

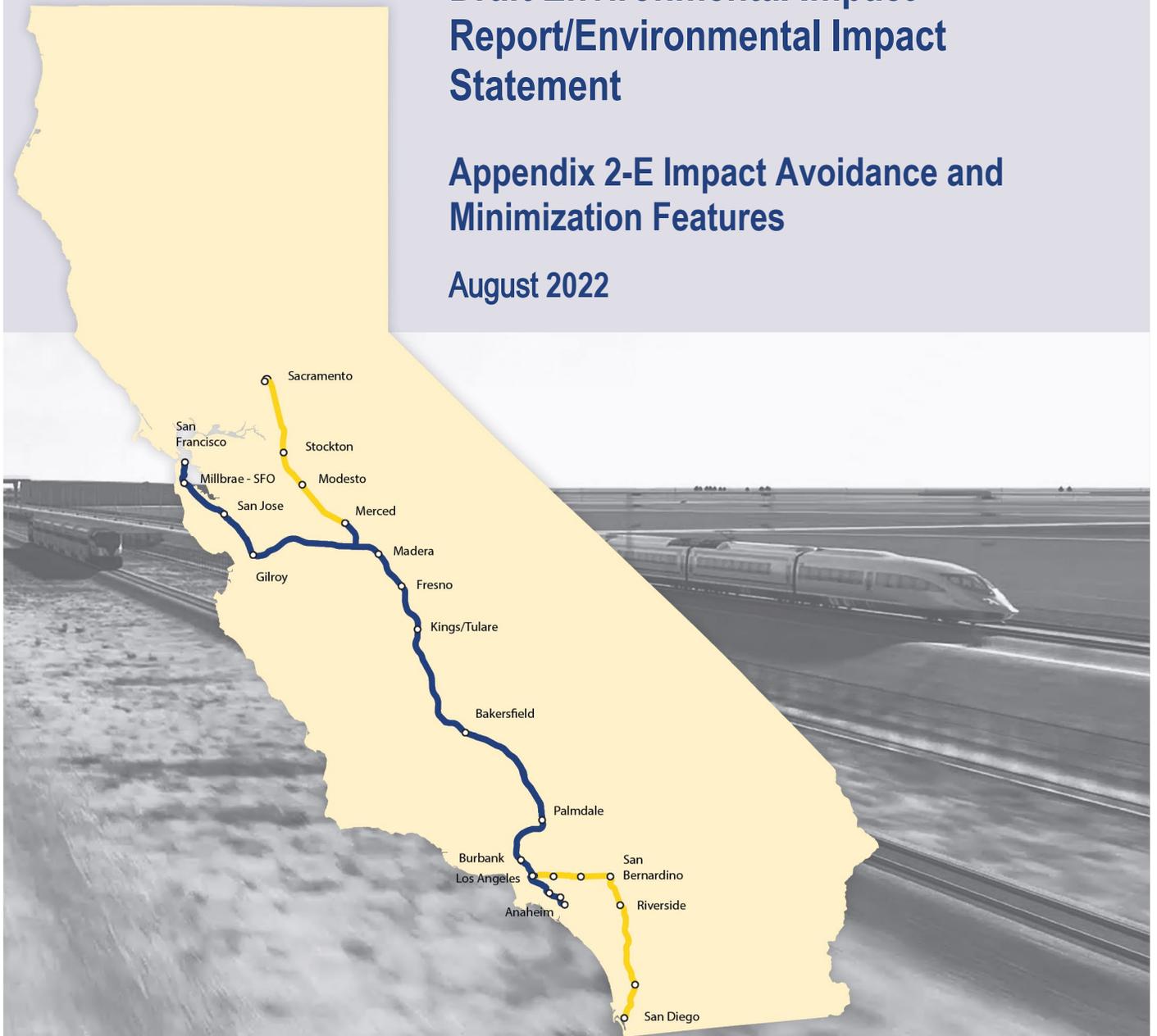
California High-Speed Rail Authority

# *Palmdale to Burbank* *Project Section*

Draft Environmental Impact  
Report/Environmental Impact  
Statement

Appendix 2-E Impact Avoidance and  
Minimization Features

August 2022



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

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## ACRONYMS AND ABBREVIATIONS

AASHTO	American Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
APE	Area of Potential Effect
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
CDFW	California Department of Fish and Wildlife
CFR	Code of Federal Regulations
CMP	Construction Management Plan
CRHR	California Register of Historical Resources
CTP	Construction Transportation Plan
CWA	Clean Water Act
DB	Design-build
DCM	Design Criteria Material
DOGGR	California Department of Conservation, Division of Oil, Gas and Geothermal Resources
EIR	Environmental impact report
EIS	Environmental impact statement
EMC	Electromagnetic compatibility
EMF	Electromagnetic field
EMI	Electromagnetic interference
EMMA	Environmental Mitigation Management and Assessment system
ESA	Environmentally sensitive areas or Endangered Species Act
FRA	Federal Railroad Administration
HMF	Heavy maintenance facility
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
NRHP	National Register of Historic Places
OSHA	Occupational Safety and Health Administration
PA	Programmatic Agreement
PCM	Project Construction Manager
PHA	Preliminary hazard analysis
PRM	Paleontological resources monitor
PRMMP	Paleontological Resource Monitoring and Mitigation Plan
PRS	Paleontological resource specialist
RWQCB	Regional water quality control board
SHPO	State Historic Preservation Office
SPCC	Spill Prevention, Control, and Countermeasure
SSPP	System Safety Program Plan
SVP	Society of Vertebrate Paleontology
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resource Control Board
TVA	Threat and vulnerability assessment
Uniform Act	Uniform Relocation Assistance and Real Property Acquisition Policies Act, as amended
USFWS	United States Fish and Wildlife Service
VOC	Volatile organic compound
WEAP	Worker Environmental Awareness Program

## APPENDIX 2-E: IMPACT AVOIDANCE AND MINIMIZATION FEATURES

### DEFINITIONS

#### Impact Avoidance and Minimization Features

The California High-Speed Rail Authority (Authority) and the Federal Railroad Administration (FRA) have pledged to integrate programmatic impact avoidance and minimization features (IAMF) consistent with the (1) *2005 Statewide Program Environmental Impact Report/ Environmental Impact Statement (EIR/EIS)*, (2) *2008 Bay Area to Central Valley Program EIR/EIS*, and (3) 2012 Partially Revised Final Program EIR into the high-speed rail (HSR) project. The Authority will implement these features during project design and construction, as relevant to the Palmdale to Burbank Project Section (Project section, or project) to avoid or minimize impacts.

IAMFs are incorporated into the project design and construction to avoid or minimize the environmental or community impacts. The description of each measure details the means and effectiveness of the measure in avoiding or minimizing impacts, as well as the environmental benefits of implementing the measure. For example, an IAMF can require development and application of measures to reduce impacts on air quality and hydrology based on applicable design standards that will also reduce impacts to biological resources.

The Draft Environmental Impact Report/Environmental Impact Statement describes how the IAMFs are applicable to project construction and operations and, where appropriate, how they are effective at avoiding or minimizing potential impacts. The IAMFs are included in the Mitigation Monitoring and Enforcement Plan to enhance implementation tracking, identify the responsible party, and clarify implementation timing.

### DESCRIPTIONS OF IMPACT AVOIDANCE AND MINIMIZATION FEATURES

#### Agricultural Farmland and Forest Land

##### 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 design-build construction contract requirements.

##### 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.

### **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 be filed with Environmental Mitigation Management and Assessment system (EMMA).

### **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.

### **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.

### **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.

## **Air Quality**

### **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 of the top 1 inch of soil but avoiding overland flow. Rain events may result in adequate wetting of top 1 inch of soil thereby alleviating the need to manually apply water.
- Limit vehicle travel speed on unpaved roads to 15 miles per hour (mph).
- Suspend any dust-generating activities when average wind speed exceeds 25 mph.
- Stabilize all disturbed areas, including storage piles that are not being used on a daily basis for construction purposes, by using water, a chemical stabilizer/suppressant, hydro mulch or by covering with a tarp or other suitable cover or vegetative ground cover, to control fugitive dust emissions effectively. In areas adjacent to organic farms, the Authority will use non-chemical means of dust suppression.
- Stabilize all on-site unpaved roads and off-site unpaved access roads, using water or a chemical stabilizer/suppressant, to effectively control fugitive dust emissions. In areas adjacent to organic farms, the Authority will use non-chemical means of dust suppression.
- Carry out watering or presoaking for all land clearing, grubbing, scraping, excavation, land leveling, grading, cut and fill, and demolition activities.
- For buildings up to 6 stories in height, wet all exterior surfaces of buildings during demolition.
- Limit or expeditiously remove the accumulation of mud or dirt from adjacent public streets at a minimum of once daily, using a vacuum-type sweeper.
- After the addition of materials to or the removal of materials from surface or outdoor storage piles, apply sufficient water or a chemical stabilizer/suppressant.

#### **AQ-IAMF#2: Selection of Coatings**

During construction, the Contractor shall use:

- Low-volatile organic compound (VOC) paint that contains less than 10 percent of VOC contents (VOC, 10%).
- Super-compliant or Clean Air paint that has a lower VOC content than that required by South Coast Air Quality Management District Rule 1113 and San Joaquin Valley Unified Air Pollution Control District Rule 4601 when available. If not available, the Contractor shall document lack of availability, recommend alternative measure(s) to comply with Rule 1113 and 4601 (note: update to name relevant air district and rules as appropriate) or disclose absence of measure(s) for full compliance and obtain concurrence from the Authority.

#### **AQ-IAMF#3: Renewable Diesel**

During construction, the Contractor will use renewable diesel fuel to minimize and control exhaust emissions from all heavy-duty diesel-fueled construction diesel equipment and on-road diesel trucks. Renewable diesel must meet the most recent American Society for Testing and Materials (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 EMMA system, of renewable diesel purchase records and equipment and vehicle fuel consumption. Exemptions to use traditional diesel can be made where renewable diesel is not available from suppliers within 200 miles of the project site. The construction contract must identify the quantity of traditional diesel purchased and fully document the availability and price of renewable diesel to meet project demand.

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

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

1. All heavy-duty off-road construction diesel equipment used during the construction phase will meet Tier 4 engine requirements.
2. Small diesel generators (less than 30 horsepower) should be avoided whenever feasible.
3. 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.
4. 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.
5. The contractor will provide the Authority with monthly reports of equipment operating hours (through the EMMA system) and annual reports documenting compliance.

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

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

1. All on-road trucks used to haul construction materials, including fill, ballast, rail ties, and steel, will consist of an average fleet mix of equipment model year 2010 (update model year as appropriate) or newer, but no less than the average fleet mix for the current calendar year as set forth in the CARB's EMFAC 2014 (update model year as appropriate) database.
2. The contractor will provide documentation to the Authority of efforts to secure such a fleet mix.
3. 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.

### **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.

## **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.

### **AVQ-IAMF#2: Aesthetic Review Process**

Prior to construction, the Contractor shall document that the Authority's aesthetic review process has been followed to guide the development of non-station area structures. Documentation shall be through 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, and evaluate aesthetic preferences for potential cost, schedule and operational impacts. The Authority will also evaluate 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 designs and local aesthetic preferences and incorporate them into final design and construction. Refer to Aesthetic Options for Non-Station Structures, 2017.

## **Biological Resources**

### **BIO-IAMF#1: Designate Project Biologist, Designated Biologists, Species-Specific Biological Monitors and General Biological Monitors**

At least 15 business days prior to commencement of any ground disturbing activity, including but not limited to geotechnical investigations, utility realignments, creation of staging areas, or initial clearing and grubbing, the Authority will submit the name(s) and qualifications of Project Biologists, Designated Biologists, Species-Specific Biological Monitors, and General Biological Monitors retained to conduct biological resource monitoring activities and implement avoidance and minimization measures. No ground disturbing activity will begin until the Authority has received written approval from 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 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, 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.

### **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 Worker Environmental Awareness Program (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 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.

### **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, will be included as appendices to the BRMP. The BRMP is intended to serve as a comprehensive document that sets out the range of avoidance and minimization measures to support the appropriate and timely implementation of those measures. The implementation of these measures will be tracked through final design, construction, and operation phases. The BRMP will contain, but not be limited to, the following information:

- A master schedule that shows construction of the project, pre-construction surveys, and establishment of buffers and exclusions zones to protect sensitive biological resources.
- Specific measures for the protection of special-status species.
- Identification (on construction plans) of the locations and quantity of habitats to be avoided or removed, along with the locations where habitats are to be restored.
- Identification of agency-approved Project Biologist(s) and Biological Monitor(s), including 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.

### **BIO-IAMF#7: Prevent Entrapment in Construction Materials and Excavations**

At the end of each workday 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 workday.

The Authority will screen, cover, or elevate at least 1 foot above ground, all construction pipe, culverts, or similar structures with a diameter of 3 inches or greater that are stored overnight within the project footprint. These pipes, culverts, and similar structures will be inspected by the Project Biologist for wildlife before such material is moved, buried, or capped.

### **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.

### **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.

### **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 (BMPs) 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).

### **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 31<sup>st</sup> of each year. The Authority will provide, on an annual basis, training updates to all construction personnel.

### **BIO-IAMF#12: Design the Project to be Bird Safe**

Prior to final construction design, the Authority will ensure that the catenary system, masts, and other structures such as fencing, electric lines, communication towers and facilities are designed to be bird and raptor-safe in accordance with the applicable recommendations presented in Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006 (APLIC 2006) and Reducing Avian Collisions with Power Lines: State of the Art in 2012 (APLIC 2012). Applicable APLIC recommendations include, but are not limited to:

- Ensuring sufficient spacing of phase conductors to prevent bird electrocution.
- Configuring lines to reduce vertical spread of lines and/or decreasing the span length if such options are feasible.
- Marking lines and fences (e.g., Bird Flight Diverter for fencing and lines) to increase the visibility of lines and reduce the potential for collision. Where fencing is necessary, using bird compatible design standards to increase visibility of fences to prevent collision and entanglement.
- Installing perch guards to discourage avian presence on and near project facilities.
- Minimizing the use of guywires. Where the use of guywires is unavoidable, demarcating guywires using the best available methods to minimize avian strikes (e.g., line markers).
- Reusing or co-locating new transmission facilities and other ancillary facilities with existing facilities and disturbed areas to minimize habitat impacts and avoid collision risks.
- Structures will be monopole or dual-pole design versus lattice tower design to minimize perching and nesting opportunities. Communication towers will conform to Recommended Best Practices for Communication Tower Design, Siting, Construction, 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.

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

- Avoid, to the extent feasible, siting transmission lines across canyons or on ridgelines to prevent bird and raptor collisions.
- Install bird flight diverters on all facilities spanning or within 1,000 feet of stream and wash channels, canals, ponds, and any other natural or artificial body of water.
- Fencing or other type of flight diverter will be installed on all viaduct structures to encourage birds and raptors to fly over the HSR and avoid flying directly in the path of on-coming trains.
- Ensure poles do not have openings that could entrap birds. Measures may include sealing or capping all openings in poles or providing for escape routes (e.g., openings accommodating escape for various species).
- Design aerial structures (e.g., viaducts and bridges) and tunnel portals to discourage birds and bats from roosting in expansion joints or other crevices.

## 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.

### **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 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 (PA). 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 CRHR by applying the criteria in California Environmental Quality Act 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 would 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 Memorandum of Agreement (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.

#### **CUL-IAMF#4: Relocation of Project Features when Possible**

Changing the rail alignment to avoid newly discovered sites is likely infeasible; however, access areas and laydown sites may be relocated should their proposed location be found to be on archaeological sites or have the potential to affect historic built resources in the vicinity. The contractor will delineate all avoidance and protection measures for identified archaeological and built resources on construction drawings.

#### **CUL-IAMF#5: Archaeological Monitoring Plan and Implementation**

Prior to construction the Contractor's professionally qualified archaeologist, as defined in the PA, 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.

#### **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 PA. 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 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 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.

### **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.

## **EMI/EMF Standards**

### **EMI/EMF-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 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.

### **EMI/EMF-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 electromagnetic compatibility (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 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.

## **Geologic 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 and Slope Instability.** Employing various methods to mitigate for the risk of ground failure from unstable soils or slope instability. If soft or loose soils are encountered at shallow depths, they can be excavated and replaced with competent soils. To limit the excavation depth, replacement materials can also be strengthened using geosynthetics. Where unsuitable soils are deeper, ground improvement methods, such as stone columns, cement deep-soil-mixing, or jet-grouting, can be used. Alternatively, if sufficient construction time is available, preloading—in combination with prefabricated vertical drains (wicks) and staged construction—can be used to gradually improve the strength of the soil without causing bearing-capacity failures. Unstable slopes or landslide areas should be mitigated through appropriate methods for slope stabilization and landslide remediation. Methods for stabilizing landslides include applications of dewatering, earthwork (mass grading including

buttress construction or complete landslide removal), and structural solutions such as retaining walls, tie back systems, or pile installation.

- 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 California Department of Transportation (Caltrans) Construction Manuals, and 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.

### **GEO-IAMF#3: Gas Monitoring**

Prior to Construction, the Contractor shall prepare a 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) 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.

#### **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 for review and approval. Depending on the properties of an individual mine, mitigations to address historic or abandoned mines could include:

- CERCLA Cleanup. Environmental cleanups at sites that are releasing or threatening to release hazardous substances such as heavy metals from acid mine drainage.
- 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.
- 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 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.

#### **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 nearby 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.

#### **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.

#### **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.

### **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.

### **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 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 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, 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 walls used for retained fills, and for design of various types of cantilevers (e.g., soldier pile, secant pile, and tangent pile) and tie-back walls used for retained cuts.
- American Society for Testing and Materials: 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<sup>1</sup> (CP) within the Project Section, the Contractor will retain a Paleontological Resources Specialist (PRS) responsible for

- reviewing the final design for the CP,
- developing a detailed Paleontological Resources Monitoring and Mitigation Plan (PRMMP) for the CP, and
- the PRS will be responsible for implementing the PRMMP, including development and delivery of WEAP Training, supervision of Paleontological Resource Monitors (PRMs), evaluation and treatment of finds, if any, and preparation of a final paleontological mitigation report, per the PRMMP and for each CP.

Retention of PRS staff will occur in a timely manner, in advance of the 90% 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 a given Project Section.

All PRS staff will meet or exceed the qualifications for a Principal Paleontologist as defined in the California Department of Transportation's current *Standard Environmental Reference*, Chapter 8 (Caltrans 2014). Appointment of PRS staff will be subject to review and approval by the Authority.

### **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 at the surface or in the subsurface), based on findings of the final Paleontological Resources Technical Report (TR) prepared for the Project Section. Evaluation will consider the location, areal extent, and anticipated depth of ground disturbance, the construction techniques that are planned/proposed, and the geology (i.e., location of geologic units with high paleontological resources) of the CP and vicinity. The evaluation and resulting recommendations will be consistent with guidance in the Society of Vertebrate Paleontology (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 location and duration of paleontological monitoring and other requirements for paleontological resources applicable to each CP within the Project Section. Paleontological protection requirements identified through the Final Design Review and Triggers Evaluation will be recorded in a concise technical memorandum ("Final Design Review Requirements for Paleontological Resources Protection") which will then be incorporated in full detail into the PRMMP for each CP. Those portions of the CP requiring paleontological monitoring will also be clearly delineated in the project construction documents for each CP.

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<sup>1</sup> Because of their length and complexity, most HSR Project Sections are expected to be designed and constructed in segments, with separate construction documents (plans and specifications) developed for each segment. *Construction package* refers to a portion (segment) of a Project Section for which a discrete, stand-alone construction document set will be developed.

### **GEO-IAMF#13: Prepare and Implement Paleontological Resources Monitoring and Mitigation Plan (PRMMP)**

Following the Final Design Review and Triggers Evaluation for each CP, the PRS will develop a CP-specific PRMMP. For greater efficiency, PRMMPs may be written such that they cover more than one CP, as long as the specific requirements of the IAMF's 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 of the PRMMP by qualified personnel, including the following positions:
  - Paleontological Resource Specialist - 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 Resources Monitors - The PRS will be required to meet or exceed Paleontological Monitor qualifications per Chapter 8 of the current *Caltrans Standard Environmental Reference* (Caltrans 2014).
- Development of pre-construction and construction-period coordination procedures and communications protocols.
- Evaluation as to whether a pre-construction survey by qualified personnel is warranted for the CP. In general, pre-construction surveys are beneficial if there is a strong possibility that significant paleontological resources (e.g., concentrations of vertebrate fossils) are exposed at the ground surface and will be destroyed during the initial clearing and grubbing phase of earthwork. Such a determination can usually be made during preparation of the paleontological resources TR.
- Requirements for paleontological monitoring by qualified PRMs of all ground-disturbance activities known to affect, or potentially affect, highly sensitive geologic units and for ground-disturbance activities affecting other geologic units in any areas where the PRS considers it warranted based on the findings of the paleontological resources TR or any pre-construction surveys. In all areas of the CP subject to monitoring, monitoring will initially be conducted full-time for all ground-disturbance activities. However, the PRMMP may provide for monitoring frequency in any given location to be reduced once approximately 50% of the ground-disturbance activity in completed locations, if the reduction is appropriate based on the implementing PRS's professional judgment in consideration of actual site conditions.
- Provisions, if recommended by the PRS for paleontological monitoring of specific construction drilling operations. In general, small diameter (i.e., <18 inches) drilling operations or drilling operations using bucket augers tend to pulverize impacted sediments and any contained fossils and are typically not monitored. The section in the PRMMP addressing monitoring for drilling operations will rely, in part, on the information supplied by the CP design and geotechnical teams but will also take into consideration of the nature, depth, and location of drilling needed, and the anticipated equipment and staging configurations.
- Provisions for the content development and delivery of paleontological resources WEAP training.
- Provisions for in-progress documentation of monitoring (and, if applicable, salvage/recovery operations) via "construction dailies" or a similar approved means.

- Provisions for a “stop work, evaluate, and treat appropriately” response in the event of a known or potential paleontological discovery, including finds in highly sensitive geologic units as well as finds, if any, in geologic units identified as less sensitive, or non-sensitive, for paleontological resources.
- Provisions for sampling and recovery of unearthed fossils consistent with SVP *Standard Procedures* (SVP 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.
- Provisions for acquiring a repository agreement from an approved regional repository for the curation, care, and storage of recovered materials, consistent with the SVP *Conditions of Receivership* (SVP Conformable Impact Mitigation Guidelines Committee 1996). If more than one repository institution is designated, separate repository agreements must be provided.
- Provisions for preparation of a final monitoring and mitigation report that meets the requirements of the Caltrans *Standard Environmental Reference* Chapter 8 provisions for the Paleontological Monitoring Report and Paleontological Stewardship Summary (Caltrans 2014).
- Provisions for the preparation, identification, and analysis and curation 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 PRS. All management and supervisory personnel and construction workers involved with ground-disturbing activities will be required to take this training before beginning work on the project. Refresher training will also be made available to management and supervisory personnel and workers as needed, based on the judgment of the PRS.

At a minimum, paleontological resources WEAP training will include information on:

- the coordination between construction staff and paleontological staff.
- the 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, and
- the 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**

Consistent with the PRMMP if fossil materials are discovered during construction, regardless of the individual making the discovery, all activity in the immediate vicinity of the discovery will halt and the find will be protected from further disturbance. If the discovery is made by someone other than the PRS or PRM(s), the person who made the discovery will immediately notify construction supervisory personnel, who will in turn notify the PRS. Notification to the PRS will take place promptly (prior to the close of work the same day as the find), and the PRS will evaluate the find and prescribe appropriate treatment as soon as feasible. Work may continue on other portions of the CP while evaluation (and, if needed, treatment) takes place, as long as the find can be adequately protected in the judgment of the PRS.

If the PRS determines that treatment (i.e., recovery and documentation of unearthed fossil(s)) is warranted, such treatment, and any required reporting, will proceed consistent with the PRMMP. The Contractor will be responsible for ensuring prompt and accurate implementation, subject to verification by the Authority.

The stop work requirement does not apply to drilling operations since drilling typically cannot be suspended in mid-course. However, if finds are made during drilling, the same notification and other follow-up requirements will apply. The PRS will coordinate with construction supervisory and drilling staff regarding the handling of recovered fossils.

The requirements of this IAMF will be detailed in the PRMMP and presented as part of the paleontological resources WEAP training.

## **Hazardous Materials and Waste**

### **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.

### **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.

### **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.

#### **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.

#### **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.

#### **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.

#### **HMW-IAMF#7: Transport of Materials**

During Construction, the Contractor will comply with applicable state and federal regulations, such as the Resource Conservation and Recovery Act, Comprehensive Environmental Response, Compensation, and Liability Act (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.

#### **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.

#### **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.

## HMW-IAMF#10 Hazardous Materials Plans

Prior to Operations and Maintenance activities, the Authority shall prepare hazardous materials monitoring plans. These will be used as a basis source, such as a hazardous materials business plan as defined in Title 19 California Code of Regulations and a SPCC plan.

## 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.

### 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 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 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 spills.

Implementation of a SWPPP will be performed by the construction contractors 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.

## **HYD-IAMF#5: Tunnel Boring Machine Design and Features**

Certain types of Tunnel Boring Machines (TBMs) can operate in either an open hard rock tunneling mode (open-mode) or a pressurized tunneling mode (closed-mode). TBMs capable of operating in either of these modes are referred to as “hybrid” TBMs. Closed-mode operations will effectively prevent seepage from occurring at the cutterhead area, even under difficult ground conditions.<sup>2</sup> The mode of operation for the proposed TBMs that will be employed will be determined by the specific conditions encountered along the tunnel alignment.

The current technology allows TBMs to sustain up to 17 bar of groundwater pressure while boring without additional measures. In areas where pressures can be expected to be higher, additional measures such as pre-grouting will be taken to minimize the water inflow into the tunnel during construction (see HYD-IAMF#7 for details).

In circumstances where groundwater pressures are 25 bar or less, a one-pass lining system will be installed in the tunnels constructed behind the passing TBM. In circumstances in which groundwater pressures exceed 25 bar, a two-pass lining system will be installed after the TBM has finalized its operations. A two-pass lining system will also be used in all instances for conventionally mined tunnels. See HYD-IAMF#6 below for more details.

The TBMs that will be needed for this project will be required to operate in a closed-mode when needed. The pressurization of the face<sup>3</sup> will be achieved with Slurry<sup>4</sup> or Earth Pressure Balance (EPB) technologies. The precise type of TBMs that will be used for the Build Alternatives cannot be identified at this time, since the selection of a TBM type will depend on a detailed knowledge of the geotechnical and hydrogeological ground conditions that exist along the alignments. Nevertheless, Slurry TBMs are generally more compatible with the high-water pressure conditions that will be encountered under the Build Alternatives.

The TBMs will be designed with ports for drilling horizontal probe holes through the TBM cutterhead, and angled probe holes through the TBM shields. These holes will allow for water pressures and flow rates to be measured ahead of the TBM. The probe holes, equipped with blow out preventers, will allow for pre-excavation grouting ahead of the TBM to cut-off groundwater inflows into the tunnel. The design and configuration of probe/grout holes will allow for concurrent drilling and grouting of multiple holes ahead of the TBM, and around the entire tunnel perimeter. Such probing and grouting operations are most applicable to a TBM operating in an open mode and will be mandatory in that instance (see HYD-IAMF#7).

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<sup>2</sup> Difficult ground conditions are considered to be soil, rock or water conditions that add difficulty to the mining of tunnels. These conditions may include: very weak rock, very strong rock, rock bursting where the exposed rock releases in-situ stress as an explosive failure, sheared rock, granular soil that can run into a tunnel (Running Ground), saturated soil that can flow into a tunnel (flowing ground), unstable rock that needs special support (e.g. rock bolts, spiling, permeation grouting, and shotcrete application) to prevent the tunnel from collapsing, swelling/squeezing ground where the ground pressures exceed the rock strength and the tunnel wall deforms resulting in the tunnel walls converging toward one another, high groundwater pressures, and high groundwater flow volumes.

<sup>3</sup> Pressure acting on the tunnel face results from pressure of groundwater and the pressure of the rock or soil pushing into the tunnel opening. To resist these in-situ pressures so that a TBM can be advanced against such pressure, the space between the tunnel boring machine and the rock face being excavated is pressurized (often with a bentonite-water slurry).

<sup>4</sup> The Slurry TBM uses a liquid slurry (often bentonite and water) to remove and transport rock and soil cuttings from the tunnel face to a disposal system.

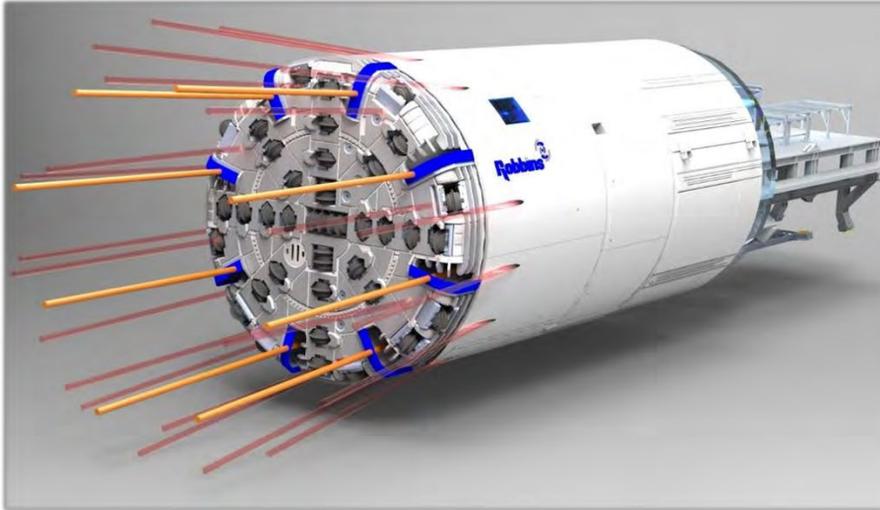


Figure 1 TBM with ports for probe drilling and ground improvement capabilities. Source: Robbins

Two additional TBM features may be required for the construction of these tunnels:

- capability for injection of pressurized bentonite to fill the void space between the TBM shield and the rock/soil outside the shield, when working in a closed-mode, and
- the use of an automatic tail void grouting system in which grout is injected simultaneously with the TBM advance while operating both in closed-mode and open-mode (see HYD-IAMF#7 “Grouting” section below).

### HYD-IAMF#6: Tunnel Lining Systems

In circumstances where groundwater pressures are 25 bar or less, a one-pass lining system will be installed in the tunnels constructed using a TBM. The lining system, which will consist of segmental, precast, concrete lining with bolted and gasketed joints, will create a tunnel lining capable of resisting the groundwater pressure with minimal leakage. A one-pass lining system could potentially be used in higher pressure locations if technological advancements were sufficient to ensure watertight seals under those pressures.

The steps to build the first lining will be the following:

1. probing ahead of the front of the cutter head to gather data about groundwater and rock conditions,
2. if the water pressure is above the TBM design pressure and it cannot work in closed-mode alone, pre-grouting ahead of the TBM through the cutter head and the shield.
3. checking with additional bores the effectiveness of the pre-grouting, and drilling of new boreholes and pre-grouting again if required,
4. excavate the ground to allow mounting of a new segmental ring, building the first lining typically about 12 m (40 ft length) behind the cutter head and performing the backfill grouting of the gap with a quick setting grout,
5. finally, if leakage is detected through the first lining, punctual check grouting through the cast-in grout ports in the first lining takes place as needed to stop leakage.

Even when following the steps above, during construction, some leakage might occur in the area between the cutter head and the first ring of lining segments. This might happen if the pre-grouting treatment fails, and the ground water pressure exceeds the maximum sustained by the TBM shield. In this situation, additional measures will be taken to reduce the permeability of the surrounding ground and therefore, the water inflow. These measures can be:

- perform additional grouting through new holes drilled through the shield and the cutter head;
- perform ground freezing techniques in case of loose soils with high permeability.

In sections where groundwater pressures are above 25 bar, and after the first lining has been installed, no significant water leakage<sup>5</sup> is expected until a second lining has been put in place. Current gaskets available in the market are nominally rated up to 50 bar; however these gaskets are assumed to withstand only 25 bars in the design (using a safety factor of 2) to account for construction quality defects and the 100-year lifespan of the infrastructure.

In order to minimize water leakage into the tunnel for the complete lifespan of the infrastructure, in the segments where ground water pressures are expected to exceed 25 bar, a monolithic second lining will be put in place after the TBM has finalized its operations and all its facilities have been dismantled (approx. 16 months). If any water flow is detected during the construction period after the installation of the first lining and before the second lining deployment, additional check grouting will be implemented as needed.

After completion of the second lining, the tunnel will be considered to be dry<sup>6</sup> during the lifespan of the infrastructure.

### HYD-IAMF#7: Grouting

A multi-phase grouting program will be implemented during the construction of the tunnels. A primary objective of the grouting program will be to reduce or prevent potential groundwater flows into the tunnels. The grouting program will be implemented for both TBM constructed and conventionally mined tunnels, although in the case of conventionally mined tunnels only pre-excavation grouting, and check grouting will be used.

To the extent applicable and feasible, the following grouting methods will be used during the construction of the tunnels to avoid and minimize groundwater flows into the tunnels:

- Pre-excavation grouting— During TBM tunnel construction using the open-mode approach, pre-excavation grouting will be implemented to reduce groundwater flow from the rock/soil mass prior to excavation, and to improve rock/soils conditions for tunneling. Systematic pre-excavation grouting ahead of the TBM will be performed to allow the TBM to advance, and the tunnel lining system to be installed, with minimum impacts to groundwater resources. Grout will be injected through the TBM shield and cutterhead holes. In circumstances where conventional mining methods are used, grout will be injected through drill holes advanced through the tunnel face and around the tunnel perimeter. Criteria for length and direction of drill holes, number of holes, grout composition, and injection pressures will be determined based on the conditions encountered in the field. The pre-grouting will create a zone of treated rock/soil around the tunnel that will be sealed to minimize groundwater inflows. Additional grouting will be implemented radially outward from the tunnel interior to broaden the diameter of the grouted zone surrounding the tunnel, as necessary, to further reduce groundwater flows into the tunnel.

There are many international examples showing that pre-excavation grouting is effective in preventing the flow of water in tunnels during its construction. This technique has existed for more than 60 years and has experienced a rapid development during the last 20 years. Pressure injection has been used up to 1650 ft of water column (50 bar).

A set of target *water ingress flow rates* should be established for this project prior to construction, based on the detailed studies to be developed in later phases, like ground water models and aquifer studies. Target inflow rates for both the construction and operation

<sup>5</sup> “No significant leakage” is defined as an amount of *water inflow rate* that will generate a limited impact to the ground water resources, allowing the recovery of the aquifer levels in a short amount of time after the leakage has stopped.

<sup>6</sup> “Dry tunnel condition” is defined as the situation where a finished tunnel has a such a low *water inflow rate* that it does not impact in any form the ground water resources, neither in the short nor in the long term.

phases should be defined, as well as differentiating per geologic formations or the different aquifers identified.

- **Steering (overcut) gap around the body of the shield**—During construction, pressurized bentonite will be injected to fill the void space between the TBM shield and the rock/soil outside the shield. The void space will be filled to seal off any potential water leakage from the cutterhead of the TBM back towards the rear of the shield. The capacity to inject pressurized bentonite is a built-in characteristic of a Slurry TBM, but this feature will need to be added to an EPB TBM if that type of TBM were to be selected. After advancing the machine, the void will be filled with the backfill grout placed around the tunnel lining (see below).
- **Backfill grouting with two-component grout**— During construction, backfill grouting will occur simultaneously with the advancement of the TBM. Grout will be injected from the tail of the shield to fill the annular gap between the TBM excavation limits and the segmental lining. The annular gap from the tail of the shield will be filled with a quick-setting grout to prevent water from traveling along the interface between the lining and the rock/soil. The accelerated two-component grout is superior to conventional cement grouts because it provides for complete and reliable backfilling of the annular gap. Moreover, this material hardens very quickly and provides resistance to water flow upon hardening.
- **Check grouting**— After the tunnel lining has been installed and backfilled, check grouting will be injected through grout ports in the tunnel lining where the back filling volume is less than the theoretical volume or there is evidence of groundwater inflow. The ports will be opened to check for voids and groundwater inflows. If any voids were detected, grout will be injected into the annular space under pressure (typically 0.7 to 1.0 bar higher than the static groundwater pressure) between the lining and rock/soil wall to control groundwater flows. The check grouting will be used for both single pass and double pass linings and will further reduce the potential for water to leak through the lining and into the tunnel.

## **Land Use and Development, Station Planning**

### **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.

### **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.

### **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-construction conditions of all temporary staging areas. All construction access, mobilization, material laydown, and staging areas will be returned to a condition equal to the pre-construction staging condition. This requirement is included in the design-build construction contract requirements.

## 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 of 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.

## 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.

## 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.

### PUE-IAMF#2: Irrigation Facility Relocation

Where relocating an irrigation facility is necessary, the Contractor will verify the new facility is operational prior to disconnecting the original facility, where feasible. Irrigation facility relocation preferences are included in the design-build 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.

### **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.

### **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.

## **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 Contractors 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.

### **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.

- 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 California Occupational Safety and Health Administration (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 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 CFR 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 CFR 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 *Collision 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 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 HS 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.

### **SS-IAMF#5: Aviation Safety**

To address Federal Aviation Administration (FAA) requirements related to their mandate of ensuring civil aviation safety and to prevent the potential for disruption of airfield and airspace operations at Hollywood Burbank Airport as a result of construction and/or operation of the Burbank To Los Angeles Project Section, the Authority and/or its contractor(s) on behalf of the Authority will:

- Submit designs and/or information to the FAA as required by Code of Federal Regulations, Title 14, Part 77, to ensure design of permanent HSR features within and adjacent to the boundary of Hollywood Burbank Airport do not intrude into imaginary surfaces as defined in 14 C.F.R. section 77.9(b).
- Submit construction plans and/or information to the FAA as required by Code of Federal Regulations, Title 14, Part 77, which may include the location of planned HSR construction and construction staging areas within and adjacent to the boundary of the Hollywood Burbank Airport, the types and height of proposed equipment, and planned time/duration of construction, to ensure construction within and adjacent to the boundary of Hollywood Burbank Airport does not intrude into imaginary surfaces as defined in 14 C.F.R. section 77.9(b).
- Implement measures required by the FAA to ensure continued safety of air navigation during HSR construction and operation, pursuant to 14 C.F.R. section 77.5(c).
- Ensure that the planned HSR facilities do not violate any grant assurances that are imposed at Hollywood Burbank Airport as a condition for obtaining an Airport Improvement Grants from the FAA.
- If necessary, work with Hollywood Burbank Airport to amend the current Airport Layout Plan for any temporary or permanent construction-related facilities required for the HSR project, to be submitted to the FAA for approval.

### **SS-IAMF#6: Stakeholder Coordination for the Hollywood Burbank Airport**

As design of the Burbank to Los Angeles Project Section progresses, the Authority shall continue to coordinate with the FAA and Burbank-Glendale-Pasadena Airport Authority (BGPAA) to avoid conflicts due to overlapping construction schedules and future operations at the Hollywood Burbank Airport. The purpose of this ongoing stakeholder coordination is to ensure that the design, construction, and operation of the HSR Build Alternative takes into consideration the Airport Layout Plan (ALP) and any future improvements to the Hollywood Burbank Airport identified in SCAG's *2020-2045 Regional Transportation Plan/Sustainable Community Strategy* (SCAG 2020) and to ensure that construction and operation of the HSR Build Alternative do not negatively impact these future improvements. Depending upon the impacts of the HSR Build Alternative on these future improvements, the Authority may enter into a funding agreement to cover the cost of an FAA Supplemental Environmental Impact Statement, if needed.

## **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.

### **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 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 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.

## 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.

### 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 will 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 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 of a shuttle bus to transfer construction workers to/from the job site. This measure shall be addressed in the CTP.

### **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.

### **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 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.

### **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.

### **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 percent or more) increase traffic on roadways affected 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.

### **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.

### **TR-IAMF#10: Off Peak Hour Employee Work Shift Changes at HMF *[as applicable to HMF-related sections or the HMF project]***

The Authority will time work shifts for the heavy maintenance facility (HMF) facilities, so the shifts do not coincide with local peak hour travel period. When the HMF employees arrive and depart, they will do so during a non-peak period for local traffic. As a result, the total volumes on the roads during shift changes will be less than the volumes that occur during the local peak periods.

### **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 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.

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