife overcrossing will come from the Authority to the extent necessary, however the Authority will also seek other funding partners and sources, including wildlife movement stakeholders in the region, through other cost sharing agreements (e.g., Caltrans, CDFW), and through other state or local funding sources (e.g., California Wildlife Conservation Board Prop 68 funding, SCVHA funding, etc.). To the extent feasible, construction of the land bridge will be conducted prior to construction of the Pacheco Pass Subsection or as soon as possible after construction begins. For these reasons the Authority will either contribute funds to SCVHA's overcrossing project via a partnership with SCVHA, or independently construct a wildlife overcrossing as follows: ▪ A pre-cast concrete arch wildlife overcrossing of no more than 130 feet in width and no more than 300 feet in length, utilizing a location that maximizes ease of construction and cost considerations (such as a location with an adequate median width that a bridge can use two arches to span opposing lanes of traffic) so that suitable habitat can be connected, or ▪ A single typical reinforced concrete bridge with one single span no more than 130 feet in width at a location where a bridge of no more than approximately 300 feet in length would span suitable habitats.							
BIO-MM#80	Minimize Permanent Intermittent Noise, Visual, and Train Strike Impacts on Wildlife Movement	To address the permanent intermittent impact of noise, visual disturbance, and train strike on movement by avian and mammalian wildlife, the Authority will build additional structures to minimize or avoid such impacts. Structures will be designed with the goal of reducing or eliminating the visual presence of the moving train and minimizing exposure to noise produced by HSR trains. With regard to birds, the noise/visual barriers will be	Design/pre-construction/ construction/ post-construction	Design of noise barriers/visual barriers	Weekly or as established by regulatory compliance agencies	Authority/ Contractor	Authority/ Contractor	Design of noise barriers/visual barriers in construction plans	Condition of construction contract	Impact BIO#44: Intermittent Noise Disturbance of Wildlife Using Corridors during Operations Impact BIO#46: Intermittent Visual Disturbance of Wildlife Using Corridors during Operations Impact BIO#47: Intermittent and Permanent Lighting Disturbance of

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		designed to minimize exceedance of the following thresholds (as measured at the outer edges of the HSR right-of-way), as described in the WCA: ▪ Permanent hearing damage: 140 dBA or greater ▪ Temporary hearing damage: 93 dBA or greater but less than 140 dBA ▪ Masking: 84 dBA or greater but less than 93 dBA ▪ Arousal: 77 dBA or greater but less than 84 dBA To this purpose, the Authority will build opaque noise/visual barriers to cover or obscure some or all of the train, including the OCS, if feasible, at the following locations: ▪ In the GEA IBA near Volta, between Stations B4550+00 and B4630+00 ▪ In the UPR IBA (corresponding to the 10-year Pajaro River floodplain), between Stations B1932+00 and B2164+00 The noise/visual barriers will be a minimum height of 17 feet and will be designed to provide a minimum of 10 dBA attenuation of sound generated by HSR operations, as measured 50 feet from the noise barrier. The noise/visual barriers will be constructed in conjunction with the installation of track and OCS and will be completed before HSR train operations begin. For approximately 3.4 miles In the GEA IBA, centered approximately at Mud Slough between Stations B4914+00 and B5095+00, the rail design will be modified to enclose the train's operating envelope and OCS. The enclosure will be constructed using opaque, nonglare materials that provide a minimum of 10 dBA attenuation of sound generated by HSR operations, as measured 50 feet from the enclosure. The enclosure will also be designed to minimize sound generated by HSR train exit and entry. The Authority will design the guideway enclosure in compliance with all HSR design, operations, and maintenance requirements, including but not limited to: ▪ Train performance ▪ Passenger comfort ▪ Fire-life-safety readiness and response ▪ Loading to viaduct girder structure and embankment foundation ▪ 100-year service life under suitable, acceptable maintenance practices and costs The guideway enclosure will be constructed in conjunction with the installation of track and OCS and will be completed before HSR train operations begin. A preliminary engineering feasibility analysis is provided in Appendix 3.7-C, HSR Guideway Enclosure for the Grasslands Ecological Area. If structure designs in the UPR and GEA IBAs can be demonstrated through quantitative modeling to reduce								Wildlife and Wildlife Using Corridors during Operations Impact BIO#48: Mortality Resulting from Train Strike during Operations Impact BIO#49: Injury and Mortality Resulting from Power Line Strike during Operations Impact NV#2: Intermittent Permanent Exposure of Sensitive Receptors to Noise from Train Operations Impact PK#7: Permanent Changes from Noise and Vibration on Parks, Recreation, and Open Space Resource Character and Use

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		sound levels outside the HSR right-of-way to less than 77 dBA, no additional measures will be necessary. If residual noise of 77 dBA or more (as measured outside the HSR right-of-way) is still demonstrated, and therefore will exceed one or more of the quantitative noise thresholds, HSR will implement the compensatory mitigation approach described in BIO-MM#58, which requires compensatory mitigation for lost habitat for waterbirds. The amount of compensatory mitigation required under BIO-MM#58, if implemented in concert with this mitigation measure, will depend on the extent of noise reduction that can be demonstrated using noise barriers or enclosures. Mitigation implemented under this measure will be consistent with and will help advance mitigation commitments at the program level, including mitigation intended to address impacts in the GEA. With regard to mammals, potential noise and visual impacts include reduced habitat suitability if train noise or visual impacts impair an animal's ability to forage, evade predators, or conduct other essential behaviors and possible deterrence from crossing the rail alignment at locations intended by HSR design. The noise/visual barriers will be sited to minimize the risk of deterrence on movement corridors critical to the San Joaquin kit fox and the mountain lion. To this purpose, the Authority will build noise/visual barriers at the following locations: ▪ In Coyote Valley to protect the wildlife crossings sited between Stations B0689+00 and B0704+00 ▪ In upper Pacheco Creek between Stations B3254+70 and B3303+00 ▪ At the crossing of the California Aqueduct at Stations B4248+00 to B4249+00 The noise/visual barriers will be a minimum height of 17 feet and will be designed to provide a minimum of 10-dBA attenuation of sound generated by HSR operations, as measured 50 feet from the noise/visual barrier. Noise/visual barriers installed at the Tulare Swale and Fisher Creek wildlife crossing structures in Coyote Valley will extend no less than 720 feet beyond the stationing limits stated above. Noise/visual barriers installed on viaduct sections of the alignment (upper Pacheco Creek and California Aqueduct crossing) will extend no less than 555 feet beyond the stationing limits stated above. The noise/visual barriers will be constructed in conjunction with the installation of track and OCS and will be completed before HSR train operations begin. These length-of-barrier specifications are intended to ensure that the barrier creates a zone of minimized noise, extending several hundred feet from the alignment, that will serve as an attraction cue for animals using sound to locate the crossing locations. The Authority will consult with CDFW, USFWS,								

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		Grasslands Water District, the owner(s) of private properties where noise/visual barriers will be placed, and other local wildlife movement stakeholders as part of final design of noise barriers and the guideway enclosure.								
BIO-MM#81	Minimize Permanent Intermittent Impacts on Terrestrial Species Wildlife Movement	To address the permanent intermittent impact of operations on wildlife movement from train strike and entrapment, the Authority will implement an array of exclusion features for terrestrial species. These features include the following, which are specified in detail in the WCA (Authority 2020a: Appendix C): ▪ Permanent, 8-foot chain-link fencing along all at-grade, embankment, and trenched profile portions of the rail (excluding the areas noted in the next bullet) ▪ Fencing buried 3.5 feet at a 45-degree angle on the outside of the fence beneath the existing grade in the following locations: between Stations B2160 to B2350 (eastern Soap Lake and western Pacheco Pass) and between Station B31545 and B4310 (Pacheco Pass) ▪ Angled barbed wire at the top of chain-link fencing to prevent large animals from jumping over the fence and into the right-of-way in the following locations: between Stations B2160 to B2350 (eastern Soap Lake and western Pacheco Pass) and between Station B31545 and B5337 (Pacheco Pass and San Joaquin Valley) ▪ Fine-mesh (0.25- to 0.5-inch mesh size) fencing or other barrier designed to exclude small animals (e.g., California tiger salamander, Fresno kangaroo rat, blunt-nosed leopard lizard, and giant garter snake) and extending at least 2 feet aboveground and at least 6 to 10 inches below-ground with an overhanging 90-degree lip (minimum 6 inches) to prevent climbing in the following locations: between Stations B800 and B900; between Stations B3148 and B3223; and between Station B4050 and Station B5337 ▪ All gates designed to prevent animal access ▪ Jump out exit features that allow large mammals such as deer to exit the fenced right-of-way will be placed near at-grade road crossings in Coyote Valley at the following station numbers: B688, B691, B703, B730, B759, B761, B822, B823, B862, B863, B902, B935, B971, and B972 ▪ Small, one-way exit flaps will be provided on each of the four fenced sections at each fence opening in Coyote Valley ▪ Prevent wildlife entry into the rail alignment at unfenced, at-grade rail sections using Rosehill anti-trespass panels or another method that has been shown to be effective for targeted focal species ▪ WEF, exit features, and exclusion devices will be inspected at least monthly to enforce proper function as described in the WCA (Authority 2020a: Appendix C). The success of exclusion fencing and crossings deterrents	Design/ pre-construction/ construction/ post-construction	Design of fencing and other wildlife movement plans	As needed	Authority/ Contractor	Authority/ Contractor	Design of wildlife movement plans	Condition of construction contract	Impact BIO#48: Mortality Resulting from Train Strike during Operations

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		to prohibit wildlife entry into the railway will be monitored, likely by cameras on the train, to determine effectiveness. If the deterrent is proven ineffective, and wildlife is gaining entry into the rail alignment with a frequency that is determined detrimental to rail function or wildlife populations, additional measures such as noise signals (an alarm sound that warns or scares the animal into leaving the location) or olfactory repellents will be implemented in the region of effect until wildlife entry into the right-of-way is effectively addressed. Access roads and the associated curbs and drainage systems can, where constructed, pose barriers to movement and entrapment opportunities for small mammals, amphibians, and reptiles. To minimize the potential for these effects, drainage inlets associated with construction or access roads will be constructed with escape tubes or ladders as described in Appendix 3 of *Measures to Reduce Road Impacts on Amphibians and Reptiles in California: Best Management Practices and Technical Guidance* (Langton and Clevenger 2021) when within 300 feet of occupied California red-legged frog aquatic habitat,1.24 miles of occupied California tiger salamander aquatic habitat, and 200 feet of occupied giant garter snake aquatic habitat. When and where curbs are needed, they should be angled or include escape gaps as described in *Guidelines for Amphibian and Reptile Conservation during Road Building and Management Activities in British Columbia* (Ministry of Environment and Climate Change Strategy 2020) when within the distances of occupied amphibian and reptile aquatic habitat described in the prior sentence.							
BIO-MM#82	Minimize Permanent Intermittent Impacts on Aerial Species Wildlife Movement	To address the permanent intermittent impact of operations on aerial wildlife movement from train strike and entrapment, the Authority will implement an array of deterrent and diversion features for avian species. These features include the following, which are specified in detail in the WCA (Authority 2020a: Appendix C): ▪ Install pigeon wire or other features to discourage birds from perching on OCS throughout the project ▪ In selected areas, place flight barriers such as fencing, pole barriers or a tubular screen (Life Impacto Cero 2015) to the height of OCS to avoid birds flying into the rail alignment and being struck by the train in the following locations: between Stations B2872 and 2930 (near the San Jose International Airport); between Stations B2164 and B2255 (eastern Soap Lake); between Stations B2340 and B3325 (western Pacheco Pass); and between Stations B4035 and B4310 (eastern Pacheco Pass). ▪ Modify OCS poles to preclude bird entrapment in hollow poles (e.g., avoid the use of tubular poles or cap openings in all poles)	Design/ 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#48: Mortality Resulting from Train Strike during Operations Impact BIO#49: Injury and Mortality Resulting from Power Line Strike during Operations

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		▪ Design aerial structures and tunnel portals to discourage bats from roosting in expansion joints or other crevices; light tunnel entrances								
BIO-MM#83	Implement Removal of Carrion that May Attract Condors and Eagles	During operations in California condor and eagle foraging areas, automated security monitoring and track inspections will be used to detect fence failures or the presence of a carcass (carrion) within the right-of-way that could be an attractant to condors and eagles. Dead and injured wildlife found in the right-of-way will be removed when the train is not in operation. This measure will apply between Stations B2164 and B2255 (eastern Soap Lake); between Stations B2340 and B3325 (western Pacheco Pass); and between Stations B4035 and B4310 (eastern Pacheco Pass).	Construction/ operation	Monitoring/ reporting	Weekly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist	Authority/ Contractor/ Project Biologist	Remove carrion from right-of-way/report findings	Condition of construction contract/condition of regulatory permits	Impact BIO#48: Mortality Resulting from Train Strike during Operations
BIO-MM#84a	Avoid and Minimize Impacts on Conservation Areas	The Authority will coordinate with affected landowners or easement holders to determine if final project designs can be refined to avoid or minimize impacts on conservation areas (those areas held in fee title and/or held under conservation easements for the purposes of conservation). Examples may include minor design changes to HSR facilities that allow for continued access to all or part of a conservation area, changes that will facilitate effective placement of wildlife crossings, or other changes that minimize effects on other conservation work that has been completed or that is in progress on the conservation areas.	Pre-construction/ construction/ post-construction	Design/ final design/ surveying/ compensatory mitigation/ reporting	Yearly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist/ Mitigation Manager	Authority/ Contractor/ Project Biologist/ Mitigation Manager	Mitigate permanent and temporary impacts on conservation areas through compensation/ report findings	Condition of construction contract/condition of regulatory permits	Impact BIO#51: Permanent Conversion or Degradation of Conservation Areas Impact BIO#53: Conflict with Santa Clara Valley Habitat Plan
BIO-MM#84b	Provide Compensatory Mitigation for Impacts on Conservation Areas	The Authority will provide compensatory mitigation to offset impacts on conservation areas (those areas held in fee title and/or held under conservation easements for the purposes of conservation). Compensatory mitigation, identified through consultation with the affected organizations, will replace the permanent loss of conservation areas with lands that are commensurate with the land cover type and ecological function of the lands lost at a ratio of 2:1 (protected:affected). In addition, the Authority will compensate affected organizations (e.g., The Nature Conservancy, SCVHA, SCVOSA, San Benito Land Trust, CDFW) for any incurred penalties (i.e., fees or other monetary considerations resulting from the termination of a conservation easement or establishment of a new conservation easement, as well as funding to offset staff time associated with identifying and protecting replacement sites) resulting from the permanent loss of a conservation area. Mitigation implemented under this measure will be consistent with and will help advance mitigation commitments at the program level, including mitigation intended to address impacts in the GEA.	Post-construction	Design/ final design/ surveying/ compensatory mitigation/ reporting	Yearly or as established by regulatory compliance agencies	Authority/ Contractor/ Project Biologist/ Mitigation Manager	Authority/ Contractor/ Project Biologist/ Mitigation Manager	Authority to provide compensation based on conservation areas affected by the project prior to operation	Condition of regulatory permits	Impact BIO#51: Permanent Conversion or Degradation of Conservation Areas Impact BIO#53: Conflict with Santa Clara Valley Habitat Plan
BIO-MM#85	Provide Compensatory Mitigation for Impacts on California Sycamore Woodland at the	To offset permanent impacts at the Pacheco Creek Open Space Regional Reserve and alleviate conflict with the SCVHP, the Authority will provide compensatory mitigation at a 1:1 ratio. The replacement reserve will be of the same	Post-construction	Design/ final design/ surveying/ compensatory	Yearly or as established by regulatory compliance	Authority/ Contractor/ Project Biologist/ Mitigation	Authority/ Contractor/ Project Biologist/ Mitigation	Authority to provide compensation based on area of	Condition of regulatory permits	Impact BIO#53: Conflict with Santa Clara Valley Habitat Plan

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
	Pacheco Creek Open Space Regional Reserve	acreage as the existing reserve (8.2 acres) or greater, and it will be primarily composed of a contiguous patch of the California sycamore alluvial woodland, the conservation target on which the reserve was formed. Mitigation lands can be co-located with the mitigation under BIO-MM#72 to meet the 10-acres minimum patch size requirement stipulated in Objective 9.2 of the SCVHP. This mitigation may be accomplished through preservation, enhancement, or restoration, or a combination thereof, with a preference given to mitigation opportunities in the Pajaro River HUC-8 watershed.		mitigation/ reporting	agencies	Manager	Manager	Pacheco Creek Open Space Reserve affected by the project prior to operation		
BIO-MM#86	Provide Compensatory Mitigation for Impacts on Monarch Butterfly Habitat	To compensate for permanent impacts on monarch butterfly habitat (breeding and foraging habitat for the monarch butterfly), the Authority will provide compensatory mitigation at a minimum 1:1 ratio for occupied breeding and foraging habitat, unless a higher ratio is required by the FESA. The Authority, in accordance with authorizations issued under the FESA, will determine the compensatory mitigation required to offset impacts on habitat for monarch butterfly. Compensatory mitigation could include one or more of the following: ▪ Purchase of credits from an agency-approved conservation bank ▪ Acquisition in fee title of USFWS-approved property ▪ Purchase or establishment of a conservation easement with an endowment for long-term management of the property-specific conservation values ▪ An in-lieu fee contribution determined through negotiation and consultation with the USFWS ▪ Contribution to monarch conservation and/or restoration initiatives in the project region (if available) 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#10, the Authority will prepare and implement an HMP that will include the considerations listed in this measure. The HMP will also set success criteria and define monitoring requirements so that species habitat can be adaptively managed.	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
BIO-MM#87	Conduct Pre-Construction Surveys and Implement	Prior to any ground-disturbing activity, regardless of the time of year, the Project Biologist (a biologist with mountain lion experience and approved by CDFW) will	Pre-construction/ construction	Surveying/ monitoring/	Monthly or as established by regulatory	Authority/ Contractor/	Authority/ Contractor/	Pre-construction coordination with CDFW to	Condition of construction contract/condition of	Impact BIO#26a: Loss of Breeding, Foraging, Denning and Dispersal Habitat for and Direct Mortality or Disturbance of

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
	Avoidance and Minimization Measures for Mountain Lion Dens	conduct pre-construction surveys for known or potential mountain lion dens within suitable habitat located within the work area and within 1,970 feet of the work area (unless a different buffer distance is required under authorizations under the CESA). These surveys will be conducted no less than 14 days and no more than 30 days prior to the start of ground-disturbing activities in a work area. Known and potential mountain lion den types will be defined as follows (terminology generally consistent with the USFWS (2011) guidance for another mammal in the region, San Joaquin kit fox). ▪ Known den—Any existing natural den or human-made structure that is used or has been used at any time in the past by a mountain lion. Evidence of use may include historical records; past or current radio telemetry or tracking study data; mountain lion sign, such as tracks, scat, and/or prey remains; or other reasonable proof that a given den is being or has been used by a mountain lion. ▪ Potential den—Any thick vegetation, boulder piles, rocky outcrops, or undercut cliffs within the species' range for which available evidence is insufficient to conclude that it is being used or has been used by a mountain lion. Potential dens will include the following characteristics: (1) refuge from predators (coyotes, golden eagles, other mountain lions) or (2) shielding of the litter from heavy rain and hot sun. The Project Biologist will use location-specific survey methods to identify known and potential dens. The survey method will consider topography, vegetation density, safety, and other factors. Surveys will be conducted by a qualified biologist (i.e., a biologist with demonstrated experience in mountain lion biology, identification, and survey techniques) and may involve the establishment of camera stations, scent stations, pedestrian surveys (looking for tracks, caches, etc.), the use of scent detection dogs, monitoring GPS collars (if available), or other appropriate methods as determined in coordination with CDFW. Survey methods used will be designed to avoid the disturbance of known or potential dens to the extent feasible. If known or potential mountain lion dens are identified or observed during pre-construction surveys, mountain lion dens will be assumed to have kittens present until the Project Biologist can document that they are not present and/or that the den is not being used. A nondisturbance buffer of at least 1,970 feet will be established around the known or potential den until the Project Biologist can document and confirm that the den is not occupied. If the den is determined to be occupied, the 1,970-foot nondisturbance buffer will be maintained until the den is confirmed abandoned by the Project Biologist. Construction may proceed if the Project Biologist		reporting	compliance agencies	Project Biologist	Project Biologist	develop a survey protocol and surveys of mountain lion dens and maintain no-work buffer/ report findings	regulatory permits	Mountain Lion

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		determines that the den is not being used by mountain lions.								
BIO-MM#88	Provide Compensatory Mitigation for Impacts on Mountain Lion Habitat	The Authority will provide compensatory mitigation for impacts on mountain lion suitable habitat through the preservation of suitable habitat that is acceptable to CDFW. Habitat will be replaced at a minimum ratio of 2:1 for permanent impacts on breeding/foraging habitat and high-priority foraging and dispersal habitat and at a ratio of 1:1 for low-priority foraging and dispersal habitat, unless a higher ratio is required by regulatory authorizations issued under CESA. Compensatory mitigation will be provided using one or more of the methods described in BIO-MM#10 and will, where feasible and acceptable to CDFW, contribute to preserving important movement lands across the HSR alignment.	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 mountain lion core and patch habitat	Condition of construction contract/ condition of regulatory permits	Impact BIO#26a: Loss of Breeding, Foraging, Denning and Dispersal Habitat for and Direct Mortality or Disturbance of Mountain Lion
BIO-MM#89	Minimize the Impacts of Operational Lighting on Wildlife Species	To address the permanent and intermittent impacts from ALAN, the Authority will implement measures to minimize the intensity and duration of operational lighting of permanent facilities (e.g., traction power facilities, radio sites, and maintenance facilities), as well as intermittent train lighting, and will install noise/visual barriers at essential wildlife crossings to shield views of the operational train and its headlights. Outdoor lighting at operational facilities will be consistent with minimum OSHA requirements established by 29 C.F.R. Section 1926.56 when the facilities are in use. The Authority will minimize the duration of lighting at operational facilities by using methods other than lighting (e.g., remote monitoring systems) to ensure security of facilities during nighttime hours when they are not in use. Train headlights will use the minimum standard allowed by the FRA under 49 C.F.R. Section 229.125 (a single headlight of at least 200,000 candelas) within the following stationing limits (areas with low existing ALAN exposure): ▪ B670 to B1020 (Coyote Valley) and B1750 to B5335 (areas east of Gilroy). If feasible (as determined through compliance with OSHA requirements and other applicable standards), as determined by the Authority, operational facilities, including trains, will use lighting that avoids shorter wavelengths of light (i.e., blue wavelengths). Lamps will have the lowest color temperature feasible for the desired application; green and red lighting appears to have the least wildlife impact and will be appropriate for some applications, such as security lighting (Longcore and Rich 2016; Kayumov et al. 2005).	Operations	Reporting and monitoring	Monthly	Authority/ Contractor	Contractor	Implement measures to minimize the intensity and duration of operational lighting of permanent facilities and intermittent train lighting	Reporting contract requirements/ specifications	Impact BIO#47: Intermittent and Permanent Lighting Disturbance of Wildlife and Wildlife Using Corridors during Operations
Hydrology and Water Resources										
HYD-MM#1	Prepare and Implement a Groundwater Adaptive Management and Monitoring	To minimize potential impacts on public and private water supplies derived from groundwater resources, including water supply wells, springs, and seeps, as well as from surface water resources supported by groundwater, the	Design/ pre-construction/ construction/	Reporting and monitoring/ design/ plan preparation/	Follow reporting requirements as established by regulatory	Authority/ Contractor	Authority/ Contractor	Follow reporting requirements as established by regulatory	Reporting contract requirements/ specifications	Impact HYD#10: Temporary Impacts on Groundwater and Surface Water Hydrology during Tunnel Construction

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
	Program	Authority proposes to implement a long-term Groundwater Adaptive Management and Monitoring Program (GAMMP), which will include ongoing monitoring, management, and reporting activities to detect, address, and remedy groundwater and hydrology impacts that may arise during and after tunneling in a timely manner. GAMMP requirements for stream flows, wetland inundation, and the biological resources that are supported by groundwater-dependent water resources, including plants, wildlife, wetlands, and habitats, are discussed in Mitigation Measure BIO-MM#9 in Section 3.7. Although mitigation for stream flows and wetland inundation is relevant to the hydrology and water resources impacts described in Section 3.8, mitigation requirements for stream flows and wetland inundation have been developed to sustain existing biological functions and values. The GAMMP requirements described here also apply to Mitigation Measure BIO-MM#9. The GAMMP will advance a flexible strategy to respond to monitoring information that indicates changes to existing conditions resulting from project activities. In addition, if monitoring demonstrates that adaptive management actions taken to address such changes are not achieving the intended outcomes, management actions will be modified, or other strategies implemented to meet the objectives. In summary, the intent of the GAMMP is to: ▪ Define a study area and identify locations where impacts are likely to occur using detailed geological information generated by the geotechnical investigation and existing data sources. ▪ Establish baseline groundwater and surface water hydrology conditions with data collection and in situ monitoring devices. ▪ Develop a groundwater model that can be used to predict where groundwater and surface water impacts are likely to occur. The model will be updated during construction with additional geological information generated during tunnel construction, and the updated model will be used to predict potential changes in groundwater conditions and anticipate adaptive management needs. ▪ Develop a monitoring program to detect real-time changes in groundwater and surface water conditions during and after construction through comparison to baseline conditions and use of paired reference sites. ▪ Establish numeric triggers that require implementation of adaptive management measures to avoid or reduce impacts on groundwater and surface water resources during construction. Adaptive management measures may include modifying construction methods, providing supplemental water to affected resources, and other feasible measures that will reduce or avoid a predicted	post-construction	report compliance	compliance permits			compliance permits		

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		impact. ▪ To the extent feasible, provide water quality treatment for groundwater inflows and beneficially reuse groundwater inflows as part of the adaptive management program or discharge treated groundwater to receiving waterbodies. ▪ Generate reports to keep the public and resources agencies apprised of groundwater and surface water conditions before, during, and after construction as well as contribute to the body of scientific knowledge about the complex hydrogeology of the Pacheco Pass area. ***Goals, Objectives, and Review/Approval of GAMMP*** The purpose of the GAMMP is to maintain the minimum baseline range of well productivity, spring and seep flow, and measured groundwater levels within documented seasonal variation to: ▪ Maintain water resource conditions during construction substantially like flows documented during pre-construction/baseline monitoring. ▪ Detect any material changes in conditions that may forewarn of conditions that have potential to affect groundwater and surface water resources. ▪ Avoid or minimize disruptions in public and private water supplies with adaptive management measures. Prior to construction, the GAMMP will be submitted to the U.S. Department of the Interior, Bureau of Reclamation, SWRCB, RWQCBs, and local groundwater management agencies such as the SCVWD, San Benito County, and Merced County for review (and approval as applicable). ***Assessment, Modeling, and Monitoring Actions*** **Define Groundwater Study Area and Area of Potential Effects** A hydrogeologist will review existing geologic maps, groundwater monitoring data, results of the geotechnical investigation, and other data sources as necessary to define a groundwater study area around the proposed tunnels as well as downstream of the proposed tunnels along receiving waterbodies (i.e., Pacheco Creek, Ortega Creek, and Romero Creek). Within the groundwater study area, an area of direct surface water drawdown associated with groundwater inflows into the interior of the tunnels will be identified. The area of potential effect will also include, as appropriate, downstream reaches of receiving waterbodies specifically including Pacheco Creek. **Baseline Inventory and Monitoring of Groundwater and Surface Water Resources** The Authority, to the extent feasible, will establish baseline hydrologic conditions within the groundwater study area through data collection and monitoring. The baseline inventory will include surveying and mapping all surface water resources within the groundwater study area. Baseline surveys will characterize potential surface water								

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		and groundwater resources within the groundwater study area, including but not limited to: ▪ General characteristics (e.g., age of well, depth of pump and screen, production capacity, water level, water flow, water quality, use of water) and locations of public and private water supply wells, springs, and seeps. ▪ Reviewing well completion reports associated with public and private water supply wells in the vicinity of the proposed tunnels and any relevant hydrology data from gaging stations on Pacheco Creek. ▪ Monitoring groundwater pressures within geotechnical bore holes and wells as well as monitoring of seeps and springs to collect information on flows. ▪ Typical responses of wells, springs, and seeps to seasonal changes and weather fluctuations. ▪ Establishing baseline water quality through field and laboratory testing. Parameters measured with field instrumentation will include dissolved oxygen, electrical conductivity, pH, oxidation-reduction potential, temperature, and turbidity. Laboratory testing will include total hardness, calcium, magnesium, sodium, potassium, total alkalinity, hydroxide, carbonate, bicarbonate, chloride, sulfate, nitrate as N, fluoride, nitrite as N, and Title 22 metals (i.e., mercury, antimony, arsenic, barium, beryllium, cadmium, total chromium, cobalt, copper, lead, manganese, molybdenum, nickel, selenium, silver, thallium, vanadium and zinc). **Groundwater Modeling** A hydrogeologist will build a gridded surface water/groundwater model prior to commencing any tunneling activities. The purpose of the modeling will be to identify potential locations, durations, and extents of drawdown effects on the groundwater table and resulting surface water hydrology effects associated with tunneling; support the selection of appropriate locations to monitor groundwater drawdown during and after construction and reference sites that will not be affected by tunnel-related groundwater effects; identify properties where temporary water supply facilities may be necessary to remedy any shortages during tunneling; and estimate required storage capacity of temporary water supply facilities to offset estimated shortages. The model will be calibrated using baseline data collected through data collection and monitoring and structural geologic information generated from the geotechnical investigation, which will include faults and fractures in the area. The model will be updated during the construction period, and it will be used during tunneling to predict where groundwater conditions are expected to change substantially. In this way, the model will be used to predict the specific locations where adaptive management measures may be necessary, as well as the specific								

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		adaptive management measures that may remedy the impact such that impacts can be anticipated by the Contractor and remedial measures can be implemented in a timely fashion. Model inputs will include rainfall, groundwater elevations, historical rainfall, and temperature data and model outputs will include evapotranspiration gaging, spring and stream flow rates, and surface water outflows. **Construction Monitoring** The Authority will designate locations and methodologies for monitoring wells, springs, and seeps that are most likely to be affected by tunneling as indicated by groundwater modeling. The purpose of this monitoring is to capture nearly real-time changes in groundwater conditions (e.g., flow, pressure readings) that might be related to tunnel construction. Monitoring data collected during construction will be compared to baseline ranges of data collected during pre-construction monitoring and with paired reference sites that are not expected to be affected by groundwater drawdown. The monitoring plan will include a schedule for monitoring that reflects periods when effects are most likely to occur at specific locations (e.g., when tunneling is nearing areas with high quantities of groundwater inflows). The monitoring plan will account for a potential delay between groundwater drawdown associated with tunneling and the appearance of surface water effects. In addition, the plan will require additional monitoring efforts if groundwater levels are found to be affected beyond the predicted area of effect established by pre-construction groundwater modeling in order to capture the full extent of potential effects on wells and springs. The following actions will be required to monitor groundwater and hydrology conditions during construction: ▪ Update and calibrate groundwater model with structural geology (e.g., faults and fracture trends), water pressures, groundwater inflows, water quality, temporal changes, and other observations and monitoring data. Use model to help predict potential groundwater effects in advance of tunnel construction heading. ▪ Establish remotely accessed telemetry system for measuring real-time variations in groundwater pressures and select spring/stream flows within area of potential drawdown and paired reference sites. ▪ Measure pressure changes in monitoring wells and existing water supply wells near tunnel construction for early indicators of potential effects on wells, springs, and streams. ▪ During construction, monitor flows of springs and streams weekly or bimonthly for early detection of any changes in comparison to the baseline data and reference sites. ▪ Compare minimum flow range of monitored resources to paired reference sites outside of construction								

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		influence to determine if factors, related or not related to construction, may be influencing trend (e.g., seasonal changes). ▪ Emphasize more frequent monitoring intervals as the TBM approaches critical ranges predicted by the groundwater model or as effects of water flows become more apparent as the TBM approaches established monitoring points. ▪ Test water quality of groundwater inflows for comparison to baseline water quality of springs and stream flows. Changes in water chemistry may indicate that streams or springs have tapped into different groundwater resources as a result of water losses into tunnel. ▪ Track groundwater recovery using pressure transducers or piezometers between the spring locations and increasing distance with the TBM that has passed a resource. ▪ Measure travel time through the system. ▪ Measure water quality parameters. ▪ Track groundwater and spring/seep flow recovery. ▪ Use of an on-site rainfall gaging station to correlate recovery of resources with rainfall quantities. **Post-Construction Monitoring** The extent of water drawdown is not predictable at this time, but implementation of the GAMMP is intended to monitor and detect hydrological changes that may result from tunneling activities. Upon completion of tunnel construction (i.e., lining system installation, backfill grouting), tunnels are generally sealed from the groundwater system, and leakage into the tunnels is stopped. Under such conditions, groundwater resources will recover from tunneling effects by being recharged by natural precipitation. However, this could take months to years after the final tunnel lining system is installed (Berg 2012). Additional monitoring will be developed to observe recovery of water resources after tunnel construction activities are completed. The monitoring will continue until such time that conditions are comparable to the ranges of baseline conditions established before construction. ▪ The post-construction monitoring program will be modified to focus on areas where the GAMMP has documented water resource effects during construction, until such time that recovery of the water resources is complete. ▪ The gridded surface water/groundwater model will be updated and calibrated it with the data collected during tunnel construction. The modeling program will be used to help predict rates of recovery for water resources affected during construction. ***Remedial Actions*** **Beneficial Reuse of Groundwater Inflows**							

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		Two general scenarios are available for the contractor to manage groundwater inflows into the tunnel during construction: discharge into a waterbody or disposal at a publicly owned treatment works. To minimize temporary indirect reductions in groundwater levels along receiving waterbodies (e.g., Pacheco Creek, Ortega Creek, Romero Creek) and conserve water, the Authority will prioritize discharging groundwater into receiving waterbodies under applicable permits from resources agencies or beneficially reusing the water as part of the adaptive management program after treatment with a temporary active treatment system. Off-haul and disposal of contaminated groundwater at a publicly owned treatment facility will only be considered if the Authority demonstrates that providing adequate levels of treatment prior to discharge is technically infeasible using the best available and economically practicable technology. Discharging treated groundwater inflows into receiving waterbodies will provide opportunities for water to percolate back into the water table, recharge downstream aquifers, and offset potential downstream reductions in groundwater levels and stream flows. Additionally, the Authority will consider using the treated effluent from the active treatment system to provide supplemental nonpotable water as needed based on construction monitoring and adaptive management triggers, but only if the effluent meets appropriate water quality standards for the end use of the water. Providing adequate levels of water quality treatment to meet water quality standards for discharges into receiving waterbodies or reuse as part of the adaptive management program is expected to be challenging due to high pH levels associated with exposure to cement grouts and concrete as well as other construction materials in the interior of the tunnels. To meet water quality standards for beneficial reuse, settling ponds, storage tanks, and a series of treatment systems may be necessary. Only treated groundwater that meets appropriate water quality standards will be beneficially reused or discharged into receiving waterbodies. ***Adaptive Management Measures*** Adaptive management measures will be implemented to remedy observed impacts on water supplies. **Adaptive Management Triggers** The GAMMP will establish quantitative triggers that forewarn of potential effects on surface water resources and groundwater levels and begin the implementation of adaptive management measures. Quantitative adaptive management triggers will be established for each potentially affected seep, spring, well, or water resource based on comparisons to the baseline inventory or reference sites. Quantitative adaptive management triggers may include, but will not be limited to, exceeding or falling below specified flow rates of springs and seeps;								

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		water levels falling below screened intervals of existing wells; and well productivity falling below certain rates. Additionally, adaptive management measures will be considered if any landowner or public water agency reports changes in their water supply, as described below. **Notifications and Hotline** The Authority will establish a hotline for property owners and public water agencies to report changes to wells, springs, and seeps on their property during construction. The hotline number will be included in the notice to be sent to all property owners and public water agencies prior to construction and will be prominently posted at each of the work areas. The Authority will check the hotline daily and respond to all calls within 24 hours. **Pre-Tunneling Supplemental Water Infrastructure Provision** In advance of tunneling and as approved by landowners and public water agencies, the Authority will install water tanks and water lines on properties with wells, springs, and seeps not already equipped with sufficient storage capacity in the area where groundwater modeling predicts that an effect on groundwater levels could occur. The tanks and lines will be sufficiently sized to make up the potential shortfall of capacity up to the average baseline water supply and use based on pre-construction monitoring data for the period the groundwater is affected. Tanks, lines, appurtenances, and all other associated temporary facilities required for the provision of supplemental water supplies will consist of inert materials that will not contribute to the degradation of water quality, such as chemical leaching from synthetic materials. Temporary facilities used to provide supplement water to surface water resources like streams and creeks will be shielded from solar radiation or adequately insulated to prevent substantial increases in water temperature. The Authority will be responsible for installing and maintaining all temporary facilities required to convey, store, and use supplemental water. After installation, the temporary water supply facilities will be inspected and tested to verify that it is in proper working order prior to engaging tunneling activities that may affect the existing water supply. Once monitoring demonstrates that affected resources have recovered to existing conditions are within the range of natural variation, the Authority will be responsible for removing these temporary facilities. Additionally, the Authority will review currently planned and permitted landowner development projects within the groundwater study area. If it is determined that the water supply of planned or permitted developments could be adversely affected during or after construction of tunnels, the Authority will provide water tanks or temporary water supply facilities with sufficient storage capacity to offset any shortfalls generated by tunneling activities.							

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		The required storage capacity of temporary water supply facilities will be calculated by a hydrogeologist. The hydrogeologist will calculate potential water supply shortages and identifying the storage capacity required to remedy estimated shortages. The predictive groundwater model will be used to estimate changes in groundwater levels and associated water supply shortages, unless more precise methods are available prior to and during project construction. **Adaptive Management Measures** If, during construction, monitoring indicates that adaptive management triggers have been met, the Authority will initiate appropriate actions to arrest or minimize further changes in the water resources. All employees engaged in implementation of the following adaptive management measures will be properly trained on appropriate mitigation procedures so that they are executed in a timely manner. The following adaptive management measures will be implemented, as necessary: **Additional Monitoring and Engineering Controls to Minimize Groundwater Inflows** As appropriate, during construction, addition engineering controls and monitoring methods will be implemented to minimize potential inflows. Additional monitoring actions will be required to determine effective engineering controls that can more effectively arrest or mitigate water losses. Additional monitoring actions will include geotechnical investigations to identify appropriate modification of construction methods; these additional investigations could include probe drilling ahead of the TBM, surface exploratory drilling, and installing additional monitoring instrumentation. These monitoring methods will inform whether increasing quantities of pre-excavation and backfill grout can further reduce or prevent high inflow rates. ***Upgrade Existing Water Supply Wells and/or Provide Supplemental Water*** If, during tunneling, a landowner, planned/permitted project proponent, or public water agency notifies the Authority that their water supply and use is being negatively affected, as soon as possible and no more than 8 hours later, the Authority will inspect the well, seep, or spring, verify there is a change from baseline conditions based on available pre-construction monitoring data and, if warranted, initiate the provision of supplemental water to the affected party. Where an effect is verified, the Authority will: ▪ Assess if the change in conditions can be addressed by modifying the well equipment, such as by lowering the pump within the well, cleaning the pump, or providing a larger pump; if so, the Authority will implement such changes. The Authority will provide supplemental water								

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		as necessary during the time period required to modify the well equipment. ▪ If supplemental water is the selected approach, the Authority will initiate provision of supplemental water from the previously placed water tank or water line or fill the landowner's existing tank with supplemental water. Supplemental potable water will be purchased from a water retailer or a commercial water delivery service. For nonpotable water, the Authority will consider using effluent from active treatment systems used to treat groundwater inflows, but only if the effluent meets water quality standards appropriate for end uses of the water supply. Alternatively, the Authority will consider using recycled water available from water retailers or publicly owned treatment works, such as the South County Regional Wastewater Authority in Gilroy, provided that recycled water is of adequate quality to meet end water uses. By 2025, the SCVWD is planning to make an additional 8 billion gallons of recycled water per year available (SCVWD and City of San Jose 2012), so it is believed that an adequate supply of recycled water will be available for use during tunnel construction, because similar tunnel mitigation programs only used 60 million gallons total over the course of several years (Berg 2012). Lastly, the Authority will coordinate with the appropriate water agencies to determine whether water impounded by the existing Pacheco Reservoir along North Fork Pacheco Creek may be used for nonpotable supplemental water. ▪ In coordination with the landowner or public water agency, water provided could be a combination of potable water meeting regulatory requirements for human consumption and, where applicable, water of equal or better quality than water supply used for landscaping and livestock watering. If preconstruction data are not available to determine the quality of water used for landscape and livestock, supplemental water will meet state and federal drinking water standards. ▪ The Authority will continue to refill the tank or tanks or operate supplemental water lines on an ongoing basis until it is determined that well or spring production capacity has been restored such that baseline average water supply and use conditions are restored, the existing well has been modified to restore baseline average water supply and use, or another long-term measure is implemented, as discussed in the next item. ▪ Supplemental water discharged into surface waterbodies must comply with water quality standards. As previously described, water supply infrastructure will consist of inert materials that have low to no risk of leaching into the supplemental water supply. This infrastructure will also be either shielded or otherwise insulated from solar radiation to prevent substantial increases in water temperature in receiving							

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		waterbodies. If conventionally treated potable or recycled water will be used to supplement surface water flows in waterbodies, the water will be aerated, circulated, exposed to ultraviolet light, or otherwise treated to reduce concentrations of chlorine and other byproducts of water treatment prior to discharge. ***Provide Supplemental Water Outside of Area of Predicted Effects*** The Authority will establish contingency procedures to provide supplemental water outside the area of predicted effects and within the groundwater study area, if warranted by monitoring. As soon as possible and no more than 24 hours after notification, the Authority will inspect affected resources, verify if there is a change from baseline conditions based on available pre-construction monitoring data and, if warranted, initiate the provision of supplemental water to the affected landowner. Where an effect is verified, the Authority will: ▪ Assess if the change in conditions can be addressed by modifying the well equipment, such as by lowering the pump within the well, cleaning the pump, or providing a larger pump, and if so, will implement such changes. The Authority will provide supplemental water as necessary during the time period required to modify the well equipment. ▪ Begin providing supplemental water to the landowner(s) to make up for the shortfall, such as by providing on-call commercial water truck delivery to the property. ▪ Within 1 week of verified effect, the Authority will work with the landowner(s) to increase commercial water delivery service, install a tank and water lines or fill an existing tank, as necessary, to provide any shortfall in supply relative to the baseline average water supply and use for the period of effect. ▪ The Authority will have staff, equipment, and supplies readily available for quick response, such as by having an on-call commercial service in place or staging materials at one of the work areas (e.g., trucks; water containers; tanks; plumbing pipe, fixtures, and hoses). ▪ In coordination with the landowner(s), water provided could be a combination of potable water meeting regulatory requirements for human consumption and nonpotable water for landscaping and livestock consumption. ▪ The Authority will continue to provide supplemental water to make up shortfalls until the Authority can document that the project is not causing an effect or, if it is causing an effect, until it is determined that well or spring production capacity has been restored such that baseline average water supply and use conditions are restored, the existing well has been modified to restore baseline average water supply and use, or another								

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		long-term measure is implemented, as discussed in the following items. ***Reporting Actions*** The following reports will be prepared, published, and posted on a publicly accessible internet website to keep stakeholders and the public informed of baseline conditions observed, impacts and remedial actions taken during construction, and post-construction recovery of water resources. Additionally, making this information publicly available will assist the broader scientific community with understanding the complex geology and hydrology of the area. ▪ Prepare and publish annual summary reports. The first annual summary report will be published by January 31 of the year following initiation of pre-construction monitoring. Annual summary reports will be prepared before, during, and after tunnel construction. Preparation and publication of these reports will persist until post-construction monitoring has ended. Annual summary reports will summarize the content of the quarterly construction and post-construction monitoring reports, including the results of all monitoring performed during the calendar year, discussion of how monitoring results relate to progression of tunnel construction, comparison of monitoring data to baseline data or paired reference sites, remedial actions taken during construction if any and descriptions of their efficacy at achieving intended results, and post-construction monitoring efforts. ▪ Prepare and publish quarterly pre-construction monitoring reports that summarize baseline conditions observed since preparation and publication of the previous report, including seasonal and long-term responses of monitoring sites to rainfall. ▪ Prepare and publish quarterly construction monitoring reports that summarize all construction monitoring of water resources as well as any adaptive management measures implemented in response to monitoring observations or notifications from landowners. ▪ Prepare and publish quarterly post-construction monitoring reports to document recovery of water resources once the tunnels are complete. Prepare and publish a comprehensive tunneling report that describes the results of this GAMMP, whether it was effective at identifying and remediating observed impacts, lessons learned, and a summary of all data collected as part of baseline data collection, construction monitoring, and post-construction recovery. This report will include descriptions of observed effects on surface water and groundwater resources, including changes in groundwater quality, during tunneling and any remedial actions taken to reduce effects, including frequency and quantity of any								

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		supplemental water provided to landowners. The report will also include summaries of the duration of impact and recovery for wells, seeps, springs, and surface water resources.								
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 Section 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 will be required to monitor all use of extremely hazardous substances. The above construction mitigation measure for hazardous materials and wastes is consistent with California Public Resources Code Section 21151.4. 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#12: Intermittent Impacts from Hazardous Materials and Wastes Activities near Schools during Construction
Safety and Security										
SS-MM#3	Install Emergency Vehicle Detection	Prior to construction, the contractor will install emergency vehicle detection equipment at the following intersections on Monterey Road: Bernal Road northbound ramps, Flintwell Way, Ford Road, Monterey Plaza Driveway, Blossom Hill Road eastbound ramps, Chynoweth Avenue, Edenview Drive, Branham Lane, Skyway Drive, Senter Road, Capitol Expressway eastbound ramps and Capitol Expressway westbound ramps. The contractor will prepare all materials necessary for and seek the approval of the cities of San Jose, Morgan Hill, and Gilroy for the implementation of these improvements. This mitigation measure will apply to areas of San Jose where EVP is not already in place and in Morgan Hill and Gilroy.	Pre-construction/ construction	Install emergency vehicle access detection equipment and monitor	As needed	Authority/ Contractor	Authority/ Contractor	Installation of equipment	Condition of construction contract	Impact S&S#1: Temporary Impacts on Emergency Access and Response Times from Temporary Roadway and Highway Closures, Relocations, and Modifications Impact S&S#3: Permanent Impacts on Emergency Access and Response Times from Permanent Roadway and Highway Closures, Relocations, and Modifications Impact S&S#4: Continuous Permanent Impacts on Emergency Access and Response Times
SS-MM#4	Install Emergency Vehicle Response Improvements	This measure includes three components: ▪ San Jose Diridon Station Area: Emergency Vehicle Priority Plan and priority treatments ▪ Downtown Gilroy Station Area Emergency Vehicle Priority Plan and priority treatments; and ▪ At-Grade Crossing Emergency Vehicle Priority Treatment Plan and associated improvements **San Jose Diridon Station Area**	Pre-construction/ construction	Install emergency vehicle access detection equipment and monitor	As needed	Authority/ Contractor	Authority/ Contractor	Installation of equipment	Condition of construction contract	Impact S&S#4: Continuous Permanent Impacts on Emergency Access and Response Times

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		Prior to construction, to mitigate fire station emergency access and response time impacts related to the San Jose Diridon 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 Jose Fire Station 30. It is anticipated that this may include installation of emergency vehicle priority treatments where they do not exist on Auzerais Avenue between Sunol Street and Delmas Avenue, West San Carlos Street between Bird Avenue and Delmas Avenue, and Bird Avenue between Park Avenue and West Virginia Street. The Contractor will prepare all materials necessary for and obtain the approval of the City of San Jose for implementation of these emergency vehicle priority treatments. **Downtown Gilroy Station Area** Prior to construction, to mitigate fire station emergency access and response time impacts related to the Downtown Gilroy 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 the Gilroy fire station at 7070 Chestnut Street. It is anticipated that this may include installation of emergency vehicle priority treatments where they do not exist on 10th Street between Monterey Road and Camino Arroyo. The Contractor will prepare all materials necessary for and obtain the approval of the City of Gilroy for implementation of these emergency vehicle priority treatments. **At-Grade Crossings** 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 at-grade crossings, the Authority will conduct monitoring and make a fair-share contribution to 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, including local cities, local fire departments, and local first responders. The Authority will make a fair share contribution toward emergency vehicle priority treatments related to the level of impact of increased gate down time associated with HSR train operations. 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 operations and maintenance of any facilities constructed.								

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		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 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 October. Travel time data will be collected at the following intervals: ▪ 1 year prior to initiation of new HSR service to establish a baseline emergency response travel times for each corridor, ▪ Monthly for the first 6 months of initial operations[5] and annually thereafter for 3 years, and ▪ Starting approximately 6 months after initiation of any subsequent increase in HSR service, and annually thereafter for 3 years. Travel time data will be collected at the following at-grade crossing locations: ▪ Branham Avenue (San Jose) ▪ Chynoweth Avenue (San Jose) ▪ Skyway Drive (San Jose) ▪ Blanchard Road (San Jose) ▪ Palm Avenue (San Jose) ▪ Live Oak Avenue (Morgan Hill) ▪ East Main Street (Morgan Hill) ▪ East Dunne Avenue (Morgan Hill) ▪ San Pedro Avenue (Morgan Hill) ▪ Tennant Avenue (Morgan Hill) ▪ East Middle Avenue (Morgan Hill) ▪ San Martin Avenue (San Martin) ▪ Church Avenue (Gilroy) ▪ Masten Avenue (Gilroy) ▪ Rucker Avenue (Gilroy) ▪ Buena Vista Avenue (Gilroy) ▪ Cohansey Avenue (Gilroy) ▪ Las Animas Avenue (Gilroy) ▪ Leavesley Road (Gilroy) ▪ IOOF Avenue (Gilroy) ▪ Lewis Street (Gilroy) ▪ Martin Street (Gilroy) ▪ 6th Street (Gilroy) ▪ 7th Street (Gilroy) ▪ 10th Street (Gilroy) 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 will occur due to HSR service. The performance standard for the plan is to								

[5] Initial HSR operations will be more limited in scope than full operations expected by 2040. Chapter 2 of the Final EIR/EIS identifies that initial operations will 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 will have much less effect on emergency vehicle response times than full Phase I operations. With full Phase I operations, the project will have up to seven trains per peak hour per direction, which corresponds to up to 28 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	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		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 Vehicle 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 will result in exceedance of the 30-second threshold. Emergency vehicle priority treatment strategies may include constructing improvements to streets parallel to the HSR corridor 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: ▪ EVP equipment at roadway traffic signals ▪ Route-based roadway traffic signal priority control systems ▪ Emergency vehicle and transit queue bypass lanes at roadway intersections ▪ 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 and provision of funding for the initial operating costs for up to 5 years for new fire stations (based on estimated impacts illustrated on Figure 3.11-10 in the Final EIR/EIS, this measure presumes that one new fire station may be required in South San Jose, one in south Morgan Hill/San Martin, and one in Gilroy) ▪ 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 in contracted first responder ambulance services to reduce first responder ambulance response times in affected areas For the Authority-owned railroad operations involving at-grade operations between CP Lick in San Jose to Gilroy, this measure will also include Authority partnership with local public emergency service providers and local jurisdictions to provide real-time information regarding train location and at-grade crossing gate operations to								

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		facilitate better emergency response route planning. This may be facilitated through one-way data output from the HSR operational control center and/or through installation of trackside equipment and hardwire connections. Implementation of any physical installations of trackside equipment or communication connections will be via Authority funding of local jurisdictions to install such equipment or communication connections and associated software. As an alternative to these strategies, the Authority and a local agency may reach a mutual agreement to have the Authority make an in-lieu payment toward other infrastructure projects including nearby grade-separation projects. If the Authority and a local agency are seeking an agreement prior to operations, then the Authority will conduct additional modelling of potential HSR effects of emergency response utilizing emergency service provider response time data, as available, to validate the modelling. This additional modelling will be used to support the estimation of the need for, and potential extent of, one or more of the improvement measures noted above. The in-lieu payment will be the capital contribution that the Authority will have otherwise made to one or more of the above emergency vehicle priority treatment strategies. As noted above, if cities choose not to implement and operate emergency vehicle priority treatments using construction funds provided by the Authority, impacts will be considered significant and unavoidable. In that case, some of the site-specific traffic mitigation measures identified in Section 3.2 will be required to help reduce traffic congestion/delays at intersections adjacent or near at-grade crossings during peak hours at certain intersections where the project will 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#1e: Monterey Road/Chynoweth Avenue-Roeder Road—Widen and Reconfigure ▪ TR-MM#1t: Monterey Road/San Martin Avenue—Restripe Southbound Approach ▪ TR-MM#1u: Monterey Road/IOOF Avenue—Widen and Reconfigure Southbound Approach ▪ TR-MM#1w: Chestnut Street/Luchessa Street—Reconfigure Southbound Approach ▪ TR-MM#1x.6: East Main Avenue/Depot Street—Install Traffic Signal ▪ TR-MM#1x.8: Llagas Road/San Martin Avenue—Install Traffic Signal ▪ TR-MM#1x.9: School Access/IOOF Avenue—Install Traffic Signal								

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		▪ TR-MM#1x.10: SR 25/Bloomfield—Install Traffic Signal Although these traffic mitigation measures will help to address traffic delays at adjacent or nearby intersections, they will not change gate-down times. As such, if cities choose not to implement and operate emergency vehicle priority treatments discussed above using construction funds provided by the Authority, then the impact will remain significant and unavoidable.								
Socioeconomics and Communities										
SO-MM#1	Implement Measures to Reduce Impacts Associated with Residential Displacement (NEPA Effect Only)	At least 1 year prior to construction (in the specific residential areas noted below), the Authority will minimize impacts in residential areas by conducting special outreach to affected homeowners and residents to understand their special relocation needs fully. In addition to the relocation assistance required under the federal Uniform Relocation Assistance and Real Property Acquisition Policies Act and the California Relocation Act, in areas with inadequate relocation availability in reasonable proximity to displacements, the Authority will make efforts to locate suitable replacement properties that are comparable to those currently occupied by these residents and/or support the construction of suitable replacement facilities, if necessary. This measure applies only to the areas of insufficient residential relocation availability as follows: ▪ Unincorporated Merced County—There is an estimated residential availability deficit of 22 units in this area within the unincorporated county area, but there is surplus residential relocation availability in nearby Los Banos. Some homeowners and residents may desire to remain in the unincorporated County areas outside Los Banos instead of relocating to available units within Los Banos, and this measure will only apply to those who desire to remain in the unincorporated County areas. In cases where residents wish to remain in the immediate vicinity and there is inadequate local relocation availability, the Authority will take measures to purchase vacant land or buildings in the area and consult with local authorities over matters such as zoning, permits, and moving of homes and connection of services and utilities, as appropriate. The Authority will document implementation of this measure through annual reporting. With application of this mitigation measure, the Authority will assist these displaced residents with finding new suitable housing within the communities they currently reside in, if desired. The Authority, as a condition of providing funding, will require implementing partners to implement relevant IAMFs and direct mitigation measures discussed in the Final EIR/EIS.	Pre-construction/ construction/ post-construction	Reporting	Monthly	Authority	Authority	Monthly reporting	Authority to provide compensatory mitigation The Authority will meet with affected residents and property owners and design appropriate measures to minimize impacts	Impact SOCIO#6: Displacements and Relocations of Residences
Agricultural Farmland										

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
AG-MM#1	Conserve Important Farmland (Prime Farmland, Farmland of Statewide Importance, Farmland of Local Importance, and Unique Farmland)	The Authority has entered into an agreement with the DOC California Farmland Conservancy Program to implement agricultural land mitigation for the HSR system. The Authority will fund the California Farmland Conservancy Program's work to identify suitable agricultural land for mitigation of impacts and to fund the purchase of agricultural conservation easements from willing sellers. The performance standards for this measure are to preserve Important Farmland in an amount commensurate with the quantity and quality of converted farmlands in the same agricultural regions as the impacts occur, at a replacement ratio of not less than 1:1 for lands that are permanently directly converted to nonagricultural use by the project. In addition to mitigation for Important Farmlands that are permanently directly converted to nonagricultural use, the Authority will fund the purchase of an additional increment of acreage for agricultural conservation easements at a ratio of not less than 0.5:1 for Important Farmland within a 25-foot-wide area adjacent to permanently fenced HSR infrastructure to mitigate for permanent indirect effects. The Authority will document implementation of this measure through annual issuance of a compliance memorandum. Mitigation implemented under this measure will be consistent with and will help advance mitigation commitments at the program level, including mitigation intended to address the conversion of Important Farmland. Figure 3.14-5 in the Final EIR/EIS illustrates how mitigation ratios will be applied to parcels of Important Farmland affected by the project.	Pre-construction	Compliance reporting	Monthly	Authority and California Farmland Conservancy	Authority	Monthly reporting prior to construction	The Authority has entered into an agreement with the Department of Conservation and its California Farmland Conservancy Program to implement agricultural land mitigation for the HSR system.	Impact AG#2: Permanent Conversion of Important Farmland to Nonagricultural Use Impact AG#3: Permanent Creation of Remnant Parcels of Important Farmland
AG-MM#2	Minimize the Area of Important Farmland (Prime Farmland, Farmland of Statewide Importance, Farmland of Local Importance, and Unique Farmland) Required for HSR Guideway	To minimize direct and indirect impacts on Important Farmland resulting in permanent conversion of Important Farmland to nonagricultural use, mitigation will restrict the project footprint to the minimum dimensions and area required to operate and maintain the aerial guideway. The Authority will design the permanent right-of-way so that it will not exceed the dimensions or area required to operate and maintain the aerial guideway, specifically 40 feet on either side of the track centerline, with the exception of the proposed viaduct section near Casa de Fruta, between stations 3220 and 4250, where permanent right-of-way must be 45 feet on either side of the track centerline, in order to minimize the area of Important Farmland permanently converted to nonagricultural use by the project.	Design/ construction	Restrict project footprint where feasible	As needed	Authority/ Contractor	Authority	Restrictions to project footprint where feasible	Condition of construction contract	Impact AG#2: Permanent Conversion of Important Farmland to Nonagricultural Use Impact AG#3: Permanent Creation of Remnant Parcels of Important Farmland
AG-MM#3	Evaluate Modified Access to Remnant Parcels with Landowner Input	Prior to construction where partial property acquisitions will result in division of agricultural parcels by the HSR alignment or facilities (i.e., severed parcels), the Authority will evaluate potential for modified access with the property owner's input to allow continued use of agricultural lands and facilities. Any such access will remain within the approved project footprint. Modified	Design/ pre-construction/ construction	Modify access where feasible	As needed	Authority/ Contractor	Authority	Access modifications	Condition of construction contract	Impact AG#3: Permanent Creation of Remnant Parcels of Important Farmland

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		access could include the design of overcrossings or undercrossings to allow farm equipment passage. The Contractor will prepare a technical memorandum for Authority review and approval detailing the Contractor's outreach to affected property owners, evaluation results, and what measures were implemented to address severed parcels. Any modified access will remain within the existing footprint.								
AG-MM#4	Relocate and Reconnect Drainage Facilities before Disconnecting Original Facilities	Where relocating an agricultural drainage facility on Important Farmland within the project footprint will be necessary, the Contractor will verify the replaced facility is operational prior to disconnecting the original facility, where feasible. The Authority will coordinate with landowners during preliminary engineering for construction procurement or during final design for construction to determine drainage facility relocation preferences that will reduce impacts on continued operation of drainage facilities. These relocation preferences will be included in the construction contract and include proximity to and clearance from existing infrastructure, access, slope, and the ability to stay within public road rights-of-way or existing easements, where feasible. The construction contractor will document all relocations in a memorandum for Authority review and approval. Relocation of the drainage facility will be coordinated with landowners and will remain within the existing project footprint.	Design/ pre-construction/ construction	Ensure relocation of agricultural drainage is successful	As needed	Authority/ Contractor	Authority	Monitoring	Condition of construction contract	Impact AG#4: Temporary Disruption of Agricultural Infrastructure Serving Important Farmland Impact AG#5: Permanent Disruption of Agricultural Infrastructure Serving Important Farmland
AG-MM#5	Avoid Infrastructure Serving Important Farmland near Casa de Fruta (from Station 3148+60 to Station 3154)	In order to avoid impacts on irrigation infrastructure on Important Farmland, the Authority will convert the embankment to an aerial guideway near Casa de Fruta (from Station 3148+60 to Station 3154). The Authority will implement this design refinement, consistent with geotechnical investigations to confirm to the feasibility of a viaduct in this location, during preliminary engineering for construction procurement or during final design for construction. The construction contractor will implement the revised design. Modification of design will remain within the existing project footprint.	Design/ pre-construction/ construction	Change in design to aerial guideway	As needed	Authority/ Contractor	Authority	Design change	Condition of construction contract	Impact AG#5: Permanent Disruption of Agricultural Infrastructure Serving Important Farmland
Parks, Recreation, and Open Space										
PR-MM#1	Provide Access to Trails during Construction	Prior to construction-related ground-disturbing activities affecting trails, the Contractor will prepare a technical memorandum documenting how connections to the unaffected trail portions and nearby roadways will be maintained during construction. The Contractor will provide alternative access via a temporary detour or permanent realignment of the trail using existing roadways or other public rights-of-way. This will include a detour during construction while portions of Highway 87 Bikeway North are closed. The Contractor will provide detour signage and lighting and alternative routes that meet public safety requirements. The technical memorandum will be submitted to the Authority for review and approval.	Design/ pre-construction	Prepare technical memorandum	Prior to construction and as needed	Authority/ Contractor	Authority	Reporting	Condition of construction contract	Impact PK#2: Temporary Changes to Access or Use of Parks

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		Upon approval by the Authority, the Contractor will implement the activities identified in the technical memorandum. These technical memoranda would be provided to the OWJ to demonstrate how access would be maintained. The activities will be incorporated into the design specifications and will be a pre-condition requirement.								
PR-MM#2	Provide Temporary Park Access	Prior to construction-related ground-disturbing activities affecting park access, the Contractor will prepare a technical memorandum documenting how connections to the unaffected park portions or nearby roadways will be maintained during construction. The technical memorandum will be submitted to the Authority for review and approval. Upon approval by the Authority, the Contractor will implement the activities identified in the technical memorandum. These technical memoranda would be provided to the OWJ to demonstrate how access would be maintained. The activities will be incorporated into the design specifications and will be a pre-condition requirement.	Design/ pre-construction	Prepare technical memorandum	Prior to construction and as needed	Authority/ Contractor	Authority	Reporting	Condition of construction contract	Impact PK#2: Temporary Changes to Access or Use of Parks
PR-MM#3	Provide Permanent Park Access	During the design phase, the Contractor will prepare a technical memorandum documenting how access to parks and trails will be maintained or established following completion of construction activities. The technical memorandum will be submitted to the Authority for review and approval. Upon approval by the Authority, the Contractor will implement the activities identified in the technical memorandum. These technical memoranda would be provided to the OWJ to demonstrate how access would be maintained. The activities will be incorporated into the design specifications and will be a pre-condition requirement.	Design/ pre-construction	Prepare technical memorandum	Prior to construction and as needed	Authority/ Contractor	Authority	Reporting	Condition of construction contract	Impact PK#4: Permanent Changes Affecting Access to or Circulation in Parks, Recreational Facilities, and Open Space Resources Impact PK#6: Permanent Acquisition of Parks, Recreation, and Open Space Resources
PR-MM#4	Implement Project Design Features	Upon approval by the Authority, the Contractor will implement project design features identified in the technical memorandum prepared as part of PK-IAMF#1. The project design features will be incorporated into the design specifications and will be a pre-condition requirement.	Design/ pre-construction	Incorporate design changes	Prior to construction and as needed	Authority/ Contractor	Authority	Reporting	Condition of construction contract	Impact PK#2: Temporary Changes to Access or Use of Parks
PR-MM#5	Implement Measures to Reduce Impacts Associated with the Relocation of Important Facilities	Prior to construction, the Authority will minimize impacts resulting from the acquisition, displacement, and/or relocation of key community facilities. The Authority will consult with the appropriate parties before land acquisition to assess potential opportunities to reconfigure land use and buildings or to relocate affected facilities, as necessary, to minimize the disruption of facility activities and services, and also to provide for relocation that allows the community currently being served to continue to use these services. The Authority will continue to implement a comprehensive non–English speaking language outreach program as land acquisition begins. This program will facilitate the	Design/ pre-construction	Consult with affected parties to assess potential for land use reconfiguration	Design and prior to construction	Authority/ Contractor	Authority	Reporting	Condition of construction contract	Impact PK#6: Permanent Acquisition of Parks, Recreation, and Open Space Resources

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		identification of approaches that will maintain continuity of operation and allow space and access for the types of services currently provided and planned for these facilities. To avoid disruption to these community amenities, the Authority will provide for reconfiguring land uses or buildings, or relocating community facilities before demolishing existing structures. The Authority will document compliance with this measure through annual reporting. Related impacts for other resources have mitigation measures that will further reduce the likelihood for impacts on parks, recreation, open space, and school district play areas. For example, mitigation measures for noise and vibration and the potential impacts of implementing them are presented in Section 3.4. The following mitigation measures identified for other resources will be relevant for parks, recreation, open space, and school district play areas. ▪ AQ-MM#1: Implement Additional On-Site Emissions Controls to Reduce Fugitive Dust ▪ AQ-MM#2: Offset Project Construction Emissions in the San Francisco Bay Area Air Basin ▪ AQ-MM#4: Offset Project Construction Emissions in the San Joaquin Valley Air Basin ▪ BIO-MM#80: Minimize Permanent Intermittent Noise, Visual, and Train Strike Impacts on Wildlife Movement ▪ NV-MM#1: Construction Noise Mitigation Measures ▪ NV-MM#2: Construction Vibration Mitigation Measures ▪ 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#8: Project Vibration Mitigation Measures ▪ SS-MM#2: Construct Temporary Access Roads and Driveways for Morgan Hill Charter School								
PR-MM#6	Minimize Construction Noise Impacts During Noise Sensitive Special Events	During preparation of the construction management plan, the Contractor will modify the schedule of construction activity to minimize construction noise disruption of noise sensitive outdoor events (such as concerts and weddings) at the Morgan Hill Community and Cultural Center and Villa Mira Monte. The Contractor will coordinate with representatives from the Morgan Hill Community and Cultural Center and Villa Mira Monte in developing the construction management plan.	Pre-construction/ construction	Prepare technical memorandum/ compliance reporting	Monthly	Authority/ Contractor	Contractor	Prepare a construction management plan	Condition of construction contract	Impact PK#1: Temporary Changes from Noise, Vibration, and Construction Emissions on Use and User Experience of Parks, Recreational Facilities, and Open Space Resources
Aesthetics and Visual Quality										
AVQ-MM#1	Minimize Visual Disruption from Construction Activities	Prior to construction, the Contractor will prepare a technical memorandum identifying how the project will minimize construction-related visual/aesthetic disruption using the following strategies: ▪ Minimize pre-construction clearing to that necessary for construction.	Pre-construction/ construction/ post-construction	Prepare technical memorandum	Prior to construction	Authority/ Contractor	Contractor	Prior to construction	Contract requirements and specifications	Impact AVQ#1: Temporary Direct Impacts on Visual Quality and Scenic Vistas Impact AVQ#18: Temporary Direct Impacts on Nighttime Light Levels

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		▪ Limit the removal of buildings to those that will conflict with project components. ▪ Where possible, preserve existing vegetation, particularly vegetation along the edge of construction areas that may help screen views. ▪ After construction, regrade areas disturbed by construction, staging, and storage to original contours and revegetate with plant material similar in numbers and types to that removed, based on local jurisdictional requirements. If no local jurisdictional requirements exist, replace removed vegetation at a 1:1 replacement ratio for shrubs and small trees and a 2:1 replacement ratio for mature trees. For example, if the Contractor removes 10 mature trees in an area, replant 20 younger trees that within 5 to 15 years (depending on the growth rates of the trees) will be of a height and spread to provide visual screening similar to the visual screening provided by the trees that were removed for construction. Replacement shrubs will be a minimum of 5-gallon planter size, and replacement trees will be a minimum 24-inch box and minimum 8 feet in height. ▪ To the extent feasible, locate construction staging sites outside of the immediate foreground distance (0 to 500 feet) of existing residential neighborhoods, recreational areas, or other land uses that include highly sensitivity viewers. Where such siting is unavoidable, screen staging sites from viewers using appropriate solid screening materials such as temporary fencing and walls. Paint over or remove any graffiti or visual defacement of temporary fencing and walls within 5 business days of it occurring. The Contractor will submit the technical memorandum to the Authority for review and approval.								
AVQ-MM#2	Minimize Light Disturbance during Construction	Prior to construction activities requiring nighttime construction, the Contractor will prepare a technical memorandum describing how the Contractor will shield nighttime construction lighting and direct it downward in a manner to minimize the light that falls outside the construction site boundaries. The Contractor will submit the technical memorandum to the Authority for review and approval.	Pre-construction/ construction	Prepare technical memorandum	Prior to construction	Authority/ Contractor	Contractor	Prior to construction	Contract requirements and specifications	Impact AVQ#1: Temporary Direct Impacts on Visual Quality and Scenic Vistas Impact AVQ#18: Temporary Direct Impacts on Nighttime Light Levels
AVQ-MM#4	Provide Vegetation Screening along At-Grade and Elevated Guideways Adjacent to Residential Areas	Prior to operations and maintenance of the HSR system, the Contractor will plant trees or other vegetation along the edges of the HSR rights-of-way in locations adjacent to residential areas to screen the elevated guideway from the residential area. The species of trees to be installed will be selected based on their mature size and shape, growth rate, hardiness, and drought tolerance. No species listed by the Invasive Species Council of California will be planted. At maturity, the crowns of trees used will be tall enough to partially or fully screen views of the elevated guideway from adjacent at-grade areas. Upon maturity,	Construction/ post-construction	Plant trees/ compliance report	Prior to operation planting trees; within 90 days of completing any construction section or segment documenting the species of trees that were incorporated into	Authority/ Contractor	Contractor	Prior to operation planting trees; within 90 days of completing any construction section or segment documenting the species of trees that were incorporated into	Contract requirements, specifications; landscaping, and maintenance will be provided by the Contractor for its scope of work until completion of the work at which time the Authority will	Impact AVQ#5: Permanent Direct Impacts on Visual Quality—Communications Hill Landscape Unit Impact AVQ#19: Permanent Direct Impacts on Nighttime Light Levels at Fixed Locations

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		trees will allow ground-level views under the crowns (with pruning if necessary) and will not interfere with the 15-foot clearance requirement for the guideway. The trees will be maintained. Irrigation systems will be installed in the tree planting areas. The Contractor will prepare a technical memorandum within 90 days of completing any construction section or subsection documenting the species of trees that were incorporated into the edges of the HSR right-of-way adjacent to residential uses. The Contractor will submit the technical memorandum to the Authority to document compliance.			design			design	assume responsibility for landscaping or assign the responsibility to other third parties	
AVQ-MM#5	Replant Unused Portions of Lands Acquired for the HSR	Prior to operations and maintenance, the Contractor will plant vegetation on land acquired for the project (e.g., shifting roadways) that was not used for the HSR, related supporting infrastructure, or other higher or better use. Planting design 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, at maturity, will be similar in size and character to the removed vegetation. Replaced shrubs will be minimum 5-gallon planter size, 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 by the Invasive Species Council of California 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	Impact AVQ#5: Permanent Direct Impacts on Visual Quality—Communications Hill Landscape Unit
AVQ-MM#6	Screen Traction Power Distribution Stations and Radio Communication Towers	Within 90 days of completing traction power substation or radio tower construction, the Contractor will screen from public view the traction power substations (located at approximately 30-mile intervals along the HSR guideway), including radio towers where required, through the use of landscaping or solid walls/fences. Screening will consist of context-appropriate landscaping of a type and scale that does not draw attention to the station or feature. Plant species will be selected based on their mature size and shape, growth rate, hardiness, and drought tolerance. Planted shrubs will be a minimum 5-gallon planter size, and trees will be a minimum 24-inch box and 8 feet in height. No species listed by the Invasive Species Council of California will be planted. The landscaping will be continuously maintained, and appropriate irrigation systems will be installed in the landscaped areas. Walls will be constructed of cinderblock or similar material and will be painted a neutral color to blend in with the surrounding context. If a chain-link or cyclone fence is used, it will include slats in the fencing. Any graffiti or visual defacement or damage of fencing and walls will be painted over or repaired within a reasonable period as agreed between the Authority and local	Construction/ post-construction	Reporting	Monthly	Contractor/ Authority	Contractor	Construction/ monthly reporting	Contract requirements/ specifications	Impact AVQ#19: Permanent Direct Impacts on Nighttime Light Levels at Fixed Locations

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		jurisdiction. The mitigation measures are typical of visual treatments applied on linear transportation facilities; they have been defined to be specific in range, implementable according to context, and designed in coordination with local jurisdictions. The Contractor will prepare a technical memorandum documenting how the requirements in this measure were implemented. The Contractor will submit the technical memorandum to the Authority to document compliance.								
Cultural Resources										
CUL-MM#1	Mitigate Adverse Effects on Archaeological and Built Environment Resources Identified during Phased Identification and Comply with the Stipulations Regarding the Treatment of Archaeological and Historic Built Resources in the PA and MOA	Once parcels are accessible and surveys have been completed, including consultation as stipulated in the MOA, additional archaeological and built environment resources may be identified. For newly identified eligible properties that will be adversely affected, the following processes will be followed, which are 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 principal investigator (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 site under CEQA. If the resource is not a historical resource but is an archaeological site, 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. ▪ 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.	Pre-construction/ construction	Reporting	Weekly	Contractor/ Authority	Contractor/ Authority	Pre-construction surveys and construction/ weekly reporting or as dictated by the ATP and the MOA	PA	Impact CUL#1: Permanent Disturbance of Unknown Archaeological Sites Impact CUL#2: Permanent Disturbance of a Known Archaeological Site Impact CUL#4: Permanent Demolition, Destruction, Relocation, or Alteration of Built Resources or Setting

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
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 Fed. Reg. 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)); Cal. 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. 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 effects 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 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 were 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	Construction	Reporting	During construction	Contractor/ Authority	Contractor	Daily logs during active monitoring	ATP/MOA	Impact CUL#1: Permanent Disturbance of Unknown Archaeological Sites Impact CUL#2: Permanent Disturbance of a Known Archaeological Site

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		no investigation is required and the remains are of Native American origin the Authority will contact the NAHC to identify the most likely descendant (MLD). The MLD will be empowered to reinter the remains with appropriate dignity. 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 site, 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 Pre-Contact Archaeological Sites	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 within 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 that will be executed as a condition of the Final EIR/EIS. Access to previously inaccessible properties to complete the archaeological resource identification effort is expected to be available after the ROD, during the construction 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 unlikely, because the alignment is already established. As such, impacts on as-yet-unidentified significant archaeological resources as a result of this 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	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 Sites Impact CUL#2: Permanent Disturbance of a Known Archaeological Site

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		develop meaningful mitigation measures for effects 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.								
CUL-MM#4	Minimize Adverse Effects through Relocation of Historic Buildings and Structures	The Authority-prepared MOA and BETP may identify historic properties/historical resources for relocation to avoid their destruction and minimize adverse effects resulting from physical damage or alteration. The development of plans for relocation and the implementation of relocation will take place before construction within 1,000 feet of the properties. The relocation of the historic properties/historical resources will be specified in the BETP by the Authority or the PI, depending on when the location is identified, and take into account the historic site and layout (i.e., the orientation of the buildings to the cardinal directions), and their potential reuse. The Contractor's qualified architectural historian, along with an interdisciplinary team of professionals as appropriate, will prepare a relocation plan that will provide for protection and stabilization of the buildings or structures before, during, and after the move, as well as measures to address inadvertent damage. The plan will be subject to review and approval by the Authority, in consultation with the MOA signatories and concurring parties. The relocation will be implemented according to the plan. As the design progresses, the Authority may determine that additional properties require this mitigation.	Design/ pre-construction/ construction	Identification and treatment of historical resources	As needed	Authority/ Contractor	Authority	Weekly reporting	MOA/ATP/PA	Impact CUL#4: Permanent Demolition, Destruction, Relocation, or Alteration of Built Resources or Setting
CUL-MM#6	Prepare and Submit Additional Recordation and Documentation	The Authority-prepared MOA and BETP will identify specific historical resources that the project will physically alter, damage, relocate, or destroy and that will require documentation. This documentation may consist of preparation of updated recordation forms (DPR 523), or may be consistent with the Historic American Buildings Survey (HABS), the Historic American Engineering Record (HAER), or the Historic American Landscape Survey (HALS) programs; a Historic Structure Report; or other recordation methods stipulated in the MOA and described in the BETP. The specific mitigation for each property will be determined in consultation with the MOA signatories and concurring parties. The BETP will detail the appropriate type and level of recordation for each property. The recordation undertaken by this treatment will focus on the aspect of integrity the project will affect for each historic property subject to this treatment. For example, historic properties in an urban setting that will experience an adverse visual effect will be photographed to capture exterior and contextual views; interior spaces will not be subject to recordation if they will not be affected. The BETP will specify the appropriate method of documentation for each property, resulting from	Design/ pre-construction	Identification and treatment of historical resources	As needed	Authority/ Contractor	Authority	Weekly reporting	MOA/BETP/PA	Impact CUL#4: Permanent Demolition, Destruction, Relocation, or Alteration of Built Resources or Setting

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		consultation with the SHPO, MOA signatories, and concurring parties. Such documentation will follow the appropriate guidance for the recordation format and program selected. Copies of the documentation will be provided to the consulting parties and offered to the appropriate local governments, historical societies and agencies, or other public repositories, such as libraries, as specified in the BETP. The documentation will also be offered in printed and electronic form to any repository or organization to which the SHPO, the Authority, and the local agency with jurisdiction over the property, through consultation, may agree. The electronic copy of the documentation may also be placed on an agency or organization's website. As the design progresses, additional properties may be determined by the Authority as requiring documentation. In general, photography should capture views of the historic property from multiple views, and could include reproduction of historic images, and architectural or engineering drawings as well. The Contractor will complete all fieldwork necessary for photodocumentation, architectural or engineering drawings, and digital recordation through geographic information system or global positioning system, and the Authority and SHPO will approve it before project construction begins. The written data will include a narrative for the historic property that will utilize existing inventory, evaluation, and nomination documents to the extent possible. This kind of documentation will require the Contractor to engage an interdisciplinary team to adequately complete this mitigation. The team will likely be required to include, at a minimum, an architectural historian, a historian, and a photographer. Other team members may include a landscape architect or computer-aided design and drafting technician. The BETP will detail the required personnel and qualification standards for these preparers. The Authority will submit the documentation to the SHPO for review and comment. If the documentation is to follow the HABS/HAER/HALS program, consultation by the Authority with the National Park Service (NPS) will be required. The Contractor's qualified team will prepare the final documentation, NPS will approve it, and the Authority will submit it to the Library of Congress. The BETP will identify the distribution of printed and electronic copies of the photodocumentation, as well as permanent archival disposition of the record, if applicable.							
CUL-MM#7	Prepare Interpretive or Educational Materials	The Authority-prepared MOA and BETP will identify historic properties and historical resources that will be subject to historic interpretation or preparation of educational materials. Interpretive and educational materials will address the significance of the properties that will be affected by the project. Interpretive or	Post-Construction	Reporting	Annual	Authority/ Contractor	Post-construction/annual reporting	Authority, in consultation with SHPO and appropriate consulting parties	BETP, photographic documentation, plan for repairs to historic properties	Impact CUL#4: Permanent Demolition, Destruction, Relocation, or Alteration of Built Resources or Setting

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		educational materials could include, but are not limited to, brochures, videos, websites, study guides, teaching guides, articles or reports for general publication, commemorative plaques, or exhibits. The BETP will specify the agreed-upon method of interpretation for each property, resulting from consultation with the SHPO, MOA signatories, and concurring parties. The Contractor will be responsible for assembling the appropriate interdisciplinary team to fulfill this mitigation. The BETP will specify the required professionals and their qualifications. In the preparation of the interpretive or educational materials, the Contractor's team will utilize previous research included in the environmental technical documents, images, narrative history, drawings, or other material produced for other mitigation measures. The interpretive or educational materials will be made available to the public in physical or digital formats, at local libraries, historical societies, or public buildings, as specified in the BETP.								
CUL-MM#10	Station Design Consistent with the Secretary of the Interior's Standards for the Treatment of Historic Properties	Prior to HSR station construction adjacent to or on an NRHP or CRHR site, the Contractor will prepare a historic properties compatibility report for Authority review and approval. Several HSR stations will be constructed adjacent to or on the site of NRHP/CRHR-listed or NRHP/CRHR-eligible railroad stations, within historic districts, or in proximity to other historic properties. At the time of the RODs for each project section, the station locations will be identified; station design will be prepared post-ROD. The Authority will issue requests for qualifications (RFQ) to receive statements of qualifications (SOQ) from qualified firms (Contractor) for station designs and related services. Such firms will be contracted to provide professional consultant and design services for all design stages through final design. Selected firms will be responsible for making their designs context-sensitive and meeting the SOI's standards for the treatment of historic properties. The Section 106 MOA and BETP will identify stations that require this mitigation measure, as appropriate. The MOA and BETP will also specify consultation roles of MOA signatories and interested parties in the design of the stations. At a minimum, the Authority's professionally qualified architectural historians and the SHPO will receive the opportunity to review and comment on the designs. If the proposed location is on the site of or adjacent to historic properties, the Contractor at a minimum will include on their team a professionally qualified architectural historian, and may also be required to include a historical architect, a landscape architect with experience related to historic properties, an archaeologist, or other historic preservation professionals. The	Design/ pre-construction	Compatibility report	Prior to ground-disturbing activities	Authority/ Contractor	Authority	Prior to ground-disturbing activities	MOA/BETP/PA	Impact CUL#4: Permanent Demolition, Destruction, Relocation, or Alteration of Built Resources or Setting

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		Authority's professionally qualified staff will review and approve selected professionals' qualifications. The Authority will require the Contractor to provide three schemes for Authority review, including an evaluation of each scheme. The deliverables will also include drawings, such as plans, elevations, and renderings. The Contractor must include in each evaluation a historic property design compatibility report prepared by a qualified architectural historian describing how the scheme is consistent with the SOI's Standards for Rehabilitation for infill designs or additions, and if any restoration or rehabilitation will be required of the historic buildings and structures and how such restoration is consistent with the SOI's Standards for Restoration. The report will reference applicable NPS Preservation Briefs, such as #14 New Exterior Additions to Historic Buildings, and discuss size, scale, and massing of the proposed project and how it will be differentiated from the historic property. It will also include application of the criteria of adverse effect (36 C.F.R. § 800.5) to each proposed scheme to ascertain that the selected design will not adversely affect historic properties. For the purposes of evaluating effects on historic properties, the Contractor may be required to produce renderings that include adjacent properties. The Authority's professionally qualified staff will review and comment on the report, and they may require revision prior to transmitting it to the SHPO and other MOA signatories and consulting parties, as specified in the MOA and BETP.								
Section 4(f) [6]										
4F-MM#1 (NEPA Only)	Coordinate with Santa Clara County Department of Parks and Recreation	The Authority will consult with the Santa Clara County Department of Parks and Recreation and provide a Draft of any technical memorandum or designs prepared per PK-IAMF#1 for Coyote Creek Parkway County Park to the County for review and input prior to finalization. The Authority will consult with the Department and provide a Draft of any technical memorandum or designs prepared per Mitigation Measure PR-MM#2 for Coyote Creek Parkway County Park and Field Sports County Park to the County for review and input prior to finalization.	Design/pre-construction	Provide review opportunity to Santa Clara County Department of Parks and Recreation	Design and prior to construction	Authority/ Contractor	Authority	Reporting	Condition of construction contract	Responds to County requests stated in the County's comment on the Individual 4(f) Evaluation of Two Parks in Santa Clara County.
Environmental Justice[7]										
EJ-MM#1	Minimize Residual Severe Noise Impacts in Environmental Justice Communities	To minimize residual severe noise impacts in environmental justice communities (as defined by having low-income populations or minority populations greater than in the reference community), the final technical report required per Mitigation Measure NV-MM#3 will include an	Design/pre-construction/ construction	Evaluate noise impacts and potential additional practicable	Annually during design phase and construction	Authority/ Contractor	Authority	Documentation of design impact analysis, assessment of practicable	Condition of construction contract	Noise effects described in Chapter 5, Environmental Justice, Table 5-26.

[6] The final column titled "Impact # and Impact Title" does not show impact numbers for the Section 4(f)/6(f) evaluations, but it does describe the request by Santa Clara County that generated this commitment.

[7] In Chapter 5, Environmental Justice, the analysis is organized by subject and not by impact numbers. Consequently, the final column titled "Impact # and Impact Title" does not show impact numbers for the Environmental Justice analysis, but it does describe the relevant impact addressed by the mitigation.

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		assessment of whether remaining severe noise impacts, after application of recommended noise treatments and direct mitigations, may disproportionately impact low-income populations or minority populations. For impacted receptors within environmental justice communities, property owners will be notified of the potential noise impact and the Authority's proposed noise treatments and direct mitigations for their property. If the report finds that severe noise impacts may disproportionately impact low-income populations or minority populations, the Authority will prepare an additional report to assess whether any additional practicable measures may be undertaken to avoid, eliminate, or reduce the noise impacts that disproportionately impact environmental justice communities. The Authority will seek and consider the input of affected sensitive receptors in low-income populations or minority populations prior to finalizing the report.		measures during design phase and conduct outreach				measures, and outreach conducted		
SC/NSJ-OMM#1	Noise Treatments for Residential Buildings A Caltrain Corridor to Address Existing Noise	Provide funding in an amount not to exceed[8] $75,000 in total and $25,000 per building for installation of building insulation and window treatments for up to three building façades affected by existing noise between Santa Clara Station and I-880. See measure description, cost estimate, and roles and responsibilities sections in corresponding profile No. 1 in Final EIR/EIS, Volume 2, Appendix 5-C, Attachment A.	Design/pre-construction/ construction (completion prior to HSR operation)	Implement noise treatment program	Quarterly	Authority/ Contractor	Authority	Documentation of homes treated and treatments implemented	Authority contract with implementing firm	Noise effects described in Chapter 5, Environmental Justice, Table 5-26.
SC/NSJ-OMM#2	El Camino Real and Benton Street Safety Improvements	The City of Santa Clara has identified a suite of safety improvements at the intersection of El Camino Real and Benton Street, including decorative crosswalk, curb extensions, pedestrian crosswalk motion sensor, and signal improvements (leading pedestrian interval, countdown timers, accessible pedestrian signal). The Authority will either contribute $500,000 for the full suite of improvements or will fund certain discrete improvements up to $500,000. See footnote 8. The Authority, as a condition of providing funding, will require the implementing entity to implement relevant IAMFs and direct mitigation measures applied to the Preferred Alternative during the construction of this improvement. See measure description, cost estimate, and roles and responsibilities sections in corresponding profile No. 2 in Final EIR/EIS, Volume 2, Appendix 5-C, Attachment A.	Design/ pre-construction/ construction (completion prior to HSR operation)	Provide funding to an implementing entity. Implementing entity to be determined by the Authority. Potential or anticipated implementing entity may be: City of Santa Clara	Upon funding	Authority	Authority	Provision of funding to implementing entity	Authority agreement with implementing entity	Noise effects described in Chapter 5, Environmental Justice, Table 5-26.
SJD-OMM#2	Noise Treatments for Homes Affected by Freeway Noise (I-	Provide funding in an amount not to exceed $793,000 in total and $12,632 per single-family home and $25,000 per multifamily building for building insulation and window	Design/ pre-construction/ construction	Implement noise treatment program	Quarterly	Authority/ Contractor	Authority	Documentation of homes treated and treatments	Authority contract with implementing firm	Noise effects described in Chapter 5, Environmental Justice, Table 5-26.

[8] For all "not to exceed" costs specified in mitigation measures labeled as "OMM," all such cost ceilings may be adjusted for inflation by the Authority.

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
	280/SR-87)	treatments for homes directly adjacent to and affected by existing freeway noise adjacent to Interstate (I-) 280 and State Route (SR) 87 in these areas: Adjacent to the west side of SR 87 (between San Fernando St. and Auzerais Ave.); and adjacent to the north side of I-280 (between Delmas Ave and Los Gatos Creek). See also footnote 8. See measure description, cost estimate, and roles and responsibilities sections in corresponding profile No. 5 in Final EIR/EIS, Volume 2, Appendix 5-C, Attachment A.	(completion prior to HSR operation)					implemented		
SJD-OMM#3	Reestablish Inez C. Jackson Library at the African American Community Service Agency (AACSA) Family Resoure Center	Provide funding in an amount not to exceed $100,000 for the reestablishment of the Inez C. Jackson Library space at the African American Community Service Agency (AACSA) Family Resource Center in San Jose. See also footnote 8. AACSA is willing to provide the space for the library but needs funding to renovate and modernize the space and to provide new furniture, books, computers and other electronics, and audio-visual equipment. The space will also need to be made Americans with Disabilities Act compliant. The Authority, as a condition of providing funding, will require the implementing entity to implement relevant IAMFs and direct mitigation measures applied to the Preferred Alternative during the construction of this improvement. See measure description, cost estimate, and roles and responsibilities sections in corresponding profile No.6 in Final EIR/EIS, Volume 2, Appendix 5-C, Attachment A.	Design/pre-construction/ construction (completion prior to HSR operation)	Provide funding to an implementing entity. Implementing entity to be determined by the Authority. Potential or anticipated implementing entity may be: AACSA	Upon funding	Authority	Authority	Provision of funding to implementing entity	Authority agreement with implementing entity	Noise effects described in Chapter 5, Environmental Justice, Table 5-26.
GWG-OMM#1	Gardner Elementary School Noise Treatments	Provide funding for noise treatments such as a sound wall barrier or other building and window insulation improvements to the buildings and walls adjacent to West William Street and Willis Avenue facades. Funding for the sound wall would not exceed $588,000. See also footnote 8. The sound wall will either be: (1) on school property along the south side of W. William Street (and the northwest side of Willis Avenue) or (2) be north of W. William Street (if permission can be obtained from Caltrans/City of San Jose presuming public ownership). Funding for building/window treatments would not exceed $125,000 in total and $25,000 per multifamily building. Window treatments and building insulation could be applied to buildings facing I-280 along W. William Street and the building on the northeast side of the campus along Willis Avenue. See also footnote 8. Santa Clara VTA's I-280 Soundwalls Project is currently proposing to construct soundwalls on I-280 between SR 87 and Los Gatos Creek including adjacent to the I-280 southbound lanes adjacent to the Gardner Elementary School. This project is scheduled to go through environmental clearance from 2020 to 2022, design and engineering in 2022 and 2023, and construction between 2023 and 2024. If the I-280	Design/pre-construction/ construction (completion prior to HSR operation)	Provide funding to an implementing entity. Implementing entity to be determined by the Authority. Potential or anticipated implementing entities may be: the San Jose Unified School District (SJUSD) or VTA	Upon funding	Authority	Authority	Provision of funding to an implementing entity	Authority agreement with an implementing entity.	Noise effects described in Chapter 5, Environmental Justice, Table 5-26.

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		Soundwalls Project is advanced, then GWG-OMM#1 will be redundant with the soundwall project, provided a soundwall is placed adjacent to the southbound I-280 lanes such that it reduced traffic noise for the Gardner Elementary School. In that instance, this measure allows for the funds for noise treatments at the school to instead be provided to VTA to support the I-280 Soundwalls Project, provided the soundwalls installed will benefit the Gardner Elementary School and provided the San Jose to Merced HSR project section is fully funded prior to construction of the I-280 Soundwalls Project. If the project section is funded after construction of the I-280 Soundwalls Project, then the Authority will not be able to fund the Soundwalls Project. If no funding is provided to the VTA I-280 Soundwalls Project by the Authority and the soundwalls project is completed and there still remain traffic noise effects to the Gardner Elementary School, then the Authority could provide funding for school building treatments as needed to address that residual noise. The Authority, as a condition of providing funding, will require the implementing entity to implement relevant IAMFs and direct mitigation measures applied to the Preferred Alternative during the construction of this improvement. See measure description, cost estimate, and roles and responsibilities sections in corresponding profile No. 7 in Final EIR/EIS, Volume 2, Appendix 5-C, Attachment A.							
GWG-OMM#2	Noise Treatments for Certain Residential Buildings	Provide funding for building insulation and window treatments for up to 43 homes affected by existing freeway noise adjacent to the west side of SR 87 (between W Virginia St. and Brown St.) and adjacent to the south side of I-280 (between Spencer Ave. and Los Gatos Creek) to address existing noise. The improvement will consist of building and window insulation improvements for the homes. Funding for building and window insulation for 43 single-family homes will not exceed $543,000 in total and $12,632 per single-family home. See footnote 8. If the Santa Clara VTA's I-280 Soundwalls Project is advanced (currently scheduled to be constructed by 2024), it will include soundwalls on the south side of I-280 between Los Gatos Creek and SR 87, which will obviate the need for building noise treatments in the neighborhood adjacent to I-280. If that happens, then this measure will only include treatments along SR 87 for up to approximately 15 homes and any homes on the south side of I-280 between Los Gatos Creek and SR 87 with residual traffic noise effects after soundwall construction (for example where gaps in soundwalls may exist) and funding will not exceed $190,000. See footnote 8. See measure description, cost estimate, and roles and responsibilities sections in corresponding profile No. 8 in Final EIR/EIS, Volume 2, Appendix 5-C, Attachment A.	Design/ pre-construction/ construction (completion prior to HSR operation)	Implement noise treatment program	Quarterly	Authority/ Contractor	Authority	Documentation of homes treated and treatments implemented	Authority contract with implementing firm	Noise effects described in Chapter 5, Environmental Justice, Table 5-26.

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
GWG-OMM#3	Fuller Park/Fuller Avenue Recreational Amenities	Provide funding in an amount not to exceed $190,000 for recreational amenities at Fuller Park and along Fuller Avenue. See also foonote 8. A number of small vacant parcels are scattered throughout the Gardner/Willow Glen community, all owned by public entities. For example, a parcel adjacent to the intersection of Coe and Bird Avenues was improved by residents with landscaping, heritage lights, and a walking path some years ago. This space has fallen into disrepair but has been funded for renovation per the Greater Gardner Neighborhood Improvement Plan. Fuller Park is of specific concern given the low quality of existing material; that is, turf and fencing. Renovation of this Fuller Park site could include children's play areas with equipment, picnic benches, fitness equipment, bicycle racks, or other smaller amenities. The Authority, as a condition of providing funding, will require the implementing entity to implement relevant IAMFs and direct mitigation measures applied to the Preferred Alternative during the construction of this improvement. See measure description, cost estimate, and roles and responsibilities sections in corresponding profile No. 9 in Final EIR/EIS, Volume 2, Appendix 5-C, Attachment A.	Design/ pre-construction/ construction (completion prior to HSR operation)	Provide funding to an implementing entity. Implementing entity to be determined by the Authority. Potential or anticipated implementing entity may be: City of San Jose	Upon funding	Authority	Authority	Provision of funding to implementing entity	Authority agreement with implementing entity	Noise effects described in Chapter 5, Environmental Justice, Table 5-26.
WGTA-OMM#3	Noise Treatments for Residential Buildings Along SR 87 to Address Existing Noise	Provide funding in an amount not to exceed $945,000 in total, $12,632 per single-family home, $25,000 per multifamily building, and $75,000 for improvements to one side of a multifamily building facing the railroad alignment only for building insulation and window treatments for homes affected by existing freeway noise adjacent to the east side of State Route (SR) 87 between Virginia St. and Shadowgraph Drive. The measure will consist of building and window insulation improvements for the homes along SR 87. See measure description, cost estimate, and roles and responsibilities sections in corresponding profile No. 12 in Final EIR/EIS, Volume 2, Appendix 5-C, Attachment A. See footnote 8.	Design/ pre-construction/ construction (completion prior to HSR operation)	Implement noise treatment program	Quarterly	Authority/ Contractor	Authority	Documentation of homes treated and treatments implemented	Authority contract with implementing firm	Noise effects described in Chapter 5, Environmental Justice, Table 5-26.
WGTA-OMM#4	Rocketship Mateo Sheedy Elementary School Public Address System Upgrade	Provide funding in an amount not to exceed $200,000 for an upgrade of the existing public address (PA) system within the school to help overcome disturbance from outside noise including airplane noise. The Authority, as a condition of providing funding, will require the implementing entity to implement relevant IAMFs and direct mitigation measures applied to the Preferred Alternative during the construction of this improvement. See improvement description, cost estimate, and roles and responsibilities sections in corresponding profile No. 13 in Final EIR/EIS, Volume 2, Appendix 5-C, Attachment A. See footnote 8.	Design/ pre-construction/ construction (completion prior to HSR operation)	Provide funding to an implementing entity. Implementing entity to be determined by the Authority. Potential or anticipated implementing	Upon funding	Authority	Authority	Provision of funding to implementing entity	Authority agreement with implementing entity	Noise effects described in Chapter 5, Environmental Justice, Table 5-26.

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
				entity may be: Rocketship Mateo Sheedy Elementary School						
WGTA-OMM#5	Tamien Park Sports Field Netting	Provide funding in an amount not to exceed $16,000 for sports field ball netting along the west side of the existing park to reduce the chance of soccer balls, basketballs or other field sports balls landing in the active railroad right-of-way to the west of the park. This will reduce the potential for individuals to enter the railroad right-of-way to retrieve lost balls. The netting will be installed on the park property and not within the railroad right-of-way. The Authority, as a condition of providing funding, will require the implementing entity to implement relevant IAMFs and direct mitigation measures applied to the Preferred Alternative during the construction of this improvement. See measure description, cost estimate, and roles and responsibilities sections in corresponding profile No. 14 in Final EIR/EIS, Volume 2, Appendix 5-C, Attachment A. See footnote 8.	Design/ pre-construction/ construction (completion prior to HSR operation)	Provide funding to an implementing entity. Implementing entity to be determined by the Authority. Potential or anticipated implementing entity may be: City of San Jose	Upon funding	Authority	Authority	Provision of funding to implementing entity	Authority agreement with implementing entity	Noise effects described in Chapter 5, Environmental Justice, Table 5-26.
SSJ-OMM#2a	Monterey Road Pedestrian/Bike Overpass at Skyway	Provide funding for pedestrian overcrossing of Monterey Road at Skyway Drive. The improvement will provide an east-west connection, which will improve safety for students, pedestrians, and bicyclists. The Authority will provide funding for this overcrossing, and the City of San Jose will implement. The City is considering potential grade separation of the railroad crossings at this location. If grade separation is realized, then the underlying residual safety effect related to emergency vehicle response times will be avoided. Consequently, if the City is advancing the grade separations toward completion by the time the HSR project will become operational (nominally 2031 based on the Authority's 2020 Revised Business Plan) or within several years of commencement of HSR service between San Jose and Gilroy, then, provided there is agreement of both the Authority and the City, the Authority could instead provide the equivalent funding that would have gone to the pedestrian overcrossings to fund the grade separation project(s). The Authority's funding commitment for SSJ-OMM#2a, SSJ-OMM#2b, and SSJ-OMM#2c shall not exceed $36.4 million in total for all three measures combined. See Footnote 8. The Authority, as a condition of providing funding, will require the implementing entity to implement relevant IAMFs and direct mitigation measures applied to the Preferred Alternative during the construction of this	Design/ pre-construction/ construction (completion prior to HSR operation)	Provide funding to an implementing entity. Implementing entity to be determined by the Authority. Potential or anticipated implementing entity may be: City of San Jose	Upon funding	Authority	Authority	Provision of funding to implementing entity	Authority agreement with implementing entity	Safety (emergency vehicle response delay) effects described in Chapter 5, Environmental Justice, Table 5-26.

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		improvement. See measure description, cost estimate, and roles and responsibilities sections in corresponding profile No. 16 in Final EIR/EIS, Volume 2, Appendix 5-C, Attachment A.								
SSJ-OMM#2b	Monterey Road Pedestrian/Bike Overpass at Branham	Provide funding for pedestrian overcrossing of Monterey Road at Branham Lane. The improvement will provide an east-west connection, which will improve safety for students, pedestrians, and bicyclists. The Authority will provide funding for this overcrossing, and the City of San Jose will implement. The City is considering potential grade separation of the railroad crossings at this location. If grade separation is realized, then the underlying residual safety effect related to emergency vehicle response times will be avoided. Consequently, if the City is advancing the grade separations toward completion by the time the HSR project will become operational (nominally 2031 based on the Authority's 2020 Revised Business Plan) or within several years of commencement of HSR service between San Jose and Gilroy, then, provided there is agreement of both the Authority and the City, the Authority could instead provide the equivalent funding that would have gone to the pedestrian overcrossings to fund the grade separation project(s). The Authority's funding commitment for SSJ-OMM#2a, SSJ-OMM#2b, and SSJ-OMM#2c shall not exceed $36.4 million in total for all three measures combined. The Authority, as a condition of providing funding, will require the implementing entity to implement relevant IAMFs and direct mitigation measures applied to the Preferred Alternative during the construction of this improvement. See measure description, cost estimate, and roles and responsibilities sections in corresponding profile No. 16 in Final EIR/EIS, Volume 2, Appendix 5-C, Attachment A. See footnote 8.	Design/ Pre-construction/ Construction (Completion prior to HSR operation)	Provide funding to an implementing entity. Implementing entity to be determined by the Authority. Potential or anticipated implementing entity may be: City of San Jose	Upon Funding	Authority	Authority	Provision of funding to implementing entity	Authority agreement with implementing entity	Safety (emergency vehicle response delay) effects described in Chapter 5, Environmental Justice, Table 5-26.
SSJ-OMM#2c	Monterey Road Pedestrian/Bike Overpass at Chynoweth	Provide funding for pedestrian overcrossing of Monterey Road at Chynoweth Avenue. The improvement will provide an east-west connection, which will improve safety for students, pedestrians, and bicyclists. The Authority will provide funding for this overcrossing, and the City of San Jose will implement. The City is considering potential grade separation of the railroad crossings at this location. If grade separation is realized, then the underlying residual safety effect related to emergency vehicle response times will be avoided. Consequently, if the City is advancing the grade separations toward completion by the time the HSR project will become operational (nominally 2031 based on the Authority's 2020 Revised Business Plan) or within several years of commencement of HSR service between	Design/ Pre-construction/ Construction (Completion prior to HSR operation)	Provide funding to an implementing entity. Implementing entity to be determined by the Authority. Potential or anticipated implementing entity may be:	Upon Funding	Authority	Authority	Provision of funding to implementing entity	Authority agreement with implementing entity	Safety (emergency vehicle response delay) effects described in Chapter 5, Environmental Justice, Table 5-26.

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		San Jose and Gilroy, then, provided there is agreement of both the Authority and the City, the Authority could instead provide the equivalent funding that would have gone to the pedestrian overcrossings to fund the grade separation project(s). The Authority's funding commitment for SSJ-OMM#2a, SSJ-OMM#2b, and SSJ-OMM#2c shall not exceed $36.4 million in total for all three measures combined. See footnote 8. The Authority, as a condition of providing funding, will require the implementing entity to implement relevant IAMFs and direct mitigation measures applied to the Preferred Alternative during the construction of this improvement. See measure description, cost estimate, and roles and responsibilities sections in corresponding profile No. 16 in Final EIR/EIS, Volume 2, Appendix 5-C, Attachment A.		City of San Jose						
SSJ-OMM#3	Noise Treatments for Residential Buildings Along US 101 to Address Existing Noise	This measure will upgrade existing residential structures to improve noise attenuation along certain portions of U.S. Highway (US) 101. This measure will apply to up to 20 residential units along the west side of US 101 from Blossom Hill Road to SR 85, including the southbound exit ramp to SR 85. Noise barriers already exist in most of these residential areas adjacent to US 101. These barriers have been built as part of roadway improvement projects for noise abatement purposes and provide acoustical shielding at outdoor use areas and at ground-level facades of buildings. Accordingly, the proposed offsetting mitigation measure will instead focus on addressing indoor noise level through retrofitting up to 20 homes with noise reduction features, including upgraded windows and insulation. Funding for this measure shall not exceed $500,000 in total, $12,632 per single-family home, and $25,000 per multifamily building. See Footnote 8. See measure description, cost estimate, and roles and responsibilities sections in corresponding profile No. 17 in Final EIR/EIS, Volume 2, Appendix 5-C, Attachment A.	Design/ pre-construction/ construction (completion prior to HSR operation)	Implement noise treatment program	Quarterly	Authority/ Contractor	Authority	Documentation of homes treated and treatments implemented	Authority contract with implementing firm	Noise effects described in Chapter 5, Environmental Justice, Table 5-26.
SSJ-OMM#4	Caroline Davis Intermediate School All-Weather Turf and Track	Provide funding in an amount not to exceed $1,250,000 for upgrade of an existing natural turf to an all-weather turf and all-weather track at (Caroline) Davis Intermediate School. This will ensure year-round use for students, the community, and for sporting activities. This could include light standards, goal posts, striping, seating, turf, and track. See footnote 8. The Authority, as a condition of providing funding, will require the implementing entity to implement relevant IAMFs and direct mitigation measures applied to the Preferred Alternative during the construction of this improvement. See measure description, cost estimate, and roles and responsibilities sections in corresponding profile No. 18 in	Design/ pre-construction/ construction (completion prior to HSR operation)	Provide funding to an implementing entity. Implementing entity to be determined by the Authority. Potential or anticipated implementing	Upon funding	Authority	Authority	Provision of funding to implementing entity	Authority agreement with implementing entity	Noise effects described in Chapter 5, Environmental Justice, Table 5-26.

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		Final EIR/EIS, Volume 2, Appendix 5-C, Attachment A.		entity may be: Oak Grove School District (OGSD)						
MH-OMM#3	Noise Treatments for Residential Buildings Along West Side of US 101	This measure will upgrade existing residential structures to improve noise attenuation along US 101 to promote a healthier community and improve the quality of life in the neighborhood. Residences in Morgan Hill are adjacent to the west side of US 101 from approximately 0.35 mile north of East Main Avenue to Diana Avenue and from San Pedro Avenue to Barret Avenue. Noise barriers already exist along approximately one-third of the length of these residential areas adjacent to US 101. This measure will provide resources to retrofit homes with noise reduction features, including upgraded windows and insulation. Funding for this measure shall not exceed $1.1 million in total, $12,500 per single-family home, and $25,000 per multifamily building. See footnote 8. See measure description, cost estimate, and roles and responsibilities sections in corresponding profile No. 21 in Final EIR/EIS, Volume 2, Appendix 5-C, Attachment A.	Design/ pre-construction/ construction (completion prior to HSR operation)	Implement noise treatment program	Quarterly	Authority/ Contractor	Authority	Documentation of homes treated and treatments implemented	Authority contract with implementing firm	Noise effects described in Chapter 5, Environmental Justice, Table 5-26.
MH-OMM#4	Fund 30% Design of Master Plan for Caltrain Station and Access	Provide funding in an amount not to exceed $500,000 of the 30% design for a Master Plan for Caltrain Station and Access in Morgan Hill. Does not include funding for capital improvements or subsequent design. See footnote 8. See measure description, cost estimate, and roles and responsibilities sections in corresponding profile No. 22 in Final EIR/EIS, Volume 2, Appendix 5-C, Attachment A.	Design/ pre-construction/ construction (completion prior to HSR operation)	Provide funding to an implementing entity. Implementing entity to be determined by the Authority. Potential or anticipated implementing entity may be: City of Morgan Hill	Upon funding	Authority	Authority	Provision of funding to implementing entity	Authority agreement with implementing entity	Noise effects described in Chapter 5, Environmental Justice, Table 5-26.
MH-OMM#5	Fund School Bus Route Study	Provide funding in an amount not to exceed $60,000 for a study to be prepared to evaluate and recommend potential enhancements to Morgan Hill Unified School District's bus routes. The study will focus on the effects of the institution of at-grade HSR service through the City of Morgan Hill. Using the locations of Morgan Hill Unified School District's students and school sites, the current route structure will be reviewed and assessed. Alternative route structures	Design/ pre-construction/ construction (completion prior to HSR operation)	Provide funding to an implementing entity. Implementing entity to be determined by	Upon funding	Authority	Authority	Provision of funding to implementing entity	Authority agreement with implementing entity	Noise effects described in Chapter 5, Environmental Justice, Table 5-26.

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		and service patterns will be developed and tested to assess if modifications could be made that will reduce the effects (delay) of additional gate-down time on bus service. As part of the study, the local community, stakeholders, and school officials will be engaged so their input can be heard and incorporated into the work. See footnote 8. Does not include funding for additional buses, bus operations, capital improvements or subsequent study. See measure description, cost estimate, and roles and responsibilities sections in corresponding profile No. 23 in Final EIR/EIS, Volume 2, Appendix 5-C, Attachment A.		the Authority. Potential or anticipated implementing entity may be: Morgan Hill Unified School District						
G-OMM#1	Sidewalk and Curb Improvement	Provide funding in an amount not to exceed $500,000 to improve sidewalks and curb ramps throughout the City of Gilroy in accordance with the results of the upcoming Citywide Sidewalk Condition Assessment Project. Currently, there are several sidewalks throughout the city that have gaps in the pedestrian network, damaged sidewalks, and curb ramps that are not compliant with current Americans with Disability Act (ADA) standards. The offsetting mitigation measure will make such improvements to the sidewalks and curb ramps identified in the assessment to improve pedestrian circulation and safety throughout the city. Sidewalk and Curb Improvement will be within the Gilroy Neighborhood Revitalization Strategy Area nominally along the HSR alignment between Las Animas Ave. on the north and US 101 on the south. See footnote 8. The Authority, as a condition of providing funding, will require the implementing entity to implement relevant IAMFs and direct mitigation measures applied to the Preferred Alternative during the construction of this improvement. See measure description, cost estimate, and roles and responsibilities sections in corresponding profile No. 26 in Final EIR/EIS, Volume 2, Appendix 5-C, Attachment A.	Design/ pre-construction/ construction (completion prior to HSR operation)	Provide funding to an implementing entity. Implementing entity to be determined by the Authority. Potential or anticipated implementing entity may be: City of Gilroy	Upon funding	Authority	Authority	Provision of funding to implementing entity	Authority agreement with implementing entity	Safety (emergency vehicle response delay) effects described in Chapter 5, Environmental Justice, Table 5-26.
G-OMM#2	Bikeway Improvements (IOOF Avenue, Monterey Road, 6th Street, 4th Street, and Alexander Street)	Provide funding in an amount not to exceed $550,000 for bikeway enhancements to five roads within the City of Gilroy (IOOF Avenue, Monterey Road, 6th Street, 4th Street, and Alexander Street) in accordance with the Gilroy Station Area Plan and the City of Gilroy's Bicycle/Pedestrian Transportation Plan as follows: ▪ IOOF Avenue: Class II bike lanes along IOOF Avenue between Monterey Road and Murray Avenue. ▪ Monterey Road: Class II bike lanes between the northern Gilroy City limit and 3rd Street. ▪ 6th Street: Additional bicycle markings between Chestnut Street and Camino Arroyo. ▪ 4th Street: A bike boulevard along 4th Street between Monterey Road and Miller Avenue. ▪ Alexander Street: Bike lanes between Lewis Street and	Design/ pre-construction/ construction (completion prior to HSR operation)	Provide funding to an implementing entity. Implementing entity to be determined by the Authority. Potential or anticipated implementing entity may be:	Upon funding	Authority	Authority	Provision of funding to implementing entity	Authority agreement with implementing entity	Safety (emergency vehicle response delay) effects described in Chapter 5, Environmental Justice, Table 5-26.

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		Chestnut Street. The Authority, as a condition of providing funding, will require the implementing entity to implement relevant IAMFs and direct mitigation measures applied to the Preferred Alternative during the construction of this improvement. See measure description, cost estimate, and roles and responsibilities sections in corresponding profile No. 27 in Final EIR/EIS, Volume 2, Appendix 5-C, Attachment A. See also footnote 8.		City of Gilroy						
G-OMM#3	Neighborhood Street Lighting	Provide funding in an amount not to exceed $250,000 for neighborhood street lighting within the Gilroy Neighborhood Revitalization Strategy Area nominally along the HSR alignment between Las Animas Ave. on the north and US 101 on the south. The measure will install new streetlights in areas where the streetlights do not currently meet the City of Gilroy's minimum standards for streetlight spacing. The Authority, as a condition of providing funding, will require the implementing entity to implement relevant IAMFs and direct mitigation measures applied to the Preferred Alternative during the construction of this improvement. See measure description, cost estimate, and roles and responsibilities sections in corresponding profile No. 28 in Final EIR/EIS, Volume 2, Appendix 5-C, Attachment A. See also footnote 8.	Design/ pre-construction/ construction (completion prior to HSR operation)	Provide funding to an implementing entity. Implementing entity to be determined by the Authority. Potential or anticipated implementing entity may be: City of Gilroy	Upon funding	Authority	Authority	Provision of funding to implementing entity	Authority agreement with implementing entity	Safety (emergency vehicle response delay) effects described in Chapter 5, Environmental Justice, Table 5-26.
G-OMM#4	Murray Avenue Sidewalk Gap Closure Project	Provide funding in an amount not to exceed $1,235,000 to the City of Gilroy to construct approximately 2,000 linear feet of sidewalk on the west side of Murray Avenue between Kishimura Drive and Leavesley Road. The Authority, as a condition of providing funding, will require the implementing entity to implement relevant IAMFs and direct mitigation measures applied to the Preferred Alternative during the construction of this improvement. See measure description, cost estimate, and roles and responsibilities sections in corresponding profile No. 29 in Final EIR/EIS, Volume 2, Appendix 5-C, Attachment A. See also footnote 8.	Design/ pre-construction/ construction (completion prior to HSR operation)	Provide funding to an implementing entity. Implementing entity to be determined by the Authority. Potential or anticipated implementing entity may be:City of Gilroy	Upon funding	Authority	Authority	Provision of funding to implementing entity	Authority agreement with implementing entity	Safety (emergency vehicle response delay) effects described in Chapter 5, Environmental Justice, Table 5-26.
G-OMM#5	IOOF Bicycle/ Pedestrian Overcrossing and Complete Streets	Provide funding in an amount not to exceed $13.2 million for a bicycle and pedestrian overcrossing at IOOF Avenue as well as additional complete street improvements, such as high visibility crosswalks, Americans with Disability Act (ADA) curb ramps, Class II bike lanes, and rectangular	Design/ pre-construction/ construction (completion prior to HSR	Provide funding to an implementing entity.	Upon funding	Authority	Authority	Provision of funding to implementing entity	Authority agreement with implementing entity	Safety (emergency vehicle response delay) effects described in Chapter 5, Environmental Justice, Table 5-26.

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		rapid flashing beacons on IOOF Avenue in the vicinity of Gilroy Prep School, South Valley Middle School, and Rebekah Children's Services. The Authority, as a condition of providing funding, will require the implementing entity to implement relevant IAMFs and direct mitigation measures applied to the Preferred Alternative during the construction of this improvement. See measure description, cost estimate, and roles and responsibilities sections in corresponding profile No. 30 in Final EIR/EIS, Volume 2, Appendix 5-C, Attachment A. See also footnote 8.	operation)	Implementing entity to be determined by the Authority. Potential or anticipated implementing entity may be:City of Gilroy						
G-OMM#6	Noise Reduction Program	This measure will upgrade existing residential structures to improve noise attenuation along US 101 in the area adjacent to the west side of US 101 from south of Las Animas Avenue to Leavesley Road, from Adams Court to San Ysidro Park, and from San Ysidro Park to north of East 7th Street. Funding for this measure shall not exceed $1.15 million in total, $12,500 per single-family home, and $25,000 per multifamily building. This measure will provide resources to retrofit homes with noise reduction features, including upgraded windows and insulation. See measure description, cost estimate, and roles and responsibilities sections in corresponding profile No. 31 in Final EIR/EIS, Volume 2, Appendix 5-C, Attachment A. See also footnote 8.	Design/ pre-construction/ construction (completion prior to HSR operation)	Implement noise treatment program	Quarterly	Authority/ Contractor	Authority	Documentation of homes treated and treatments implemented	Authority contract with implementing firm	Noise effects described in Chapter 5, Environmental Justice, Table 5-26.
G-OMM#8	Rebekah Children's Services New Security Fence and Gate	Provide funding in an amount not to exceed $100,000 to install fencing around the perimeter of the Rebekah Children's Services facility. See also footnote 8. The Authority, as a condition of providing funding, will require the implementing entity to implement relevant IAMFs and direct mitigation measures applied to the Preferred Alternative during the construction of this improvement. See measure description, cost estimate, and roles and responsibilities sections in corresponding profile No. 33 in Final EIR/EIS, Volume 2, Appendix 5-C, Attachment A.	Design/ pre-construction/ construction (completion prior to HSR operation)	Provide funding to an implementing entity. Implementing entity to be determined by the Authority. Potential or anticipated implementing entity may be: Rebekah Children's Services	Upon funding	Authority	Authority	Provision of funding to implementing entity	Authority agreement with implementing entity	Safety (emergency vehicle response delay) effects described in Chapter 5, Environmental Justice, Table 5-26.
SJV-OMM#1	Volta Elementary School Improvements	Provide funding in an amount not to exceed $5 million to improve and expand Volta Elementary School. These funds could be used for tree planting and other landscaping; window replacement; insulation installation;	Design/ pre-construction/ construction (completion prior	Provide funding to an implementing entity.	Upon funding	Authority	Authority	Provision of funding to implementing entity	Authority agreement with implementing entity	Noise effects described in Chapter 5, Environmental Justice, Table 5-26.

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact # and Impact Title
		and construction of permanent classrooms to replace the portables, a parking area, or a community room at Volta Elementary School. Funds also could be used for water supply improvements and other critical safety features required for school expansion. See also footnote 8. The Authority, as a condition of providing funding, will require the implementing entity to implement relevant IAMFs and direct mitigation measures applied to the Preferred Alternative during the construction of this improvement. See measure description, cost estimate, and roles and responsibilities sections in corresponding profile No. 37 in Final EIR/EIS, Volume 2, Appendix 5-C, Attachment A.	to HSR operation)	Implementing entity to be determined by the Authority. Potential or anticipated implementing entity may be:Los Banos Unified School District						
SJV-OMM#2	Volta Community Park at the Volta Elementary School	Provide funding in an amount not to exceed $1,153,000 for development at the Volta Elementary School campus for use as a community park. The park could include a combination of turf, ball courts, shade structures, picnic tables, and play equipment and will be accessible to the broader community. This measure will also include fencing (to separate the park from the school for potential after hours use) and a small parking lot. The Authority, as a condition of providing funding, will require the implementing entity to implement relevant IAMFs and direct mitigation measures applied to the Preferred Alternative during the construction of this improvement. See measure description, cost estimate, and roles and responsibilities sections in corresponding profile No. 38 in Final EIR/EIS, Volume 2, Appendix 5-C, Attachment A. See also footnote 8.	Design/ pre-construction/ construction (completion prior to HSR operation)	Provide funding to an implementing entity. Implementing entity to be determined by the Authority. Potential or anticipated implementing entity may be:Los Banos Unified School District	Upon funding	Authority	Authority	Provision of funding to implementing entity	Authority agreement with implementing entity	Adverse effects related to visual aesthetics

AACSA	African American Community Services Agency
ACE	Altamont Corridor Express
ALAN	artificial light at night
APE	area of potential effect
ATC	automatic train control
ATP	Archaeological Treatment Plan
Authority	California High-Speed Rail Authority
BAAQMD	Bay Area Air Quality Management District
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
Cal.	California
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CCC	Central California coast
C.F.R.	Code of Federal Regulations
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
cm	centimeter
CMP	compensatory mitigation plan
CP	control point
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
DPR	Department of Parks and Recreation
EFH	essential fish habitat
EIR/EIS	environmental impact report/environmental impact statement
EMMA	Environmental Mitigation Management and Assessment system
EO	Executive Order
ESA	environmentally sensitive area
Fast Act	Fixing America's Surface Transportation Act
FESA	Federal Endangered Species Act
FRA	Federal Railroad Administration
GAMMP	groundwater adaptive management and monitoring program
GEA	Grasslands Ecological Area
GIS	geographic information system
GPS	global positioning system
HABS	Historic American Buildings Survey
HAER	Historic American Engineering Record
HALS	Historic American Landscape Survey
HMP	habitat mitigation plan
HSR	high-speed rail
HST	high-speed train
HUC	hydrologic unit code
I-	Interstate
IAMF	impact avoidance and minimization feature
IBA	Important Bird Area
L_{eq}	equivalent sound level
LOS	level of service
MBARD	Monterey Bay Air Resources District
MBTA	Migratory Bird Treaty Act
MLD	most likely descendant
MOA	memorandum of agreement
MOU	memorandum of understanding
MOWF	maintenance of way facility
mph	miles per hour
MTC	Metropolitan Transportation Commission
NAGPRA	Native American Grave Protection and Repatriation Act
NAHC	Native American Heritage Commission
NCCAB	North Central Coast Air Basin
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NO_x	nitrogen oxides
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NZE	near-zero emissions
O_3	ozone
OCS	overhead contact system
OGSD	Oak Grove School District
O&M	operations and maintenance
OMM	offsetting mitigation measure
OSHA	Occupational Safety and Health Administration
PA	Programmatic Agreement
PA	public address
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
Res.	Resources
REQ	request for qualifications
ROD	record of decision

RRP	Restoration and Revegetation Plan
RSA	resource study area
RTP	regional transportation plan
RWQCB	Regional Water Quality Control Board
SB	Senate Bill
SCCC	south-central California coast
SCVHA	Santa Clara Valley Habitat Agency
SCVHP	Santa Clara Valley Habitat Plan
SCVOSA	Santa Clara Valley Open Space Authority
SCVWD	Santa Clara Valley Water District
SFBAAB	San Francisco Bay Area Air Basin
SHPO	State Historic Preservation Officer
SJUSD	San Jose Unified School District
SJVAB	San Joaquin Valley Air Basin
SJUVAPCD	San Joaquin Valley Unified Air Pollution Control District SJVAPCD San Joaquin Valley Air Pollution Control District
SOI	Secretary of the Interior
SOQ	statement of qualifications
SR	State Route
SWRCB	State Water Resources Control Board
TAMC	Transportation Agency for Monterey County
TBM	tunnel boring machine
UPR	Upper Pajaro River
UPRR	Union Pacific Railroad
U.S.	United States
US	U.S. Highway
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
VCP	vegetation control plan
VERA	Voluntary Emission Reduction Agreement
VMT	vehicle miles traveled
VOC	volatile organic compound
VTA	Santa Clara Valley Transportation Authority
WCA	wildlife corridor assessment
WCP	Weed Control Plan
WEAP	worker environmental awareness program
WEF	wildlife exclusion fencing
WGTA	Washington/Guadalupe, Tamien, and Alma/Almaden
ZE	zero emissions
ZEV	zero emissions vehicle

Table 2. San Jose to Merced 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 shall provide a photographic survey documenting the condition of the public roadways along truck routes providing access to the proposed project site. The photographic survey shall be submitted for approval to the agency responsible for road maintenance and the Authority. The Contractor shall 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 shall survey the condition of the public roadways along truck routes providing access to the proposed project site after construction is complete. The Contractor shall 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 design-build contractor shall prepare a detailed Construction Transportation Plan (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 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 2012) and will 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 a detour. ▪ Identified routes for construction traffic. ▪ Provisions for safe pedestrian and bicycle passage or convenient 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	Design/ construction	Prepare plan/ reporting Consult with local city, county, transit agencies, and any key stakeholders identified by the Authority, which stakeholders shall include the SAP Center, 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
		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 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 shall identify adequate off-street parking for all construction-related vehicles throughout the construction period to minimize impacts to public on-street parking areas. If adequate parking cannot be provided on the construction sites, the Contractor shall designate a remote parking area and arrange for the use a shuttle bus to transfer construction workers to/from the job site. This measure shall 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 shall prepare specific construction management plans to address maintenance of pedestrian access during the construction period. Actions that limit pedestrian access will 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, provide covered walkways and fencing. The plan objective shall be to maintain pedestrian access where feasible (i.e., meeting design, safety, Americans with Disabilities Act (ADA) requirements). This measure shall be addressed in the CTP.	Design/ construction	Prepare plan	Prior to construction	Authority/ Contractor	Contractor	Prepare construction management plans that address maintenance of pedestrian access	Condition of construction contract
TR-IAMF#5	Maintenance of Bicycle Access	The Contractor shall prepare specific construction management plans to address maintenance of bicycle access during the construction period. Actions that limit bicycle access will 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. Maintain bicycle access where feasible (i.e., meeting design, safety, ADA requirements). This measure shall be addressed in	Design/ construction	Prepare plan	Prior to construction	Authority/ Contractor	Contractor	Prepare construction management plans that address maintenance of bicycle access	Condition of construction contract

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		the CTP.							
TR-IAMF#6	Restriction on Construction Hours	The Contractor shall 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 to traffic on roadways. The Contractor shall 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 maybe 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 shall deliver all construction-related equipment and materials on the appropriate truck routes and shall 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 shall 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 shall provide a mechanism to prevent roadway construction activities from reducing roadway capacity during major athletic events or other special events that substantially (10% or more) increase traffic on roadways affect by project construction. Mechanisms include the presence of police officers directing traffic, special-event parking, use of within-the-curb parking, or shoulder lanes for through-traffic and traffic cones. This measure shall be addressed in the CTP. The Contractor shall identify adequate off-street parking using existing remote parking areas or vacant land to replace any temporary displacement of parking utilized for special events at the SAP Center on a 1:1 basis during construction.	Design/Construction	CTP to be prepared prior to construction followed by reporting During design, Authority Contractor(s) will work with and consult with the SAP Center on the preferred design and location of temporary 1:1 replacement parking for SAP Center parking losses during Project construction.	Prior to construction/ weekly	Authority/ Contractor	Contractor	Prepare CTP/ event coordination	Condition of construction contract
TR-IAMF#9	Protection of Freight and Passenger Rail during Construction	The Contractor shall 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. Contractor 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 shall prepare specific construction management plans to address maintenance of transit access during the construction period. Actions that limit transit access will 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	Construction	CTP to be prepared prior to construction followed by reporting	Prior to construction/ weekly	Authority/ Contractor	Contractor	Prepare Construction Management Plans to address maintenance of transit access	Condition of construction contract

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		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. Maintain transit access where feasible (i.e., meeting design, safety, ADA requirements). This measure shall be addressed in the CTP.							
TR-IAMF#12	Pedestrian and Bicycle Safety	Prior to construction, the Contractor shall provide a technical memorandum describing how pedestrian and bicycle accessibility will be provided and supported across the HSR corridor, to and from stations and on station property. Priority of safety for pedestrians and bicycles and vulnerable populations over motor vehicle access will be done in a way so as to encourage maximum potential access from non-motorized modes. Local access programs, such as Safe Routes to Schools, shall be maintained or enhanced. Access to community facilities for vulnerable populations shall 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 shall employ the following measures to minimize and control fugitive dust emissions. The Contractor shall prepare a fugitive dust control plan for each distinct construction segment. At a minimum, the plan shall describe how each measure will be employed and identify an individual responsible for ensuring implementation. At a minimum, the plan shall 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 miles per hour (mph). ▪ Suspend any dust-generating activities when average wind speed exceeds 25 mph. ▪ Stabilize all disturbed areas, including storage piles that are not being used on a daily basis for construction purposes, by using water, a chemical stabilizer/suppressant, 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 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.	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
		▪ 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.							
AQ-IAMF#2	Selection of Coatings	During construction, the Contractor will use: ▪ Low–volatile organic compound (VOC) paint that contains less than 10% of VOC contents (VOC, 10%). 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, Monterey Bay Unified Air Pollution Control District Rule 426, and San Joaquin Valley Unified Air Pollution Control District Rule 4601, when available. If not available, the Contractor will document the lack of availability, recommend alternative measure(s) to comply with Regulation 8, Rule 3, Rule 426, and Rule 4601 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 diesel-fueled construction diesel equipment and on-road diesel trucks. Renewable diesel must meet the most recent ASTM D975 specification for Ultra Low Sulfur Diesel and have a carbon intensity no greater than 50% of diesel with the lowest carbon intensity among petroleum fuels sold in California. The Contractor will provide the Authority with monthly and annual reports, through the Environmental Mitigation Management and Application (EMMA) system, of renewable diesel purchase records and equipment and vehicle fuel consumption. Exemptions to use traditional diesel can be made where renewable diesel is not available from suppliers within 200 miles of the project site. The construction contract must identify the quantity of traditional diesel purchased and fully document the availability and price of renewable diesel to meet project demand.	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 from On-Road Construction Equipment	Prior to issuance of construction contracts, the Authority will incorporate the following material-hauling truck fleet mix requirements into the contract specifications:	Pre-construction	Contract specifications	Prior to construction	Authority	Authority	Material hauling truck fleet mix requirements incorporated into	Contract requirements and specifications

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		▪ All diesel on-road trucks used to haul construction materials, including fill, ballast, rail ties, and steel, shall use a model year 2010 or newer engine. ▪ 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.						contract 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 daycare 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 shall 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 as not to 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
Electromagnetic Fields and Electromagnetic Interference									
EMF/EMI-IAMF#1	Preventing Interference with Adjacent Railroads	TM 3.00.10. Implementation Stage Electromagnetic Compatibility Program Plan (ISEP) 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 standard design practices to prevent interference with the electronic equipment operated by these railroads. Prior to operation and maintenance of each operating segment, the Contractor shall certify through issuance of a technical memorandum to the Authority that design provisions to prevent	Design/ construction	Prepare technical memorandum/ compliance reporting	Monthly	Authority/ Contractor	Contractor/ Authority	Prepare electromagnetic compatibility technical memorandum	Condition of construction contract

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		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 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. The HSR Design Criteria Manual (DCM) Chapter 26 summarizes the applicable electromagnetic interference/electromagnetic field (EMI/EMF) design standards that the Authority will use for the project.							
EMF/EMI-IAMF#2	Controlling Electromagnetic Fields/Electromagnetic Interference	Prior to construction, the Contractor will prepare an electromagnetic field/electromagnetic interference technical memorandum for review and approval by the Authority. The HSR project shall adhere to international guidelines and comply with applicable federal and state laws and regulations. The HSR project design will follow TM 300.10, ISEP, the CHSR DCM Chapter 26, which provides detailed EMC design criteria for the HSR systems and equipment, and the HSR DCM Chapter 22, which addresses grounding requirements for third-party metallic structures, including fences and pipelines, which are parallel and adjacent to the CHSTS 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 electromagnetic compatibility (EMC)/EMI 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 the 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 EMI/EMF technical memorandum	Condition of construction contract
Public Utilities and Energy									
PUE-IAMF#1	Design Measures	The HSR project design incorporates utilities and design elements that 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 energy efficiency during operations). Thus, the project will not overburden utility services. The design elements are included in the design-build contract. Additionally, the Authority has adopted a sustainability policy that establishes project design and construction requirements that avoid and minimize impacts	Design/ construction	Reporting	At incorporation or completion of design/monthly reporting (during construction)	Authority/ Contractor	Contractor	Incorporate utilities and design elements that minimize electrical consumption into design	Condition of construction contract
PUE-IAMF#2	Irrigation Facility	Where relocating an irrigation facility is necessary, the Contractor will verify the new facility is operational prior to disconnecting the original	Design/ pre-	Reporting	Monthly	Authority/	Contractor	Verify new irrigation facilities are	Condition of

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
	Relocation	facility, where feasible. Irrigation facility relocation preferences are included in the construction contract and reduce unnecessary impacts to continued operation of irrigation facilities. The Contractor shall document all relocations in a memorandum for Authority review and approval.	construction			Contractor		operational prior to disconnecting original facility	construction contract
PUE-IAMF#3	Public Notifications	Prior to construction in areas where utility service interruptions are unavoidable, 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 shall prepare a technical memorandum documenting how construction activities will be coordinated with service providers to minimize or avoid interruptions. It will include upgrades of existing power lines to connect the HSR system to existing utility substations. The technical memorandum shall be provided to the Authority for review and approval.	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 and Aquatic Resources									
BIO-IAMF#1	Designated 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 the U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), where applicable, and the California Department of Fish and Wildlife (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 Biological Resources Management Plan (BRMP), and for guiding and directing the work of the Designated Biologists and Biological Monitors. Designated Biologists will be responsible for directly overseeing and reporting the implementation of general and species-specific conservation measures. 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 Worker Environmental Awareness Program (WEAP) training, implementing general conservation measures, conducting general	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

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		compliance monitoring, and reporting on compliance monitoring activities. The term Project Biologist is used in these IAMFs to mean the Project Biologist, Designated Biologists, Species-Specific Biological Monitors, and General Biological Monitors, as appropriate. 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.							
BIO-IAMF#2	Facilitate Agency Access	Throughout the construction period, the Authority will allow access by the USFWS, NMFS, U.S. Army Corps of Engineers (USACE), CDFW, and State Water Resources Control Board (SWRCB) 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 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: key provisions of the federal Endangered Species Act (federal ESA), the California Endangered Species Act (CESA), the Bald and Golden Eagle Protection Act (BGEPA), the Migratory Bird Treaty Act (MBTA), California Fish and Game Code 1600, Porter-Cologne Water Quality Control Act (Porter-Cologne), and the Clean Water Act (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; and review of avoidance, minimization, and mitigation measures. 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 species' habitat and life-stage requirements will be detailed and discussed on project maps, which will show areas of planned minimization and avoidance measures. Crews will be informed during the WEAP training that, except when necessary as determined in consultation with the 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 to 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	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
		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 operation and maintenance (O&M) activities, O&M personnel will attend a WEAP training session arranged by the Authority. At a minimum, O&M WEAP training materials will include the following information: key provisions of the ESA, CESA, the BGEPA, the MBTA, Porter-Cologne, and the 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. The training will include an overview of provisions of the biological resources management plan, annual vegetation, and management plan, weed control plan 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. All project environmental plans, such as the Restoration and Revegetation Plan (RPP) and Weed Control Plan (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.	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
		▪ 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 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 (ESAs) 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 to 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 ensure the avoidance of potential impacts to 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	Construction	Monitoring/ compliance reporting	Daily monitoring/ monthly reporting	Authority/ Contractor	Contractor	Daily monitoring/ monthly reporting	Condition of construction contract

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		Project Biologist for wildlife before such material is moved, buried, or capped.							
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 effects to sensitive biological resources, including habitat for special-status species, seasonal wetlands, and wildlife movement corridors. Staging areas (including any temporary material storage areas) will be 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 ensure that vehicle traffic within the project footprint is restricted to established roads, construction areas and other designated areas.	Pre-construction	Compliance reporting	Monthly	Authority/ Contractor	Contractor	Monthly reporting	Condition of construction contract
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 ensure that all equipment entering the Work Area is free of mud and plant materials. The Authority will establish vehicle cleaning locations designed to isolate and contain organic materials and minimize opportunities for weeds and invasive species to move in and out of the project footprint. Cleaning may be done by washing with water, blowing with compressed air, brushing, or other hand cleaning. The cleaning areas will be located so as to avoid impacts to surface waters and appropriate Stormwater Pollution Prevention Plan (SWPPP) best management practices (BMP) will be implemented so as 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	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, non-storm water 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:*	Pre-construction	Design	Prior to final design	Authority	Authority	Bird- and raptor-safe design overhead contact 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
		The State of the Art in 2006 (APLIC 2006) and *Reducing Avian Collisions with Power Lines: State of the Art in 2012* (APLIC 2012), and other guidelines related to collisions with buildings available from the American Bird Conservancy (Sheppard and Phillips 2015). Applicable 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, Operation, Maintenance, and Decommissioning* (UFWS 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, and halogen). Lighting will not be installed under viaduct and bridge structures in riparian habitat areas. ▪ Use of facility designs and architecture that minimizes the potential for bird collisions with buildings, to the extent feasible and consistent with local design requirements. Additional bird operational actions will be required for the Grasslands Ecological Area, dry lakes and playas, Audubon Important Bird Areas and documented avian movement corridors. These measures include: ▪ Avoid, to the extent feasible, siting transmission lines across canyons or on ridgelines to prevent bird and raptor collisions. ▪ Install bird flight diverters on all facilities spanning or within 1,000 feet of stream and wash channels, canals, ponds, and any other natural or artificial body of water. ▪ Fencing or other type of flight diverter will be installed on all viaduct structures to encourage birds and raptors to fly over the HSR and avoid flying directly in the path of on-coming trains. ▪ Use of bird-friendly lighting on all stationary light sources (i.e., lighting with shorter wavelengths toward the blue and green spectrum),							

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		provided it is consistent with safety and security requirements.							
Hydrology and Water Resources									
HYD-IAMF#1	Storm Water Management	Prior to construction, the Contractor shall prepare a storm water management and treatment plan 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 management measures, such as detention or selected upgrades to the receiving system, will be designed to provide adequate capacity and to comply with the design standards in the latest version of Authority Technical Memorandum 2.6.5, Hydraulics and Hydrology Guidelines. On-site stormwater management facilities will be designed and constructed to capture runoff and provide treatment prior to discharge of pollutant-generating surfaces, including station parking areas, access roads, new road over- and underpasses, reconstructed interchanges, and new or relocated roads and highways. Low-impact development techniques will be used to detain runoff on site and to reduce off site runoff such as constructed wetland systems, biofiltration and bioretention systems, wet ponds, organic mulch layers, planting soil beds, and vegetated systems (biofilters), such as vegetated swales and grass filter strips, will be used where appropriate.	Design	Prepare plan	At incorporation or completion of design	Authority/ Contractor	Contractor	Prepare a stormwater management and treatment plan	Condition of construction contract
HYD-IAMF#2	Flood Protection	Prior to construction, the Contractor shall prepare a flood protection plan for Authority review and approval. The project will be designed both to remain operational during flood events and to minimize increases in 100-year or 200-year flood elevations, as applicable to locale. Design standards will include the following: ▪ Establish track elevation to prevent saturation and infiltration of stormwater into the sub-ballast. ▪ 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. ▪ 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 county floodplains manager. The following design standards will minimize the effects 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	Design	Prepare plan	At incorporation or completion of design	Authority/ Contractor	Contractor	Prepare flood protection plan	Condition of construction contract

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		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.							
HYD-IAMF#3	Prepare and Implement a Construction Stormwater Pollution Prevention Plan	Prior to Construction (any ground disturbing activities), the Contractor shall comply with the State Water Resources Control Board (SWRCB) Construction General Permit requiring preparation and implementation of a SWPPP. The Construction SWPPP will propose BMPs to minimize potential short-term increases in sediment transport caused by construction, including erosion control requirements, stormwater management, and channel dewatering for affected stream crossings. These BMPs will include measures to incorporate permeable surfaces into facility design plans where feasible, and how treated stormwater will be retained or detained on site. Other BMPs shall include strategies to manage the amount and quality of overall stormwater runoff. The Construction SWPPP will include measures to address, but are not limited to, the following: ▪ Hydromodification management to verify maintenance of pre-project hydrology by emphasizing on site retention of stormwater runoff using measures such as flow dispersion, infiltration, and evaporation (supplemented by detention where required). Additional flow control measures will be implemented where local regulations or drainage requirements dictate. ▪ Implementing practices to minimize the contact of construction materials, equipment, and maintenance supplies with stormwater. ▪ Limiting fueling and other activities using hazardous materials to areas distant from surface water, providing drip pans under equipment, and daily checks for vehicle condition. ▪ Implementing practices to reduce erosion of exposed soil, including soil stabilization, regular watering for dust control, perimeter siltation fences, and sediment catchment basins. ▪ Implementing practices to maintain current water quality, including: siltation fencing, wattle barriers, stabilized construction entrances, grass buffer strips, ponding areas, organic mulch layers, inlet protection, storage tanks and sediment traps to arrest and settle sediment. ▪ Where feasible, avoiding areas that may have substantial erosion risk, including areas with erosive soils and steep slopes. ▪ Using diversion ditches to intercept surface runoff from off site. ▪ Where feasible, limiting construction to dry periods when flows in water bodies are low or absent. ▪ Implementing practices to capture and provide proper off-site disposal of concrete wash water, including isolation of runoff from fresh concrete during curing to prevent it from reaching the local drainage system, and possible treatments (e.g., dry ice). ▪ Developing and implementing a spill prevention and emergency response plan to handle potential fuel and/or hazardous material	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

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		spills. Implementation of a SWPPP will be performed by the construction contractor's as directed by the Contractor's Qualified SWPPP Practitioner or designee. As part of that responsibility, the effectiveness of construction BMPs must be monitored before, during and after storm events. Records of these inspections and monitoring results are submitted to the local regional water quality control board (RWQCB) as part of the annual report required by the Statewide Construction General Permit. The reports are available to the public online. The SWRCB and RWQCB will have the opportunity to review these documents.							
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 shall comply with existing water quality regulations. The stormwater general permit requires preparation of a SWPPP and a monitoring plan for industrial facilities that discharge stormwater from the site, including vehicle maintenance facilities associated with transportation operations. The permit includes performance standards for pollution control.	Design/ construction	Permit compliance	At incorporation or completion of design/during monthly operation report	Authority/ Contractor	Contractor	Prepare operational SWPPP	Condition of construction contract
HYD-IAMF#5	Tunnel Design Features and Construction Methods	The Contractor shall implement the following tunnel design features and construction methods to avoid and/or minimize the potential for groundwater depletion during tunnel construction and operation, and consequential potential for hydrologic changes that may affect groundwater and/or surface water resources in areas overlying the tunnel alignment. Two types of potential effects must be considered, (1) temporary effects that occur due to construction; and (2) permanent effects that could occur over the lifetime of the project. Hydraulic conductivity of the subsurface strata is expected to be low along many parts of the Pacheco Pass tunnel alignments based on evaluation of the construction of previous tunnels nearby and of the geological strata along the proposed tunnel alignment (Authority 2017b). However, certain sections of the tunneled alignments (e.g., fault zones, zones of highly fractured or sheared rock, or other pervious deposits) could exhibit higher hydraulic conductivity, higher rates of groundwater inflow into excavated opening(s) and higher water pressure(s) on tunnel's permanent structure (final liner). Subsurface conditions for the Pacheco tunnels could include groundwater pressures up to 435 psi (Authority 2017b). The amount of groundwater depletion will depend upon the geotechnical and hydrogeological conditions along the tunnel alignment, the tunnel construction methods utilized, and design features that will minimize such inflows. Temporary inflows into the tunnel and groundwater flow around the outside of the tunnel (annular flow) during construction are likely unavoidable Thus, temporary effects on surface and groundwater conditions are possible even with implementation of this IAMF. Methods implemented to control potential effects will depend on the consequences and nature of the anticipated effects. The tunnels at Pacheco Pass could be constructed using tunnel boring machine (TBM) tunneling methods or conventional mined tunnel methods such as the sequential excavation method (SEM). Cross passages will most likely be constructed using a conventional mining approach. The table below summarizes the potential for temporary and permanent groundwater effects for the two primary tunneling methods. It	Design/ pre-construction; construction/ post-construction	Design/ reporting	Monthly/annually/ as-needed	Authority/ Contractor	Authority	At incorporation or completion of design/ during monthly construction report	Condition of construction contract

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		should be recognized that potential for groundwater effects also depends on geologic and groundwater conditions as well. See table in Final EIR/EIS, Volume 2, Appendix 2-E under Hydrology and Water Resources. **Tunnel Design to Avoid Permanent Groundwater Depletion** Tunnels shall be designed to be watertight, smooth, durable, and low maintenance to generally maintain existing groundwater levels over the tunnel structures throughout the tunnel design service life. Tunnel lining shall consist of one- or two-pass lining systems to meet HSR design criteria requirements. ▪ **TBM Methods**—One-pass tunnel lining construction entails the installation of a precast concrete segmental lining with gaskets at each segment joint to construct an essentially watertight tunnel lining. The segmental lining is installed from within the shield at the rear of a TBM. A dual system of gaskets can be utilized to increase safety factors for resisting water pressures and arrest groundwater intrusion into the final tunnel structure. The feasibility for watertight linings are generally limited to magnitudes of water pressure less than 40 bars (580 psi). A two-pass tunnel lining system involves two stages of construction and will be used in tunnels where groundwater pressures exceed the capacity of state-of-the-art one-pass linings available at the time of project construction. During the first stage of construction, an initial ground support system (e.g., precast segmental lining for a TBM tunnel) will be erected during the excavation cycle to maintain stability of the excavated opening, minimize water inflows and protect workers. During the second stage, a watertight membrane together with a cast-in-place concrete liner will be installed as the final component and permanent support of a two-pass lining system. This two-pass lining approach has been used in long, high-speed rail tunnel projects with high ground water pressures, such as in tunnels in the Lyon-Turin line, the Gotthard Base Tunnel (Switzerland), and the Vienna-St. Pölten Railway Line (Austria). ▪ **Conventional Tunneling Methods**—Conventional tunneling methods using drill and blast or mechanical excavation will also be designed to be undrained and watertight to arrest or minimize potential groundwater depletion effects. The initial concrete linings used for temporary excavation support will likely consist of sprayed shotcrete, reinforced or unreinforced, and may be preceded by implementation of grouting measures that may control groundwater inflows during excavation. Following application of initial shotcrete support and prior to installation of permanent (final) lining, a waterproofing membrane will be installed. Often “compartmentalization” of waterproofing membrane is implemented, including grouting hoses, to allow local repairs to be made later in case groundwater leakage is identified in course of the liner service life. The shape and size of the tunnel cross section of a conventionally mined tunnel will be designed and adjusted to accommodate ground conditions, including potentially high groundwater pressures. The specific tunnel lining type will be determined during final design, informed by Phase 2 geotechnical investigations proximate to the tunnel alignment. The Contractor shall utilize state-of-the-art technology							

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		available to ensure that potential groundwater depletion is avoided or minimized to the greatest degree practicable. **Construction Methods to Minimize Temporary Groundwater Depletion** The following construction methods shall be employed to avoid and minimize temporary groundwater depletion due to tunnel construction. TBM Methods TBM requirements shall include: ▪ Capability to control potential water inflows by using a closed-face, shielded TBM including special shield provisions (multiple brush system with inflatable seals) to maintain waterproofed excavation on a temporary basis prior to segmental liner installation; ▪ Capability of systematic probe drilling, monitoring of water inflows, and pre-excavation grouting and backfilling with two-component grout. Grouting requirements include providing adequate backfill grouting, monitoring grout volumes, and using appropriate grout mixes to prevent grout washout; these measures will improve watertight performance of tunnel linings; and ▪ Check-grouting through dedicated sockets in precast segmental liner to completely fill the annular opening due to TBM over-excavation, between the segments and the ground. Pre-excavation grouting can be performed from the TBM, provided the TBM is delivered with built-in capability, including grout ports through the TBM cutter-head and through the shield, and set-up for concurrent drilling and grouting of multiple holes. For predominantly non-cohesive soils, or cohesive soils, Slurry TBMs or Earth Pressure Balance (EPB) TBMs, respectively, as well as variable density TBMs, use pressurized tunnel face and pressurized tunnel perimeter around the tunnel shield to counterbalance external earth and groundwater pressures to minimize groundwater inflow during tunnel construction and work in concert with special layered shield brush-system with inflatable seals, to assure shield water-tightness during the tunnel excavation. Conventional Tunneling Methods Conventional tunneling methods require access to the open face of the tunnel are limited to ground which can remain stable during excavation. In very hard rock, drill and shoot methods are required. In medium to soft rock, a road header can be employed and in stiff clay and soil an excavator can be used. Conventional tunneling is a very flexible method and can adapt to varying ground conditions and changing geometry. Support type and excavation methods can be adapted to meet the ground conditions including the ability to vary the support types, size of opening, ring closure time and the excavation technique as well as other factors. Tunneling can be done full face or in several drifts and benches. Typically, the cyclic steps of excavation included loosening and removing material in short sets of 3 feet to 10 feet before placing support measures. The freshly exposed ground must remain stable long enough to allow workers time to put initial support measures such as dowels, mesh, shotcrete, and lattice girders in place. The face and sides of the tunnel are exposed during the time between excavation and placement of support. For this reason, conventional tunneling methods are limited to stiff soil or rock. Construction below the water table in fractured rock or							

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		highly permeable ground such as sand, requires ground modification measures such as grouting or ground freezing in advance of excavation. Such measures are usually employed for short stretches of tunnel or adits but generally are cost prohibitive for long tunnels where use of a TBM is much more economical. In conventional mined tunnel segments and cross passages, the Contractor shall use pre-excavating grouting techniques as the preliminary primary method of groundwater control to lower ground permeability and minimize or arrest ground water inflow into the excavated openings, prior to excavation of cross passages and other underground structures. Pre-excavation grouting will be adjusted as necessary to control ground water inflows. Pre-excavation grouting for conventionally mined tunnels will be carried out within the tunnel by face grouting or radial grouting. Ground improvement measures such as jet grouting and ground freezing, as applicable to specific ground conditions, are other methods which may be used to stabilize the excavation and seal off water during construction. As tunnel inflows may become mixed with construction materials such as concrete and grout that could otherwise affect water quality, tunnel inflows will be collected and pre-treated prior to any discharge into surface water or groundwater as necessary to maintain baseline water quality. **Monitoring and Remedial Action** Hydrogeologic information from pre-construction subsurface investigations will be used to model existing hydrogeologic features and evaluate potential effects of tunneling on the local groundwater regime. Based on assessment of existing conditions and anticipated effects of construction to groundwater regime, the Contractor will identify the specific methods (based on the methods described above) to minimize construction effects to the existing groundwater regime and suggest refined tunnel excavation methods and/or design to minimize or eliminate the risk and likelihood of impacts to groundwater. In order to check that these approaches are performing as anticipated, a groundwater instrumentation and monitoring program will be implemented. Prior to any disturbance of the groundwater regime by construction or pre-construction activities, baseline groundwater and surface water conditions will be established by systematic monitoring for a period of at least three years. Baseline monitoring shall include measurements of groundwater levels and groundwater quality as well as measurements of flow rates and hydroperiod of surface water features including creeks and ponds and precipitation. During tunnel construction and operation, monitoring of groundwater conditions shall consist of systematic observation, measurement, and reporting of changes in (1) water levels in monitoring wells and existing water supply wells; (2) conditions at local springs and surface water bodies; (3) groundwater and surface water chemistry; and 4) quantity and quality of groundwater inflows to the tunnel. Should unanticipated groundwater inflows be such that excavation by conventional tunneling methods is only possible with dewatering, design of dewatering measures shall specify horizontal and vertical limits on lowering of the groundwater table. Controlled dewatering, if necessary, could be accomplished by vertical or horizontal wells or vacuum drains and could be done from the ground surface or from within the tunnel. If							

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		monitoring and modeling indicate that water levels outside of the immediate vicinity of the tunnel could be affected, a simultaneous pumping and recharge system could be used to maintain existing water levels away from the immediate vicinity of the tunnel. Following initial construction of the tunnel, if groundwater inflow and/or annular flow around the completed tunnel indicates substantial ongoing groundwater depletion, then remedial action, primarily consisting of additional grouting into void spaces around the tunnel exterior and/or other appropriate actions shall be employed.							
Geology, Soils, Seismicity and Paleontological Resources									
GEO-IAMF#1	Geologic Hazards	Prior to construction, the Contractor shall prepare a Construction Management Plan (CMP) addressing how the Contractor will address geologic constraints and minimize or avoid impacts to geologic hazards during construction. The plan will be submitted to the Authority for review and approval. At a minimum, the plan will address the following geological and geotechnical constraints/resources: a. Groundwater Withdrawal. Controlling the amount of groundwater withdrawal from the project, by re-inject groundwater at specific locations if necessary, or use 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. 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 (CDSM), 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 (DB) Contractors for track bed preparation will conduct topographic surveys for preparation of final design. Because subsidence could have occurred since the original benchmarks (survey monuments) were established, the DB 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 rail bed 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 Storm Water Pollution Prevention Plan (SWPPP) (See HYD-IAMF#3), the Caltrans Construction Manuals, and	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
		the construction technical memorandum (see GEO-IAMF#6), 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 Operation and Maintenance, the Authority shall incorporate slope monitoring by a Registered Engineering Geologist into the Operation and Maintenance procedures. The procedures shall 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 shall prepare a Construction Management Plan (CMP) addressing how gas monitoring will be incorporated into construction best management practices. 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 & Health Administration (OSHA/Cal-OSHA) regulatory requirements for excavations, and by consulting with other agencies as appropriate, such as the Department of Conservation (Division of Oil and Gas)[9] and the California Environmental Protection Agency, Department of Toxic Substances Control, 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.	Design/ construction	Prepare plan/ design	Prior to construction	Authority/ Contractor	Contractor	Preparation of a CMP	Condition of construction contract
GEO-IAMF#4	Historic or Abandoned Mines	Prior to Construction, the Contractor shall prepare a CMP addressing how historic and abandoned mines will be incorporated into construction best management practices. The CMP will be submitted to the Authority	Design/ construction	Prepare plan/ design	Prior to construction	Authority/ Contractor	Contractor	Preparation of a CMP	Condition of construction contract

[9] Now known as California Geologic Energy Management Division (CalGEM)

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		for review and approval. Depending on the properties of an individual mine, mitigations to address historic or abandoned mines could include: a. CERCLA Cleanup. Environmental cleanups at sites that are releasing or threatening to release hazardous substances such as heavy metals from acid mine drainage. b. Non-CERCLA Cleanup. Cleanups of non-hazardous substance-related surface disturbance such as revegetation of disturbed areas, stabilization of mine tailings, reconstruction of stream channels and floodplains. c. Safety Mitigation. Mitigation of physical safety hazards such as closure of adits and shafts and removal of dangerous structures.							
GEO-IAMF#5	Hazardous Minerals	Prior to construction, the Contractor shall prepare a Construction Management Plan (CMP) addressing how the Contractor will minimize or avoid impacts related to hazardous minerals (i.e., radon, mercury, and naturally occurring asbestos (NOA)) during construction. The CMP will be submitted to the Authority for review and approval. The CMP shall include appropriate provisions 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 shall document how the project design incorporates installation of early warning systems, triggered by strong ground motion association with ground rupture. Known nearly active fault will be monitored. Linear monitoring systems such as time domain reflectometers or similar technology shall 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 shall 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 Operation and Maintenance activities, the Contractor shall 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

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
GEO-IAMF#9	Subsidence Monitoring	Prior to operation and maintenance, the Authority shall 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 train sets 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 speed 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
GEO-IAMF#10	Geology and Soils	Prior to construction, the Contractor shall document through issuance of a technical memorandum how the following guidelines and standards have been incorporated into facility design and construction: ▪ 2015 American Association of State Highway and Transportation Officials (AASHTO) Load and Resistance Factor Bridge Design Specifications and the 2015 *AASHTO Guide Specifications for Load and Resistance Factor Seismic Bridge Design*, 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. ▪ Federal Highway Administration (FHWA) Circulars and Reference Manuals: These documents provide detailed guidance on the characterization of geotechnical conditions at sites, methods for performing foundation design, and recommendations on foundation construction. 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. ▪ American Railway Engineering and Maintenance-of-Way Association (AREMA) 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 International Building Code (IBC). This code contains general building design and construction requirements relating to fire and life safety, structural safety, and access compliance. ▪ IBC and American Society of Civil Engineers (ASCE)-7: These codes and standards provide minimum design loads for buildings and other structures. They 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/ 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
		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, for design of mechanically stabilized earth (MSE) walls used for retained fills, and for design of various types of cantilever (e.g., soldier pile, secant pile, and tangent pile) and tie-back walls used for retained cuts. ▪ Caltrans Construction Manuals: Caltrans has a number of manuals including Field Guide to Construction Dewatering, Caltrans Construction Site BMPs Manual and Construction Site BMP Field Manual and Troubleshooting Guide. These provide guidance and best management practices for dewatering options and management, erosion control and soil stabilization, non-storm water management, and waste management at construction sites. ▪ American Society for Testing and Materials (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% design milestone for each construction package (CP) within the Project Section, the Contractor will retain a paleontological resources specialist (PRS) responsible for: ▪ Reviewing the final design for the CP, and ▪ Developing a detailed Paleontological Resources Monitoring and Mitigation Plan (PRMMP) for the CP. The PRS will be responsible for implementing the PRMMP, including delivery of WEAP Training, and evaluation and treatment of finds, if any, per the PRMMP and for each CP. A Supervising Paleontologist, who is also a PRS, will be retained and act as Lead Paleontologist for the CP if there are multiple PRS' retained for a single CP. Retention of PRS staff will occur in a timely manner, in advance of the 90% design milestone for each CP, such that the PRS is on board and can review the 90% design submittal without delay when it becomes available. If feasible, the same PRS will be responsible for all CPs within the project section. However, if efficiency dictates, separate qualified PRSs may be retained for the various Project Section CPs. Should a CP retain more than one PRS, a supervising paleontologist will be identified. All PRS staff will meet or exceed the qualifications for a Principal Paleontologist as defined in the California Department of Transportation's (Caltrans') current *Standard Environmental Reference*, Chapter 8 (Caltrans 2014). Appointment of PRS staff will be subject to review and approval by the Authority.	Design	Contractor will retain paleontological resources specialist	Prior 90% 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% design submittal to identify the portions of the CP that will involve work in paleontologically sensitive geologic units (either on the surface or in the subsurface), in consideration of the final Paleontological Resources Technical Report prepared for the project section. Evaluation will consider the location, areal extent, anticipated depth of disturbance, the construction techniques that are planned/proposed, and the geology of the CP and vicinity. The evaluation and resulting recommendations will be consistent with guidance in the Society of Vertebrate Paleontology	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
		(SVP) *Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources* (SVP Impact Mitigation Guidelines Revision Committee 2010), the SVP *Conditions of Receivership for Paleontologic Salvage Collections* (SVP Conformable Impact Mitigation Guidelines Committee 1996), and relevant guidance from Chapter 8 of the current *Caltrans Standard Environmental Reference* (Caltrans 2014). The purpose of the Final Design Review and Triggers Evaluation will be to develop specific language detailing the paleontological monitoring and other requirements 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") and will then be incorporated in full detail into the PRMMP for each CP. Portions of the CP requiring paleontological monitoring will also be clearly delineated in the project construction documents for each CP.							
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 combined such that they cover more than one CP, as long as the specific requirements of this IAMF 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 for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources* (SVP Impact Mitigation Guidelines Revision Committee 2010), the SVP *Conditions of Receivership for Paleontologic Salvage Collections* (SVP Conformable Impact Mitigation Guidelines Committee 1996), and relevant guidance from Chapter 8 of the current Caltrans *Standard Environmental Reference* (Caltrans 2014). As such, the PRMMP will provide for at least the following: ▪ Implementation by qualified personnel, as follows: – The PRS will be required to meet or exceed Principal Paleontologist Qualifications per Chapter 8 of the current Caltrans Standard Environmental Reference (Caltrans 2014). The Supervising Paleontologist may, but not necessarily, be the PRS who prepares the PRMMP. – Paleontological Monitors will be required to meet or exceed Paleontological Monitor qualifications per Chapter 8 of the current Caltrans Standard Environmental Reference (Caltrans 2014). ▪ Pre-construction survey by qualified personnel, with salvage or protection in place, as appropriate, in areas where the CP will result in surface disturbance of geologic units identified as highly sensitive for paleontological resources ("highly sensitive units"). ▪ Pre-construction and construction-period coordination procedures and communications protocols. ▪ Paleontological monitoring by qualified staff for all ground-disturbing activities known to involve, or potentially involve, highly sensitive units and for activities involving other geologic units in any areas where the	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
		PRS considers it warranted based on the results of the TR or field surveys. In all areas subject to monitoring, monitoring will initially be conducted full-time during all grading and excavation activities, but the PRMMP may provide for monitoring frequency in any given location to be reduced once 50% of the ground-disturbing activity in that location has been completed, if the reduction is appropriate based on the implementing PRS's professional judgment in consideration of actual site conditions. ▪ If the PRS considers it warranted, monitoring will also be stipulated for construction drilling operations. In general, small diameter (i.e., <18 inches) drilling activities or drilling activities using bucket augers tend to pulverize impacted sediments and contained fossils and not typically monitored. The portion of the PRMMP monitoring program for drilling operations will be developed in conjunction with the CP design and geotechnical teams, in consideration of the nature, depth, and location of drilling needed, and the anticipated equipment and staging configurations. ▪ Provisions for the content and delivery of paleontological resources WEAP training. ▪ In-progress documentation of monitoring (and, if applicable, salvage/recovery operations) via "construction dailies" or a similar 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 units as well as finds, if any, in units identified as less sensitive, or non-sensitive, for paleontological resources. ▪ Sampling and recovery procedures consistent with SVP Standard Procedures (SVP Impact Mitigation Guidelines Revision Committee 2010) and the SVP Conditions of Receivership (SVP Conformable Impact Mitigation Guidelines Committee 1996). Recovery procedures will provide for recovery of both macrofossils and microfossils. ▪ A repository agreement providing for appropriate curation of recovered materials, consistent with the SVP Conditions of Receivership (SVP Conformable Impact Mitigation Guidelines Committee 1996). If more than one repository institution is designated, separate repository agreements must be provided. ▪ Final report preparation procedures consistent with Caltrans Standard Environmental Reference Chapter 8 provisions for the Paleontological Monitoring Report and Paleontological Stewardship Summary (Caltrans 2014). ▪ Procedures for the preparation, identification, and analysis of fossil specimens and data recovered, consistent with the SVP Conditions of Receivership (SVP Conformable Impact Mitigation Guidelines Committee 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 Supervising Paleontologist. All management and supervisory personnel and construction workers involved with ground-disturbing activities will be required to take this training before beginning	Pre-construction	Training program/ reporting	Annual (training)/ monthly (reporting)	Contractor/ Authority	Contractor/ Authority	WEAP training	Condition of construction contract

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		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 ▪ The possibility of encountering fossils during construction ▪ The 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.							
GEO-IAMF#15	Halt Construction, Evaluate, and Treat if Paleontological Resources Are Found	If known or potential fossil materials are discovered during construction, regardless of the individual making a paleontological 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 qualified paleontological monitor, the person who made the discovery will immediately notify construction supervisory personnel, who will 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 parts of the site while evaluation (and, if 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 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 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 materials. The requirements of this IAMF will be detailed in the PRMMP and presented as part of the paleontological resources WEAP training.	Construction	Reporting	Daily logs during active monitoring	Authority/ Contractor	Contractor	Weekly reporting (if resource is identified during construction)	PRMMP, WEAP
Hazardous Materials and Wastes									

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
HMW-IAMF#1	Property Acquisition Phase 1 and Phase 2 Environmental Site Assessments	During the right-of-way acquisition phase, Phase 1 environmental site assessments (ESA) shall be conducted in accordance with standard ASTM methodologies to characterize each parcel. The determination of parcels that require a Phase 2 ESA (e.g., soil, groundwater, soil vapor subsurface investigations) will be informed by a Phase 1 ESA and may require coordination with state and local agency officials. If the Phase 2 ESA concludes that the site is impacted, 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 1 ESA	Condition of construction contract
HMW-IAMF#2	Landfill	Prior to Construction (any ground-disturbing activities), the Contractor shall 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	Authority	Monthly record keeping	Condition of construction contract
HMW-IAMF#3	Work Barriers	Prior to construction (any ground-disturbing activities), the Contractor shall 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 shall 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 and the Contractor will work closely with local agencies to resolve any such encounters and address necessary clean-up or disposal. Copies of all required hazardous material documentation shall be provided within 30 days to the Authority.	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 shall 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 shall be submitted to the Project Construction Manager (PCM) on behalf of the Authority for verification that appropriate demolition practices have been followed consistent with federal and state regulations regarding asbestos and lead paint abatement.	Pre-construction/ construction	Prepare plan/ reporting	As needed	Authority/ Contractor	Contractor	Prepare demolition plans/reporting as needed	Condition of construction contract
HMW-IAMF#6	Spill Prevention	Prior to construction (any ground-disturbing activities), the Contractor shall prepare a Construction Management Plan addressing spill prevention. A Spill Prevention, Control, and Countermeasure (SPCC) plan (or Soil Prevention and Response Plan if the total above-ground oil storage capacity is less than 1,320 gallons in storage containers greater than or equal to 55-gallons) shall prescribe BMPs to follow to prevent hazardous material releases and clean-up of any hazardous material releases that may occur. The plans will be prepared and submitted to the PCM on behalf of the Authority and shall 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	Pre-construction/	Regulation	Monthly	Authority/	Contractor	Weekly record	Condition of

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		federal regulations, such as the Resource Conservation and Recovery Act (RCRA), Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the Hazardous Materials Release Response Plans and Inventory Law, and the Hazardous Waste Control Act. 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.	construction	compliance/ reporting		Contractor		keeping/monthly reporting	construction contract
HMW-IAMF#8	Permit Conditions	During construction, the Contractor will comply with the State Water Resources Control Board Construction Clean Water Act 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 shall 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	Prepare a plan	Prior to construction	Authority/ Contractor	Contractor	Provide a hazardous materials and waste plan	Condition of construction contract
HMW-IAMF#9	Environmental Management System	To the extent feasible, 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. The Contractor shall 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 Operations and Maintenance activities, the Authority shall 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 a SPCC plan.	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 shall 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 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 access, and alternative access locations. The Contractor shall prepare and submit monthly reports to the Authority documenting construction transportation plan implementation activities for compliance monitoring.	Pre-construction/ construction	Prepare plan	Monthly	Authority/ Contractor	Contractor	Prepare Construction Safety Transportation Management Plan	Condition of construction contract
SS-IAMF#2	Safety and Security Management Plan	Sixty days after receiving from the Authority a construction notice-to-proceed, the Contractor shall 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 shall be responsible for implementing all construction-related safety and security plans and the Authority shall be responsible for implementing all safety and security plans related to HSR operation.	Pre-construction/ construction	Prepare plan	Sixty 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
		Workplace worker safety is generally governed by the Occupational Health and Safety Act of 1970, which established the OSHA. OSHA 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 a Safety and Security Management Plan 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. A Systems Safety Program Plan (SSPP) and a System Security Plan will be implemented prior to the start of revenue service to guide the safety and security of the operation of the high-speed rail system. Prior to Construction, the Contractor shall 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 Valley Fever Health and Safety (VFHS) designee shall coordinate with the county Public Health Officer and oversee and manage the implementation of Valley Fever control measures. The VFHS designee is responsible for ensuring the implementation of measures in coordination 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 shall include, but are not limited to the following: A) train workers 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							

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		high efficiency particulate air (HEPA) filters; and E) make NIOSH approved respiratory protection with particulate filters as recommended by the CDPH available to workers who request them. System safety program plans incorporate FRA requirements and are implemented upon FRA approval. FRA's SSPPs requirements will be determined in FRA's new System Safety Regulation (49 C.F.R. 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 2011) require implementing the principles of crime prevention through environmental design. The Contractor shall 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 is 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 HSR 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 the risk to an acceptable level. Hazard assessment includes a preliminary hazard analysis (PHA) and threat and vulnerability assessment (TVA). The Authority's programmatic PHAs are developed in conformance with the FRA's *Collison Hazard Analysis Guide: Commuter and Intercity Passenger Service* (FRA 2007) and the U.S. Department of Defense's System Safety Program Plan (MIL-STD-882) to identify and determine	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
		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 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 their 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.							
SS-IAMF#4	Oil and Gas Wells	Prior to ground-disturbing activities, the Contractor shall identify and inspect all active and abandoned oil and gas wells within 200 feet of the HSR tracks. Any active wells will be abandoned and relocated by the Contractor in accordance with the California Department of Conservation, Division of Oil, and Gas and Geothermal Resources (DOGGR) standards in coordination with the well owners. In the event that relocated wells do not attain the current production rates of the now-abandoned active wells, the Authority will be responsible for compensating the well owner for lost production. All abandoned wells within 200 feet of the HSR tracks will be inspected and re-abandoned, as necessary, in accordance with DOGGR standards and in coordination with the well owner. The Contractor will provide the Authority with documentation that the identification and inspection of the wells has occurred prior to construction.	Pre-construction	Regulatory compliance/ reporting	Monthly	Authority	Authority	Compliance with DOGGR standards/ monthly reporting	Condition of construction contract
Socioeconomics and Communities									
SOCIO-IAMF#1	Construction Management Plan	Prior to construction, the Contractor shall prepare a CMP providing measures that minimize impacts on low-income households and minority populations. The plan shall 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 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 Relocation Assistance and Real Property Acquisition Policies Act, as amended (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	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
		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 also 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 will 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 (Code of Civil Procedure Section 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: ▪ *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 Displaced Business, Farm, or Nonprofit Organization under the Uniform Relocation Assistance Program*							
SOCIO-IAMF#3	Relocation Mitigation Plan	Before any acquisitions occur, the Authority will develop a relocation mitigation 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 mitigation plan will be written in a style that also enables it to be used as a public-information document. The relocation mitigation 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	Design/construction	Prepare plan	Prior to acquisitions	Authority	Authority	Develop relocation mitigation plan	Condition of construction contract

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		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 non-profit 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 mitigation 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.							
Station Planning, Land Use, and Development									
LU-IAMF#1	HSR Station Area Development: General Principles and Guidelines	Prior to Operation and Maintenance, the Authority shall 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 HSR Station Area Development General Principles and Guidelines, February 3, 2011.	Post-construction	Reporting	For each station	Authority	Authority	Authority will prepare a technical memorandum for each station	Condition of construction contract
LU-IAMF#2	Station Area Planning and Local Agency Coordination	Prior to Operation and Maintenance, the Authority shall 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 HSR Station Area Development: General Principles and Guidelines, February 3, 2011.	Post-construction	Reporting	For each station	Authority	Authority	Authority will 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 shall prepare a restoration plan addressing specific actions, sequence of implementation, parties responsible for implementation and successful achievement of restoration for temporary impacts. Before beginning construction use of land, the Contractor shall submit the restoration plan to the Authority for review and obtain Authority approval. The restoration plan shall include time-stamped photo documentation of the pre-	Pre-construction	Prepare restoration plan	Prior to construction	Authority/ Contractor	Contractor	Contractor will prepare a restoration plan	Condition of construction contract

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		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 construction contract requirements.							
Agricultural Farmland									
AG-IAMF#1	Restoration of Important Farmland Used for Temporary Staging Areas	Prior to any ground-disturbing activities at the site of a temporary construction staging area located on Important Farmland, the Contractor shall prepare a restoration plan addressing specific actions, sequence of implementation, parties responsible for implementation and successful achievement of restoration for temporary impacts. Actions shall include removing and stockpiling the top 18 inches of soil for replacement on-site during restoration activities. Before beginning construction use of sites on Important Farmland, the Contractor shall submit the restoration plan to the Authority for review and obtain Authority (and if applicable, the landowner) approval. The restoration plan shall include time-stamped photo documentation of the pre-construction conditions of all temporary staging areas. All construction access, mobilization, material laydown, and staging areas on Important Farmlands will be returned to a condition equal to the pre-construction staging condition. This requirement is included in the construction contract requirements.	Pre-construction	Reporting	At incorporation or completion of design	Authority/ Contractor	Contractor	Prepare restoration plan	Condition of construction contract
AG-IAMF#2	Permit Assistance	Prior to disturbance causing activities affecting any segment of a confined animal facility, the Authority will assign a representative to act as a single point of contact to assist each confined animal facility owner during the process of obtaining new or amended permits or other regulatory compliance necessary to the continued operation or relocation of the facility. The Authority will consider and may provide compensation when acquisition of a confined animal site will require either relocation of the facility or amendment of its existing regulatory permits. The Authority will create a permit assistance center for landowners and operators whose operations will be out of compliance with permits because of the HSR. This permit center will focus on helping the permit holders modify or obtain any new permits that are required because of the HSR impacts.	Pre-construction	Reporting	Monthly	Authority	Authority	At incorporation or completion of design/monthly reporting during construction	Condition of construction contract
AG-IAMF#3	Farmland Consolidation Program	The Authority will establish and administer a farmland consolidation program to sell remnant parcels to neighboring landowners for consolidation with adjacent farmland properties. In addition, the program will assist the owners of remnant parcels in selling those remnants to adjacent landowners, upon request. The goal of the program is to provide for continued agricultural use on the maximum feasible amount of remnant parcels that otherwise may not be economic to farm. The program will focus on severed remainder parcels, including those that were under Williamson Act or Farmland Security Act contract at the time of right-of-way acquisition and have become too small to remain in the local Williamson Act or Farmland Security Act program. The program will assist landowners in obtaining lot line adjustments where appropriate to incorporate remnant parcels into a larger parcel that is consistent with size requirements under the local government regulations. The program will operate for a minimum of 5 years after construction of the section is completed. The Authority shall document implementation of this measure through issuance of a compliance memorandum- after the minimum operation period of 5 years has elapsed. The document shall	Operation	Establish program	Program will operate for a minimum of 5 years after construction of the project section is completed	Authority	Authority	Establish farmland consolidation program	Condition of construction contract

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		be filed with the EMMA system.							
AG-IAMF#4	Notification to Agricultural Property Owners	Prior to the start of any construction activity adjacent to farmland, the Authority shall provide written notification to agricultural property owners or leaseholders immediately adjacent to the disturbance limits for the HSR project section. The notification is to indicate the intent to begin construction, including an estimated date for the start of construction. In order to provide agricultural property owners or leaseholders sufficient lead time to make any changes to their operations due to project section construction, this notification shall be provided at least 3 months, but no more than 12 months, prior to the start of construction activity.	Pre-construction	Public notification	Monthly	Authority	Authority	Notification to adjacent property owners and leaseholders at least 3 months, but no more than 12 months, prior to the start of construction activity	Condition of construction contract
AG-IAMF#5	Temporary Livestock and Equipment Crossings	Prior to the start of any construction activity adjacent to any farmland, the Authority shall coordinate with agricultural property owners or leaseholders to provide temporary livestock and equipment crossings to minimize impacts to livestock movement, as well as routine operations and normal business activities, during project construction.	Pre-construction	Public coordination/ project design	Monthly	Authority	Authority	Coordination with agricultural property owners and leaseholders, design of livestock and equipment crossings	Condition of construction contract
AG-IAMF#6	Equipment Crossings	During final design, and in coordination with the property owners of land in use for agricultural operations, the Authority shall finalize the realignments of any affected access roads to provide equipment crossings to minimize impediments to routine agricultural operations and normal business activities that may result from long-term project operation.	Final design	Public coordination	Monthly	Authority	Authority	Coordination with agricultural property owners and leaseholders, design of agricultural access road realignments	Condition of construction contract
Parks, Recreation, and Open Space									
PK-IAMF#1	Parks, Recreation, and Open Space	Prior to construction, the Contractor shall prepare and submit to the Authority a technical memorandum that identifies project design features to be implemented to minimize impacts on parks, recreation and open space. Typical design measures to avoid or minimize impacts to 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 which allows 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 park, recreation, and open space	Condition of construction contract
Aesthetics and Visual Quality									
AVQ-IAMF#1	Aesthetic Options	Prior to construction, the Contractor shall document, through issue of a technical memorandum, how the Authority's aesthetic guidelines have been employed to minimize visual impacts. The Authority seeks to balance providing a consistent, project-wide aesthetic with the local context for the numerous high-speed rail non-station structures across the state. Examples of aesthetic options will be provided to local jurisdictions that can be applied to non-standard structures in the high-speed rail system. Refer to Aesthetic Options for Non-Station Structures, 2017	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 construction, the Contractor will document that the Authority's aesthetic review process has been followed to guide the development of non-station area structures. Documentation will be accomplished through	Pre-construction	Reporting	At incorporation or completion of design/monthly	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
		issuance of a technical memorandum to the Authority. The Authority will identify key non-station structures recommended for aesthetic treatment; consult with local jurisdictions on how best to involve the community in the process; solicit input from local jurisdictions on their aesthetic preferences; evaluate aesthetic preferences for potential cost, schedule, and operational impacts and compatibility with project-wide aesthetic goals, include recommended aesthetic approaches in the construction procurement documents; and work with the Contractor and local jurisdictions to review and incorporate designs and local aesthetic preferences into final design and construction. Refer to Aesthetic Options for Non-Station Structures, 2017.			reporting during construction				
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 or geoarchaeologist shall prepare a geospatial data layer identifying the locations of all known archaeological resources and built historic resources that require avoidance or protection, and areas of archaeological sensitivity that require monitoring within the area of potential effect (APE). The Contractor's archaeologist, who meets the Secretary of the Interior's Professional Qualifications Standards provided in 36 Code of Federal Regulations (CFR) Part 61, is to use, as appropriate, a combination of the following: known locations of archaeological sites and built historic properties, tribal consultation, landforms, depositional processes, distance to water, mapping provided in the Archaeological Treatment Plan, or historic mapping. This mapping is to be updated as the design progresses if it results in an expansion of the area of ground disturbance/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 built historic resources within the APE, for which avoidance 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 who meets the Secretary of the Interior's Professional Qualification Standards provided in 36 CFR 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 built historic 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 shall be provided by the Contractor for non-English speaking participants. The training sessions shall be given prior to the initiation of any ground disturbance	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
		activities and repeated on an annual basis. Additionally, new construction crewmembers shall 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 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 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 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 shall 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 Secretary of the Interior professional qualification standards survey and complete reporting in appropriate document for archaeology and / or built resources, in accordance with documentation requirements stipulated in the Programmatic Agreement. Identified resources shall be evaluated for the National Register of Historic Places (NRHP) and the California Register of Historical Resources (CRHR). The qualified archaeologist or architectural historian, as appropriate, will assess the potential to affect to historic properties (NRHP) by applying the effects criteria in 36 CFR Part 800.5(a)(1), and the potential of significant impacts to historical resources (CRHR) by applying the criteria in California Environmental Quality Act (CEQA) Guidelines 15064.5(b). Should the Authority and FRA determine, in consultation with the State Historic Preservation Office (SHPO), that any newly identified historic properties or historical resources will be adversely affected, the Built Environment Treatment Plan or Archeological Treatment Plan, as appropriate, will be amended, to document 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, etc. Prior to beginning surveys, updated records searches may be required by the FRA and Authority, depending on the length of the passage of time, to validate that accurate information was obtained regarding previous inventory and evaluation efforts. The Contractor's archaeologist, in consultation with the Authority, will determine if an updated records search is required. If an updated records search is necessary, the search shall be performed by the Contractor's archaeologist.	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	Construction	Relocation of access areas and laydown sites	As needed	Authority/ Contractor	Contractor	Relocation access areas and laydown sites as needed to	Condition of construction contract

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		have the potential to affect historic built resources in the vicinity. The Contractor will delineate all avoidance and protection measures for identified archaeological and built resources on construction drawings.						avoid archeological or historic built resources	
CUL-IAMF#5	Archaeological Monitoring Plan and Implementation	Prior to construction, the Contractor's professionally qualified archaeologist, as defined in the Programmatic Agreement, will prepare a monitoring plan based on the results of geospatial data layer and archaeological sensitivity map. The plan is to be reviewed and approved by the Authority prior to any ground-disturbing activities. 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 areas identified as archaeologically sensitive in the Archaeological Treatment Plan. The Contractor shall obtain Authority approval of all persons providing archaeological or tribal monitoring.	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
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 property), the Contractor may be required to assess the condition of construction-adjacent historic properties, and prepare a Plan for the Protection of Historic Built Resources and Repair of Inadvertent Damage. The MOA and Built Environment Treatment Plan (BETP) will stipulate for which properties 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 Programmatic Agreement. As the design progresses, additional properties may be identified by the Authority as requiring this plan. The plan shall record existing conditions in order to (1) establish a baseline against which to compare the property's post-project condition, (2) to identify structural deficiencies that make the property vulnerable to project construction related damage, such as vibration, and (3) to 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 shall 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 building. The plan shall 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 property. The plan shall direct that inadvertent damage to historic properties shall be repaired in accordance with the Secretary of the Interior's (SOI) *Standards for the Treatment of Historic Properties* (U.S. Department of the Interior 1995). The plan shall be developed in coordination with the Authority and FRA, and shall be submitted to the SHPO for review and approval. Protective plans will be required for buildings that will be	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

IAMF	Title	IAMF Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism
		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.							
CUL-IAMF#7	Built Environment Monitoring Plan	Prior to construction (any ground-disturbing activities within 1,000 feet of a historic property or resource), the Contractor shall prepare a Built Environment Monitoring Plan (BEMP). Draft and final BEMP's 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 the monitoring of which will be included in this monitoring plan. 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 shall develop both the draft and final plans in coordination with the Authority and FRA, and shall be submitted 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	Implement the plan described in the Plan for Protection of Historic Resources and Repair of Inadvertent Damage and in the Built Environment Treatment Plan. Such protection measures will include, but will not be limited to, vibration monitoring of construction in the vicinity of historic properties; cordoning off of resources from construction activities (e.g., traffic, equipment storage, personnel); shielding of resources from dust or debris; and stabilization of buildings adjacent to construction. Temporary stabilization and protection measures will be removed after construction is complete, and the historic properties 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.	Pre-construction	Implement protection and/or stabilization measures	Per BETP	Authority/ Contractor	Contractor	Implement historic built resource protection measures per BETP	BETP

AASHTO	American Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
APE	area of potential effect
AREMA	American Railway Engineering and Maintenance-of-Way Association
ASCE	American Society of Civil Engineers
ASTM	American Society for Testing and Materials
Authority	California High-Speed Rail Authority
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
Cal-OSHA	California Occupational Safety and Health Administration
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
CFR	Code of Federal Regulations
CHSR	California high-speed rail
CHSTS	California Safety Test Solutions
CMP	construction management plan
CP	construction package
CRHR	California Register of Historical Resources
CTP	construction transportation plan
CWA	Clean Water Act
DB	design-build
DCM	Design Criteria Manual
DOGGR	California Department of Conservation, Division of Oil, and Gas and Geothermal Resources
EMC	electromagnetic compatibility
EMF	electromagnetic field
EMI	electromagnetic interference
EMMA	Environmental Mitigation Management and Assessment
EPB	Earth Pressure Balance
ESA	Endangered Species Act
ESA	environmental site assessment
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
ISEP	Implementation Stage Electromagnetic Compatibility Program Plan
MBTA	Migratory Bird Treaty Act
MOA	Memorandum of Agreement
mph	miles per hour
MSE	mechanically stabilized earth
NCCAB	North Central Coast Air Basin
NIOSH	National Institute for Occupational Safety and Health
NMFS	National Marine Fisheries Service
NOA	naturally occurring asbestos
NRHP	National Register of Historic Places
O&M	operations and maintenance
OSHA	Occupational Safety and Health Administration
PA	Programmatic Agreement
PCM	Project Construction Manager
PHA	preliminary hazard analysis
Porter-Cologne	Porter-Cologne Water Quality Control Act
PRMMP	paleontological resources monitoring and mitigation plan
PRS	paleontological resources specialist
PSI	pounds per square inch
RCRA	Resource Conservation and Recovery Act
RPP	restoration and revegetation plan
RWQCB	Regional Water Quality Control Board
SEM	sequential excavation method
SHPO	State Historic Preservation Office
SOI	Secretary of the Interior
SPCC	Spill Prevention, Control, and Countermeasure
SSPP	Systems Safety Program Plan
SVP	Society of Vertebrate Paleontology
SWPPP	stormwater pollution prevention plan
SWRCB	State Water Resources Control Board
TBM	tunnel boring machine
TR	triggers review
TVA	threat and vulnerability assessment
Uniform Act	Uniform Relocation Assistance and Real Property Acquisition Policies Act, as amended
US	United States
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
WCP	Weed Control Plan
WEAP	Worker Environmental Awareness Program

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4 REFERENCES

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