

**APPENDICES:**

- Appendix A: Memorandum of Agreement for the Treatment of Adverse Effects on Historic Properties under Section 106 of the National Historic Preservation Act
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**Appendix A:**  
**Memorandum of Agreement**  
**For the Treatment of Adverse Effects on**  
**Historic Properties under Section 106**  
**of the National Historic Preservation Act**

**MEMORANDUM OF AGREEMENT AMONG**  
**THE FEDERAL RAILROAD ADMINISTRATION,**  
**THE CALIFORNIA HIGH-SPEED RAIL AUTHORITY,**  
**THE SURFACE TRANSPORTATION BOARD,**  
**THE U.S. ARMY CORPS OF ENGINEERS, SACRAMENTO DISTRICT,**  
**THE CALIFORNIA STATE HISTORIC PRESERVATION OFFICER, AND**  
**THE ADVISORY COUNCIL ON HISTORIC PRESERVATION**

**REGARDING THE FRESNO TO BAKERSFIELD SECTION OF THE CALIFORNIA  
HIGH-SPEED TRAIN SYSTEM IN FRESNO, KINGS, TULARE, AND KERN COUNTIES**

**WHEREAS** the California High-Speed Rail Authority (Authority) proposes to construct a high-speed train (HST) system in California and the Federal Railroad Administration (FRA) and the Authority have completed a Final Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for the Fresno to Bakersfield Section of the HST Project (Undertaking); and

**WHEREAS** a Programmatic Agreement (PA) among FRA, the Advisory Council on Historic Preservation (ACHP), the California State Historic Preservation Officer (SHPO), and the Authority regarding compliance with Section 106 of the National Historic Preservation Act (16 United States Code [U.S.C.] § 470f) (Section 106) and in accordance with its implementing regulations (36 Code of Federal Regulations [CFR] Part 800), as it pertains to the California HST Project, was executed on June 15, 2011 (Attachment 1); and

**WHEREAS** the Undertaking consists of constructing a new rail alignment, stations, maintenance facilities, electrical substations, and other appurtenant facilities between Fresno and Bakersfield; and

**WHEREAS** on April 18, 2013, the Surface Transportation Board (STB) concluded that it has jurisdiction over the proposed California HST System, which includes the Undertaking; and

**WHEREAS** the proposed Undertaking will affect waters of the United States and, in compliance with Section 404 of the Clean Water Act (33 U.S.C. § 1344), will require a permit from the United States Army Corps of Engineers, Sacramento District (Corps), whose permit area is wholly contained within the Area of Potential Effects (APE) for the Undertaking; and

**WHEREAS** FRA has invited the Corps and STB to become signatory parties to this Memorandum of Agreement (MOA); and

**WHEREAS** the Corps and STB have designated FRA as the Lead Federal Agency to act on their behalf for purposes of compliance with Section 106 for this Undertaking and have participated in this consultation; and

**WHEREAS** the Authority has established the Undertaking's APE pursuant to Stipulation IV.A of the PA as those areas within the limit of construction, temporary construction easements, permanent easements, right of way, and adjacent or contiguous properties where visual effects may occur (see Attachment 2); and

**WHEREAS** to date the FRA and the Authority have determined that, within the APE, the following properties are listed in or are eligible for inclusion in the National Register of Historic Places:

- Holt Lumber, 1916 S. Cherry Avenue, Fresno
- South Van Ness Entrance Gate, Fresno
- Washington Irrigated Colony Rural Historic Landscape, Fresno County, including five contributing elements:

- Washington Colony Canal
- North Branch of Oleander Canal
- 6422 S. Maple Avenue
- 7870 S. Maple Avenue
- 7887 S. Maple Avenue
- Peoples Ditch, Kings County
- Lakeside Cemetery, Kings County
- Santa Fe Freight Depot, Shafter
- San Francisco & San Joaquin Valley Railroad Section House, Shafter
- Friant Kern Canal, Kern County
- Harvey Auditorium at Bakersfield High School, Bakersfield
- Kern County Civic Administrative Center, 1315-1415 Truxtun Avenue, Bakersfield
- Stark/Spencer Residence, 1321 N Street, Bakersfield
- Union Avenue Corridor (State Route 204 through Bakersfield)
- Salón Juárez, 815 E. 18th Street, Bakersfield
- Residence at 1031 E. 18th Avenue, Bakersfield
- San Joaquin Cotton Oil Company, 1660 E. California Avenue, Bakersfield
- Residence at 2509 E. California Avenue, Bakersfield

**WHEREAS** the FRA and the Authority, in consultation with the SHPO, have applied the criteria of adverse effect to known historic properties and have determined that the Project will have an adverse effect on:

- South Van Ness Entrance Gate, Fresno
- Washington Irrigated Colony Rural Historic Landscape, Fresno County, including four contributing elements:
  - Washington Colony Canal
  - North Branch of Oleander Canal
  - 7870 S. Maple Avenue
  - 7887 S. Maple Avenue
- Peoples Ditch, Kings County
- Lakeside Cemetery, Kings County
- Stark/Spencer Residence, 1321 N Street, Bakersfield

**WHEREAS** the FRA and the Authority, in consultation with the SHPO, have applied the criteria of adverse effect to known historic properties and have determined that the Project will have no adverse effect through the implementation of conditions provided for in Attachment 3 of this MOA to:

- Salón Juárez, 815 E. 18th Street, Bakersfield

**WHEREAS** FRA has concluded that the Undertaking will have an adverse effect on historic properties, as documented in the Findings of Effect (FOE) for the Fresno to Bakersfield Section of the HST Project (February 2014); and

**WHEREAS** FRA and the Authority have consulted with the SHPO and the ACHP pursuant to the PA and 36 CFR Part 800 regarding the Undertaking's adverse effects on historic properties, and have notified the ACHP of the adverse effect finding pursuant to 36 CFR § 800.6(a)(1). The FRA and the Authority have invited the ACHP to participate in this MOA, and in a letter dated March 3, 2014, the ACHP elected to participate; and

**WHEREAS** the Undertaking will be contracted, designed, and constructed using a Design-Build procurement process, in which the current level of design is 15% and the Design-Build contractor will advance design to 100%, potentially resulting in adjustments to the construction footprint of the Undertaking; and



**WHEREAS** the FRA and the Authority have determined that the Design-Build process is likely to affect as-yet unidentified historic properties that have not been subject to prior cultural resource investigations, in areas that are associated with potential alignment modifications, and ancillary activities including, but not limited to, utilities relocation, wetland mitigation sites, staging, stockpiling and access areas, heavy maintenance facilities, and disposal sites, and that the APE may need to be revised and additional identification be undertaken to consider such areas; and

**WHEREAS** access for archaeological survey has been limited to approximately 30% of the Archaeological APE, due to lack of permission to enter private landholdings; and

**WHEREAS** built environment inventories and effects assessments are 100% complete for the current level of design; and

**WHEREAS** the FRA and the Authority have identified the need for ongoing identification and evaluation of historic properties, and have elected to phase these efforts as provided for in Stipulation VI.E of the PA, due to both land-access difficulties and the Design-Build process; and

**WHEREAS** the FRA and the Authority have determined that the nature of the proposed Undertaking's operation and maintenance may constrain the Undertaking's design in a manner that precludes the possibility of avoiding adverse effects on the subject historic properties, and have further determined that they will resolve such effects through the execution and implementation of this MOA, as well the future development of an Archaeological Treatment Plan (ATP) and Built Environment Treatment Plan (BETP); and

**WHEREAS** in accordance with PA Stipulations V.A and V.B, the FRA and Authority have consulted with affected local governments and other interested parties about the Undertaking and its effects on historic properties and have taken into account all comments received from them. The City of Fresno, City of Corcoran, City of Shafter, the California Department of Parks and Recreation, and the Sociedad Juárez Mutualista Mexicana have participated in the consultation and have accepted FRA and the Authority's invitation to be concurring parties to the development of this MOA; and

**WHEREAS** in accordance with PA Stipulations IV.A and IV.C., FRA has formally consulted with or has made a good faith effort to formally consult with the following federally recognized Native American tribes with ancestral ties to Fresno, Kings, Tulare, or Kern counties and has invited them to participate as consulting parties in the development of this MOA: Santa Rosa Tachi Yokuts Tribe, Table Mountain Rancheria, Picayune Rancheria of the Chukchansi Indians, Tule River Indian Tribe, Tejon Indian Tribe, Cold Springs Rancheria of Mono Indians, and Big Sandy Rancheria of Mono Indians; and

**WHEREAS** the Santa Rosa Tachi Yokuts Tribe, Table Mountain Rancheria, Picayune Rancheria of the Chukchansi Indians, and the Tule River Indian Tribe have accepted the FRA's invitation to be concurring parties to the development of this MOA; and

**WHEREAS** in accordance with PA Stipulations IV.B, IV.C.1, and IV.C.2, the Authority has consulted with or made a good faith effort to consult with the following non-federally recognized Native American tribes with ancestral ties to Fresno, Kern, Tulare, or Kings counties and has invited them to participate as concurring parties in the development of this MOA: Kings River Choinumni, Choinumni Tribe of Yokuts, Traditional Choinumni Tribe, Sierra Nevada Native American Coalition, Dumna Wo-Wah Tribal Government, Dunlap Band of Mono Preservation Society, Choinumni Tribe, and the Kern Valley Indian Council; and

**WHEREAS** the Kern Valley Indian Council has accepted the Authority's invitation to be a concurring party to the development of this MOA;

**NOW, THEREFORE** the FRA, STB, the Corps, the Authority, the SHPO, and the ACHP agree the Undertaking will be implemented in accordance with the following stipulations in order to resolve the adverse effects of the Undertaking on historic properties, and further agree that these stipulations shall govern the Undertaking and all its parts.

## **STIPULATIONS**

The FRA, in coordination with the Authority, shall ensure the following:

### **I. OVERSIGHT AND COORDINATION**

Because the undertakings of the STB and the Corps are entirely subsumed within the FRA's undertaking, the FRA as the lead federal agency will be responsible for ensuring compliance with all stipulations of this agreement.

The ATP and BETP will describe the treatment for known historic properties and outline the process of identifying presently unknown historic properties. After the design of the Undertaking is advanced to 100% and archaeological surveys are completed within the limits of construction, the FRA and the Authority will direct the Design-Build contractor to prepare proposed supplemental eligibility determinations and assessments of effects. These recommendations will be based on the Design-Build contractor's technical studies to address design changes and their effects on historic properties. The MOA signatories will review the supplemental eligibility determinations and assessments of effects in accordance with Stipulations III and IV. The FRA and the Authority will also ensure that the Design-Build contractor prepares "final supplemental treatment plans" to be reviewed by the MOA signatories in accordance with Stipulation V.D.

### **II. AREA OF POTENTIAL EFFECTS**

The FRA and Authority have delineated an APE for the Undertaking which consists of both a Built Environment and Archaeological APE and is described and depicted in Attachment 2 of this MOA. The APE consists of approximately 114 linear miles of track on new alignment, with a right-of-way anticipated to average about 100 feet wide. The vertical APE varies widely depending on terrain and engineering needs, with most areas experiencing ground disturbances to depths of two meters or less, and a small number of areas being disturbed to depths as great as eight meters. The APE represents the maximum extent of any potential ground disturbance and of any indirect effects from the construction of the Undertaking. The APE was developed and agreed upon among FRA, the Authority, and the SHPO consistent with the requirements of PA Stipulation VI.A, and accounts for potential impacts on both archaeological and built-environment historic properties that may result from the construction and operation of the Project.

The design of the Undertaking will be fully designed through the Design-Build process, which will likely result in modifications to the APE and a need for additional historic property identification efforts. Pursuant to PA Stipulation VI.A, the Authority shall inform the parties to this MOA within 15 days of the determination that the APE must be modified. Actions to be taken after any such modification shall be conducted in accordance with PA Stipulations VI and IX.

### **III. COMPLETION OF HISTORIC PROPERTIES IDENTIFICATION**

Built environment inventory and evaluations are 100% complete for the current level of design (15%), and effects assessments have also been made based on 15% design. While thorough built environment inventory and evaluations have been completed for the Undertaking, the nature of design-build

contracting requires that inventories, evaluations, and adverse effects assessments be made at the conclusion of the design process, but prior to construction, both of which will follow execution of this MOA.

As stated in the recitals, 70% of the land in the Undertaking's APE has yet to be surveyed for archaeological resources as of the time of the execution of this MOA, due to a lack of legal access to that land. Survey efforts are ongoing, and subsequent to the execution of this MOA, the FRA and the Authority will complete the remaining archaeological inventories, along with any test excavations, geoarchaeological investigations and data recovery, as outlined in the ATP, prior to construction in those areas.

Identified historic properties and potential historic properties have included archaeological sites, built environment resources (i.e., buildings, canals, etc.), an historic landscape (Washington Irrigated Colony Rural Historic Landscape), and a traditional cultural property (TCP) (Salon Juarez). FRA and the Authority acknowledge the possibility of encountering other NRHP-eligible resource types, including, but not limited to, resources such as archaeological or historical districts, Native American sacred sites, and additional cultural and/or historical landscapes. These resources will be addressed in accordance with PA Stipulations VI and VII, and will be documented and evaluated, as appropriate, in Archaeological Survey Reports (ASRs), Historic Architecture Survey Reports (HASRs), or in stand-alone evaluation documents, such as the study completed for the Salon Juarez TCP.

The FRA and Authority will ensure that any additional historic property identification efforts are completed as outlined below and that documentation of the identification efforts is prepared in accordance with this MOA, the treatment plans, and PA Stipulation VI. Following review and concurrence by the FRA as outlined in PA Stipulation VI.C.1, the Authority will submit documentation of these efforts to the SHPO and other parties to this MOA for a 30-day review period. The Authority shall ensure that the comments regarding identification efforts that are received through this consultation process will be considered prior to finalizing any inventory and evaluation documentation.

#### **A. Archaeology**

As access for archaeological survey is obtained and design is completed, the FRA and Authority shall ensure that the phased identification of archaeological resources is completed in previously-unsurveyed portions of the archaeological APE, prior to any ground-disturbing activities, and in conformance with PA Stipulations VI.C.1, Stipulation VI.E, and Attachment C of the PA. Specifically, the FRA and Authority shall ensure that pedestrian archaeological survey of these areas is conducted as access is obtained, and that testing and evaluation is conducted of archaeological sites that cannot be avoided (except those identified as exempt from evaluation, per Attachment D of the PA). Where appropriate, combined testing and data recovery will be completed as outlined in PA Stipulation VI.C.1, the requirements of which will be detailed in the ATP. The FRA and Authority shall ensure that documentation is prepared and provided to the SHPO to document these efforts to identify and evaluate archaeological resources in the Undertaking's APE in compliance with PA Stipulation VI.

#### **B. Built Environment**

As design is finalized for the Undertaking, the FRA and Authority shall ensure that the built environment APE is revised as necessary and any potential historic properties within the revised APE are inventoried and evaluated (except those identified as exempt from evaluation, per Attachment D of the PA), pursuant to PA Stipulations VI and IX. The FRA and Authority shall ensure that documentation is prepared and provided to the SHPO to document efforts to identify and evaluate built environment resources in the Undertaking's APE in compliance with PA Stipulation VI.

#### **IV. ASSESSMENT OF EFFECTS**

FRA and the Authority will ensure that supplemental FOEs are prepared in accordance with PA Stipulation VII once supplemental historic property identification efforts are completed. Following FRA review and concurrence in the supplemental FOEs, they will be submitted by the Authority for concurrent review by both signatories and concurring parties to this MOA for a 30-day review period. The Authority shall ensure that the comments regarding effects which are received as a result of this consultation process will be considered prior to finalizing the supplemental FOEs.

#### **V. TREATMENT OF HISTORIC PROPERTIES**

The FRA and Authority will ensure that adverse effects to both currently known and yet-to-be-identified historic properties will be resolved. Treatment measures for known historic resources are outlined in Attachment 3 of this MOA.

In compliance with PA Stipulation VIII.B, the FRA and Authority shall ensure that two historic property treatment plans are prepared for the Undertaking, consisting of an ATP and a BETP. FRA and the Authority acknowledge the possibility of encountering other NRHP-eligible resource types, including, but not limited to, resources such as archaeological or historical districts, Native American sacred sites, and additional cultural and/or historical landscapes. These resources will be treated in accordance with PA Stipulation VIII, and treatments will be identified in ATPs, BETPs, or stand-alone Treatment Plans (depending on which format is most appropriate). The FRA and the Authority shall ensure that the treatment plans are prepared sufficiently in advance of the start of construction to obtain concurrence on any phased identification, evaluation, and effects assessments still outstanding and in time to obtain agreement amongst the signatories and concurring parties on the adequacy of any proposed treatments. The FRA shall ensure that the Authority provides sufficient time and funding to complete all necessary preconstruction measures outlined in the treatment plans prior to commencement of construction activities that have the potential to affect historic properties. Treatment measures may be implemented before, during, or after construction of the Undertaking, depending on the timing requirements of the individual measures.

The Authority shall provide draft treatment plans to the MOA signatories for a 30-day review and comment period. Based on the comments received, the treatment plans will be finalized in accordance with PA Stipulation VIII.C.1. Treatment measures may be implemented before, during, or after construction of the Undertaking, depending on the timing requirements of the individual measures. Through these measures, the FRA and the Authority, in consultation with SHPO and the other signatories, affected tribes, and other concurring parties to this MOA, will continue the process of identifying presently unknown historic properties within the limits of construction, evaluate their eligibility for the NRHP, establish a process to address design changes and their effects on historic properties, resolve any adverse effects to such properties, and address the need to treat any previously unknown properties discovered during Project construction.

The Authority will provide the treatment plans to the Design-Build contractor, and will ensure that the Design-Build contract contains provisions identifying the treatment measures the Design-Build contractor is responsible for completing. The Authority will coordinate with FRA to determine the effects of any revisions to the APE and the treatment plans resulting from the completion of the archaeological survey and the design process.

##### **A. Archaeological Treatment Plan**

In accordance with Stipulation VIII.B and Attachment C of the PA, the FRA and Authority shall, in consultation with the SHPO and the other parties to this MOA, ensure that an ATP is developed and implemented for the treatment of archaeological resources.

There are currently no known NRHP-eligible archaeological resources within the APE. As part of the phased identification of historic properties, the ATP will describe the methods to be employed to complete the historic properties identification effort within the Undertaking's APE. Building upon the identification efforts completed to date, the ATP will describe the methods that will be employed to conduct additional archaeological site evaluations, considering all four NRHP criteria (A, B, C, and D). The ATP will also specify where and under what circumstances further efforts will be made to identify NRHP-eligible archaeological deposits which have the potential to be affected by the Undertaking. As allowed under PA Stipulation VI.C, this MOA directs that the treatment plans also address the use of a combined archaeological testing and data recovery program where needed (depending on construction scheduling and nature of discovered resources) to facilitate construction. Finally, the ATP will describe in detail the required avoidance, minimization, and/or mitigation measures for any yet-to-be-identified NRHP-eligible archaeological resources, including any historic properties of significance to Indian tribes, affected by the Undertaking.

The major elements and commitments in the ATP shall be consistent with the requirements of PA Stipulation VIII.B and shall include the following:

- Roles and responsibilities of implementing and reviewing parties
- Qualifications of staff implementing the treatment plan
- A process consistent with and reflective of Section 106, to identify, evaluate, and resolve adverse effects to historic properties, involving appropriate agencies, and affected tribes and other consulting parties.
- A summary of anticipated archaeological property types, including pertinent research domains and data requirements.
- Expectations and survey design for completing pedestrian survey of the additional investigation locations.
- Expectations and survey design for currently identified natural resource mitigation sites.
- A strategy for the systematic exploration of areas where unidentified archaeological properties are anticipated in the APE. The strategy will include methods for targeted geoarchaeological excavations in areas considered sensitive for the presence of buried archaeological resources.
- Documentation and recording standards for newly-discovered resources.
- Data collection, analysis, and reporting standards (consistent with SHPO guidelines) for NRHP-eligible properties
- Measures to be used during construction, such as exclusion zones, Environmentally Sensitive Areas (ESAs), and/or monitoring
- A monitoring plan for areas identified for archaeological monitoring and Native American monitoring, including protocols and procedures to address archaeological monitoring, unanticipated discoveries, and the treatment of human remains.
- Native American Graves Protection and Repatriation Act (NAGPRA) compliance (where applicable)
- Compliance schedule
- Reporting requirements
- Ownership and curation of archaeological materials
- Mechanisms to resolve as-yet-unidentified adverse effects
- Procedures for creating treatment plan addenda to address newly discovered resources or to outline additional treatment.

## **B. Built Environment Treatment Plan**

The FRA and the Authority will ensure that a BETP is developed and implemented outlining the treatment measures for built environment historic properties located within the APE that will be affected by the Undertaking. These measures will avoid, minimize, and/or mitigate adverse effects caused by the Undertaking and will include treatments to be conducted prior to, during, and/or after construction of the Undertaking. The plan will also include measures for identification and evaluation of effect on historic

properties that may become necessary as a result of changes in the APE. The treatments for historic properties known at the time of execution of this MOA are summarized in Attachment 3 of this MOA.

The major elements and commitments in the BETP shall be consistent with the requirements of PA Stipulation VIII.B and shall include the following:

- Roles and responsibilities of implementing and reviewing parties
- Qualifications of professional staff implementing the treatment plan
- Mechanisms to inventory, evaluate, and resolve effects for any as-yet-unidentified built environment resources, as necessary.
- Measures to be used during construction, such as exclusion zones, Environmentally Sensitive Areas (ESAs), and/or monitoring
- Requirements for building/structure protection and stabilization plans
- Requirements for response plans for unanticipated effects and inadvertent damage
- Methods to assess, avoid, minimize, or mitigate vibration and noise effects
- Monitoring requirements
- Compliance schedule
- Reporting requirements
- Requirements for archival documentation procedures
- Other treatment measures as appropriate, including, but not limited to: moving buildings/structures, historic preservation design review, preparation of interpretive materials and exhibits
- Procedures for creating treatment plan addenda to address newly discovered resources or to outline additional treatment

### **C. Treatment Plan Amendment**

To address changes in the Undertaking or the treatment of historic properties affected by the Undertaking, the Authority, in coordination with FRA may propose revisions to one or both historic property treatment plans to the other parties to this MOA. Upon the written concurrence of the SHPO, the Authority, in coordination with FRA may revise the plan(s) to incorporate the agreed-upon changes without executing a formal amendment to this MOA.

### **D. Final Supplemental Treatment Plans**

To address the Design-Build procurement process, the FRA and Authority shall ensure that final supplemental treatment plans are completed at the conclusion of the design process. These final supplemental treatment plans will reexamine the treatments recommended in the original treatment plans and review final design to ensure that all properties adversely affected are addressed and that treatments are appropriate for the impacts that will result from the final design. Preliminary draft treatment plans will be provided to FRA by the Authority for a 14-day review period. Following FRA review and revision, the Authority shall provide draft final supplemental treatment plans to the MOA signatories for a 30-day review and comment period. Based on the comments received, the Authority will revise and submit the treatment plans to the MOA signatories for final 30-day review. The Authority shall ensure that comments received as a result of this consultation process will be considered prior to finalizing final supplemental treatment plans.

## **VI. CONSTRUCTION FOLLOWING TREATMENT PLAN IMPLEMENTATION**

In accordance with PA Stipulation X, following finalization of the treatment plans and completion of the pre-construction measures prescribed therein, the Authority may authorize construction within portions of the APE either where there are either no historic properties, no historic properties affected, or where

treatment has been completed. The Authority will ensure that any ground-disturbing activities are approved to proceed before any such activities occur.

## **VII. UNANTICIPATED DISCOVERIES DURING CONSTRUCTION**

It is possible that previously unknown archaeological resources could be discovered during ground-disturbing construction activities associated with the Undertaking. The following protocols will be implemented in the event of such discoveries.

### **A. Protocols for Discoveries**

The ATP will address the identification of archaeologically-sensitive areas that require archaeological monitoring, and detail protocols for discoveries, in accordance with PA Stipulation XI. If any potential archaeological resources are observed during construction, the onsite archaeological monitor will issue a temporary work stoppage to the equipment operator to allow for a closer inspection of the discovery. Work will be stopped within a 50-foot radius of the discovery, or other such distance that is determined by the archaeological monitor to be necessary to avoid or minimize harm to the discovered archaeological resources. Construction activities may continue outside the area of the discovery, but the area of the discovery will remain undisturbed by construction activities until the archaeological monitor can complete an inspection and notify and consult with the Qualified Investigator (QI) regarding the discovery. The QI will notify the Authority of the discovery. The qualifications and general role of the QI is identified in PA Stipulation III, and will be described in greater detail in the "Roles and Responsibilities" section of the Treatment Plans. The FRA and the Authority, in consultation with the MOA signatories, will determine the resource's eligibility, identify the effects, determine if adverse effects can be avoided by alteration of construction methods or the installation of protective measures, and, if not, mitigate impacts to the new discoveries or newly affected properties in accordance with the stipulations of project-specific treatment plans. The Authority shall consult with the MOA signatories in accordance with the process outlined in PA Stipulation XI.A-F.

### **B. MOA Signatory Consultation**

In accordance with PA Stipulation XI.A-B, the Authority will consult with the FRA within 24 hours of a discovery for which a stop work order has been issued with a preliminary determination of the National Register eligibility of the historic property and the potential for the undertaking to adversely affect the resource. If adverse effects to the resource can be avoided, no consultation with MOA signatories and consulting parties is necessary. If the Authority and FRA determine that the property is likely an eligible or potentially eligible property and that it would be adversely affected by the Undertaking, they will develop recommendations regarding the proposed treatment measures to minimize adverse effects on the discovered resource. Within 48 hours of the discovery, the Authority will consult with the MOA signatories and propose treatment measures to minimize the effects. The Authority, in consultation with the FRA, will provide the MOA signatories with the recommended approach to treating the discovery. FRA and the Authority shall consult with the MOA signatories on the recommended approach via email and phone, with hard copy documentation on the treatment to follow. FRA and the Authority will take the MOA signatories comments into account in reaching a final decision on the recommended approach to avoid, minimize, or mitigate effects. If the Authority and FRA determine, in consultation with the MOA signatories and Native American tribes and groups, that the unanticipated discovery is not eligible and no further investigation is warranted, the Authority will notify the Design- Build contractor that clearance has been granted to resume work in the area.

### **C. Consultation with Native American Tribes**

In accordance with PA Stipulation XI.C, the Authority shall notify the FRA and Native American concurring parties of any discoveries that have the potential to adversely affect properties of religious and cultural significance to them within 24 hours of the discovery. After reviewing such discoveries, the aforementioned Native American tribes can request further consultation on the Undertaking by notifying the FRA in writing within 48 hours of being provided notice of the discovery. The Authority shall notify interested Native American groups that are not federally recognized of any discoveries that have the potential to adversely affect properties of religious and cultural significance to them within 24 hours of the discovery. After reviewing such discoveries, the interested Native American groups can request further consultation on the Undertaking by notifying the Authority in writing within 48 hours of the Authority providing notice of the discovery. FRA and the Authority will take the interested Native American groups' comments into account in reaching a final decision on the recommended approach to avoid, minimize, or mitigate effects.

#### **D. Evaluation and Treatment of Unanticipated Discoveries**

Per PA Stipulation XI.D through XI.F, upon agreement between the signatories to this MOA regarding the appropriate treatment for an unanticipated discovery, the Authority will direct that avoidance, minimization, or treatment(s) be conducted in accordance with the ATP. If data recovery excavations are the only selected treatment, a work in the area of the discovery can resume as soon as the data recovery fieldwork is completed. A data recovery report will subsequently be prepared in accordance with the ATP. In the case that data recovery is not a selected treatment, or that there are additional treatments, construction-related work in the area of the discovery may resume upon agreement regarding treatments, depending on the nature of the selected treatment(s) and compatibility of the treatment(s) with the resumption of construction activities.

The Authority shall advise the FRA and other signatories of the satisfactory completion of the approved work. Once the approved work is completed, the activities that were halted to address the discovery situation may resume. Any treatment to damaged properties will follow the Secretary of the Interior's Standards for the Treatment of Historic Properties. If the Authority determines damaged property should be repaired after construction is completed, then stabilization measures that will prevent and not cause further damage will be installed. If a National Historic Landmark is affected, the Authority shall include the Secretary of the Interior represented by the National Park Service regional office's program coordinator) and the ACHP in the notification process.

### **VIII. ADMINISTRATIVE STIPULATIONS**

#### **A. Professional Standards and Report Dissemination**

In accordance with PA Stipulation III, all activities regarding history, collections management, historical archaeology, prehistoric archaeology, architecture, landscape architecture, and architectural history that are accomplished pursuant to this MOA will be carried out by, or under the direct supervision of persons meeting the "Secretary of the Interior's Professional Qualification Standards" (48 FR Part 44716) in the appropriate discipline. The Authority and FRA will ensure that any additional professionals implementing any of the provisions in this MOA, the ATP, and/or the BETP will be appropriately qualified to undertake such tasks.

The Authority and FRA shall ensure that all reports, developed in accordance with Stipulation VIII, I, below, resulting from implementation of the ATP and the BETP are consistent with the PA and Authority cultural resources technical guidance, and that these reports meet contemporary professional standards as specified in the following documents (or the most recent versions available):



- *The Secretary of the Interiors Standards for the Treatment of Historic Properties* (National Park Service 1995 and updates);
- *The Secretary of the Interior's Standards and Guidelines for Archaeological Documentation* (National Park Service 1983 and updates);
- *The Secretary of the Interior's Standards and Guidelines for Architectural and Engineering Documentation* (Federal Register 2003);
- California Office of Historic Preservation's *Archaeological Resource Management Reports (ARMR): Recommended Contents and Format* (OHP 1990);
- California Office of Historic Preservation's *Guidelines for Archaeological Research Designs* (OHP 1991).

Copies of all final reports will be provided to the SHPO, the Central California Information Center and the consulting parties. FRA and the Authority shall ensure that the materials and records resulting from the activities prescribed by this MOA are curated in accordance with 36 CFR Part 79 and PA Stipulation XIV, or at a suitable facility identified in consultation with the SHPO, as appropriate.

## **B. Confidentiality**

The signatories and concurring parties to this MOA acknowledge that the handling of documentation regarding historic properties covered by this MOA are subject to the provisions of § 304 of the National Historic Preservation Act (NHPA) of 1966, and § 6254.10 of the California Government Code (Public Records Act), relating to the disclosure of archeological site information. As such, the FRA and Authority shall withhold from public disclosure sensitive information as provided for in Section 304 of the NHPA and Section 6254.10 of the California Government Code. PA Stipulation XII regarding confidentiality remains in effect and also applies to actions and documentation prescribed by the MOA.

## **C. Dispute Resolution**

Should any signatory party to this MOA object to any actions proposed or the manner in which the terms of this MOA are implemented, FRA shall consult with such party to resolve the objection. If FRA determines that such objection cannot be resolved within fifteen (15) calendar days, FRA shall forward all documentation relevant to the dispute, including the FRA's proposed resolution, to the ACHP and request its advice on the resolution of the objection within thirty (30) days of receiving documentation. FRA will also provide a copy to all signatories and concurring parties. FRA shall take into account any timely advice or comments regarding the dispute from the ACHP and signatories and concurring parties to the MOA in reaching a final decision on the dispute. Following the thirty (30) day time period, FRA shall prepare a written response documenting its final decision and provide a copy of this written response to the ACHP, signatories, and concurring parties. FRA will then proceed according to its final decision. FRA's and the Authority's responsibility to carry out all other actions subject to the terms of this MOA that are not the subject of the dispute remains unchanged.

## **D. Amendment**

Any signatory to this MOA may propose that this MOA be amended, whereupon all signatories shall consult for 30 days, or another time period as agreed to by all signatories, to consider such an amendment. This MOA may be amended when such an amendment is agreed to in writing by all signatories. The amendment will be effective on the date a copy signed by all of the signatories is filed with the ACHP. If the signatories cannot agree to appropriate terms to amend the MOA, any signatory may terminate the MOA in accordance with Stipulation V.E, below.

## **E. Termination**

If any signatory believes that the terms of this MOA are not being carried out or cannot be carried out, that party shall immediately notify the other signatories in writing and consult with the other parties for a

period of at least 30 days to attempt to develop an amendment per Stipulation V.D above. Should such consultation result in an agreement on an alternative to termination, the signatory parties shall amend the MOA in accordance with Stipulation V.D. If within thirty (30) days, or another time period agreed to by all signatories, an agreement for the amendment to the MOA cannot be reached, any signatory may terminate the MOA upon written notification to the other signatories. Termination hereunder shall render this MOA without further force or effect.

If this MOA is terminated for any reason, prior to proceeding with the Undertaking, FRA will either execute a new MOA for the Undertaking pursuant to 36 CFR § 800.6, follow the procedures outlined in 36 CFR Part 800, or request, take into account, and respond to, the comments of the ACHP pursuant to 36 CFR § 800.7. FRA shall notify the signatories and concurring parties as to the course of action it will pursue.

#### **F. Resolution of Public Objections**

At any time during implementation of the measures stipulated in this MOA, should a member of the public raise an objection in writing pertaining to such implementation to any signatory party to this MOA, that signatory party shall immediately notify the other signatory parties in writing of the objection. FRA shall consult with the objecting party and with the other signatories for no more than thirty (30) days to resolve the objection. FRA will take all comments from the other signatory parties into account. Within fifteen (15) days following closure of the consultation period, FRA shall render a decision regarding the objection and notify all parties of this decision in writing, including a copy of the response to the objecting party. FRA's decision regarding resolution of the objection will be final. Following issuance of its final decision, FRA may authorize the action subject to the objection to proceed in accordance with the terms of that decision.

#### **G. Notice to Proceed**

Upon completion of reviews without objection, or with resolution of objections under Stipulation V.C or V.F of this MOA, the Authority will issue a notice to proceed in areas where adverse effects on historic properties have been addressed through this MOA and supporting documentation.

#### **H. Duration**

This MOA will be in effect for 20 years following the date of execution, unless terminated in accordance with Stipulation VIII.E above. If FRA determines that construction of the Undertaking has not been initiated within five years following execution of this MOA, the signatories shall consult to reconsider its terms at that time. Reconsideration may include amendment of the MOA to extend its duration and/or other provisions, or termination of the MOA. Once construction has been initiated, the signatories shall consult two (2) years after the official beginning of construction, to determine whether this MOA is meeting its intended functions, and needs to be continued as originally executed, amended, or terminated. FRA shall provide the other signatories with written notice of the need to consult in both scenarios described above (i.e., if construction has not begun within five years of execution, and/or two years after construction commences).

#### **I. Reporting**

Electronic submittals are acceptable to expedite reviews.

#### **J. Bi-Annual Report**

The Authority shall prepare a biannual report (Report), in consultation with FRA, documenting the implementation of this MOA. The reporting period shall begin on the date the Notice to Proceed is given to the design-build contractor and will be required so long as this MOA is in effect.

The Report shall include, at a minimum:

- List of all studies, reports, actions, evaluations, or monitoring reviewed or generated under the Stipulations of this MOA.
- Record of all consultation and outreach efforts related to the implementation of this MOA.
- Record of all efforts to identify and/or evaluate potential historic properties, monitoring efforts, archaeological management assessments or research designs, and treatment of historic properties.
- Any recommendations to amend this MOA or improve communications among the parties.

The Authority shall submit the Report to FRA on April 1<sup>st</sup> and October 1<sup>st</sup> of each year. After FRA review and revision of the draft Report, the Authority will provide the Report to the signatories and the concurring parties for a thirty-day (30-day) period to review and comment. At the request of the SHPO or a signatory or concurring party, the Authority, in consultation with FRA, shall supplement this process through meeting(s) to address comments and/or questions. The Report will be finalized after the close of the thirty-day (30-day) comment period and provided to the signatories and consulting parties. The Authority shall ensure that the Report is made available to the public, upon request.

#### **IX. EFFECTIVE DATE AND EXECUTION**

This MOA will take effect on the date that it has been executed by the Authority, FRA, STB, the Corps, the SHPO, and ACHP.

Execution of this MOA by FRA, STB, the Corps, the Authority, the SHPO, and the ACHP, its filing with the ACHP in accordance with 36 CFR 800.6(b)(1)(i), and subsequent implementation of its terms, shall evidence that FRA and the Authority have taken into account the effects of the Undertaking on historic properties and afforded the ACHP an opportunity to comment.

**SIGNATORY PARTIES**

**FEDERAL RAILROAD ADMINISTRATION**

By: David Valenstein Date: 04/30/2014

Name: David Valenstein  
Title: Division Chief, Environment and Systems Planning

**CALIFORNIA HIGH-SPEED RAIL AUTHORITY**

By: Jeff Morales Date: May 8, 2014

Name: Jeff Morales  
Title: Chief Executive Officer

**SURFACE TRANSPORTATION BOARD**

By: Victoria Rutson Date: April 30, 2014

Name: Victoria Rutson  
Title: Director, Office of Environmental Analysis

**U.S. ARMY CORPS OF ENGINEERS, SACRAMENTO DISTRICT**

By: Michael S. Jewell Date: 6 May 2014

Name: Michael S. Jewell  
Title: Chief, Regulatory Division

**CALIFORNIA STATE HISTORIC PRESERVATION OFFICER**

By: Carol Roland-Nawi Date: 8 May 2014

Name: Carol Roland-Nawi, Ph.D.  
Title: California State Historic Preservation Officer

**ADVISORY COUNCIL ON HISTORIC PRESERVATION**

By: John M. Fowler Date: 5/14/14

Name: John M. Fowler  
Title: Executive Director

**CONCURRING PARTIES – STATE AGENCIES, LOCAL GOVERNMENTS, ORGANIZATIONS**

**CALIFORNIA DEPARTMENT OF PARKS AND RECREATION**

By: \_\_\_\_\_ Date: \_\_\_\_\_

Name: Major General Anthony L. Jackson, USMC (Retired)  
Title: Director, California Department of Parks and Recreation

**CITY OF FRESNO**

By: \_\_\_\_\_ Date: \_\_\_\_\_

Name:  
Title:

**CITY OF CORCORAN**

By: \_\_\_\_\_ Date: \_\_\_\_\_

Name:  
Title:

**CITY OF SHAFTER**

By: \_\_\_\_\_ Date: \_\_\_\_\_

Name:  
Title:

**CITY OF BAKERSFIELD**

By: \_\_\_\_\_ Date: \_\_\_\_\_

Name: Douglas McIsaac  
Title: Director, Community Development Department

**SOCIEDAD JUÁREZ MUTUALISTA MEXICANA**

By: \_\_\_\_\_ Date: \_\_\_\_\_

Name: Jessy Acosta  
Title: Treasurer

**CONCURRING PARTIES – NATIVE AMERICAN TRIBES AND GROUPS**

**SANTA ROSA TACHI YOKUTS TRIBE (FEDERALLY RECOGNIZED)**

By: \_\_\_\_\_ Date: \_\_\_\_\_

Name:  
Title:

**TABLE MOUNTAIN RANCHERIA (FEDERALLY RECOGNIZED)**

By: \_\_\_\_\_ Date: \_\_\_\_\_

Name:  
Title:

**PICAYUNE RANCHERIA OF THE CHUKCHANSI INDIANS (FEDERALLY RECOGNIZED)**

By: \_\_\_\_\_ Date: \_\_\_\_\_

Name:  
Title:

**TULE RIVER INDIAN TRIBE (FEDERALLY RECOGNIZED)**

By: \_\_\_\_\_ Date: \_\_\_\_\_

Name:  
Title:

**KERN VALLEY INDIAN COUNCIL**

By: \_\_\_\_\_ Date: \_\_\_\_\_

Name:  
Title:

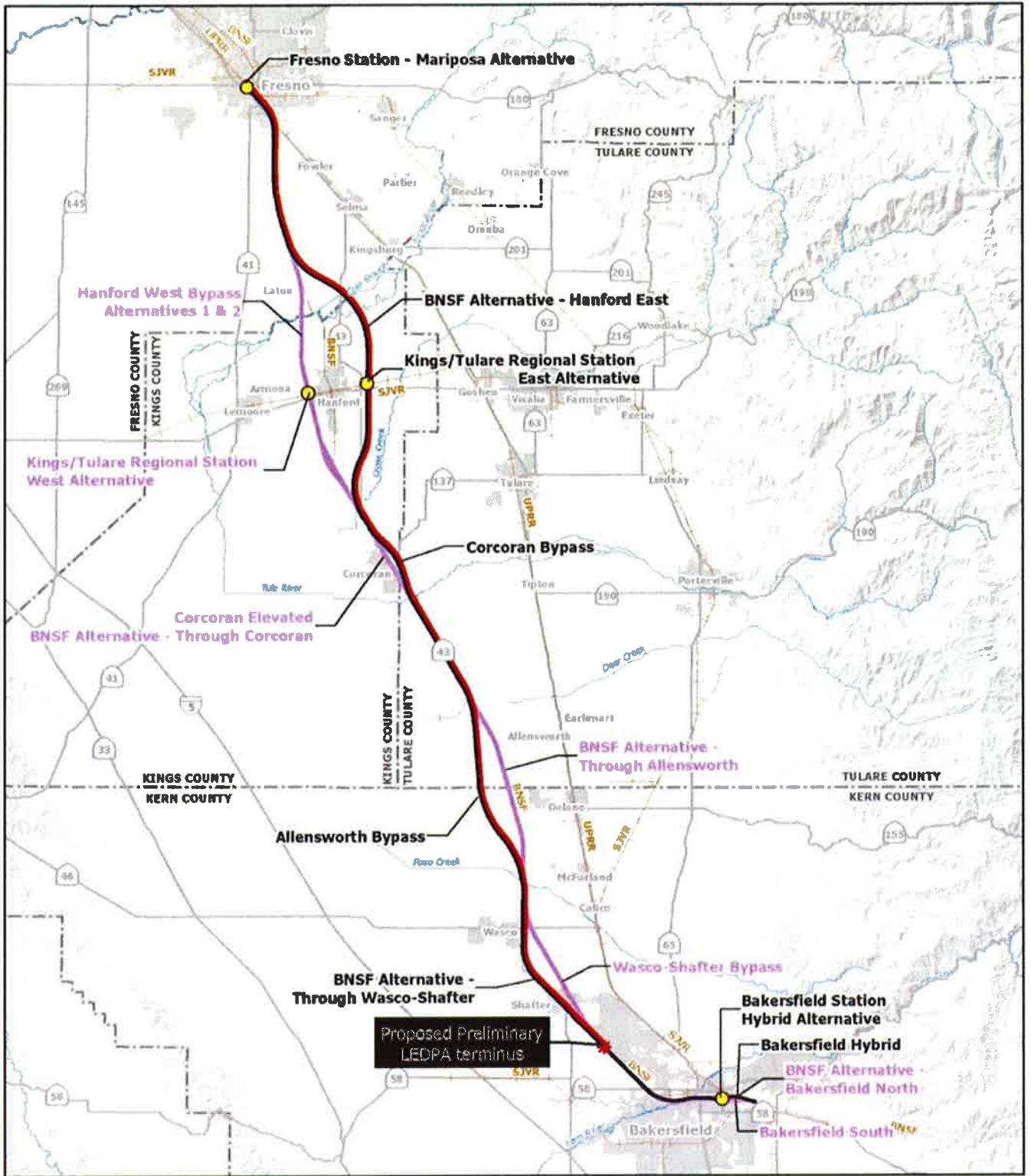
**ATTACHMENT 1:**  
**PROGRAMMATIC AGREEMENT**

## **ATTACHMENT 2:**

### **ALIGNMENT / AREA OF POTENTIAL EFFECTS**

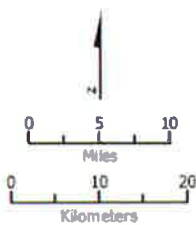
The following figure depicts the alignment of the selected alternative (thick black line) in relation to other alternatives that have also been studied (pink line). The APE for the selected alternative consists of 114 linear miles of track on new alignment, with a right-of-way anticipated to average approximately 100 feet wide. The vertical APE varies widely depending on terrain and engineering needs, with most areas experiencing ground disturbances to depths of two meters or less, and a small number of areas being disturbed to depths as great as eight meters. The APE represents the maximum extent of any potential direct ground disturbance and of any indirect effects from the construction of the Undertaking. The APE was developed and agreed upon among FRA, the Authority, and the SHPO consistent with the requirements of PA Stipulation VI.A, and accounts for potential impacts on both archaeological and built-environment historic properties that may result from the construction and operation of the Project. Potential changes to the APE are addressed in Stipulation II of this MOA.





Data source: URS/HMM/Arup JV, 2013

October 8, 2013



- Proposed Preliminary LEDPA
- Proposed Preferred Alternative
- Alternative alignment
- Station
- Stream
- Existing rail line
- Community/Urban area
- County boundary

**ATTACHMENT 3:**

**AVOIDANCE AND MITIGATION MEASURES  
FOR KNOWN HISTORIC PROPERTIES**

### **ATTACHMENT 3. MEASURES AND CONDITIONS FOR KNOWN HISTORIC PROPERTIES**

#### **GENERAL AVOIDANCE MEASURES**

The HST design was refined to enable the project to avoid certain types of adverse effects, specifically noise and vibration. Adverse noise and vibration effects on historic properties could occur during construction activities and during operation of the HST System. The following general avoidance measures have been developed to avoid effects to multiple historic properties on the HST System.

##### **General Avoidance Measure #1 – Noise Effects**

Operational noise has the potential to cause indirect adverse effects on historic properties that have an inherent quiet quality that is part of a property's historic character and significance (36 CFR 800.5[a][2][iv] and [v]). The objective of this treatment is to develop design solutions or construction methods to minimize adverse operational noise effects on historic properties that have qualities that make them sensitive noise receptors. The primary requirement of this treatment is to document the consideration of operational noise reduction methods and an assessment of the reduction of operational noise levels associated with the alternative designs. If alternatives are deemed infeasible, or would not notably reduce noise impacts, this will be clearly explained in a technical memorandum for use in conferring with the MOA consulting parties.

##### **General Avoidance Measure #2 – Vibration Effects**

Steps taken to address potential adverse effects on historic properties shall include developing methods to avoid construction vibration effects. Potential structural damage caused by construction vibration is anticipated only from impact pile driving at very close distances to buildings. Vibration from impact pile driving during construction could reach up to 0.12 inch/second (in/sec) peak particle velocity (PPV), or approximately 90 root mean square vibration velocity level, decibels [VdB], at 135 feet from the project centerline. This level could cause the physical destruction, damage, or alteration of historic properties within 135 feet. Because impact pile driving could cause indirect adverse effects, alternative construction methods causing vibration of less than 0.12 in/sec PPV shall be employed near historic properties, or CEQA historical resources, located within 135 feet from the project centerline. Implementation of this condition (development of alternative construction methods) will minimize adverse vibration effects on historic properties.

#### **GENERAL MITIGATION MEASURES**

The following general mitigation measures have been developed to mitigate effects to multiple historic properties on the HST System.

##### **General Mitigation Measure #1 – Plan for Repair of Inadvertent Damage**

A plan for repair of inadvertent damage shall be prepared and implemented as a treatment to minimize inadvertent adverse effects on historic properties caused by project construction activities. The plan content shall be detailed in the BETP and developed before construction begins. The plan shall use any survey or preconstruction photographic documentation prepared for the property as part of the baseline condition for assessing damage. The plan shall describe the protocols for documentation of inadvertent damage (should it occur), as well as notification,

coordination, and reporting to the SHPO and the owner of the historic property. The plan shall direct that inadvertent damage to historic properties shall be repaired in accordance with the Secretary of the Interior's (SOI) *Standards for the Treatment of Historic Properties* (U.S. Department of the Interior 1995). The plan shall be developed in coordination with the Authority and FRA, and shall be submitted to the SHPO for review and comment.

#### **General Mitigation Measure #2 – Recordation/Documentation of Historic Properties**

Historic properties that would be physically altered, damaged, relocated, or destroyed by the project shall be documented in detailed recordation that includes photography. This documentation may consist of preparation of updated recordation forms (DPR 523), or may be consistent with the HABS, the Historic American Engineering Record (HAER), or the Historic American Landscape Survey (HALS) programs; a Historic Structure Report; or other recordation methods detailed in the BETP. The recordation undertaken by this treatment shall focus on the aspect of integrity and significance that would be affected by the project for each historic property subject to this treatment. For example, historic properties in an urban setting that would experience an adverse visual effect would be photographed to capture exterior and contextual views; interior spaces would not be subject to recordation if they would not be affected. Consultation with the SHPO and the consulting parties shall be conducted for the historic architectural resources to be documented. Recordation documents shall follow the appropriate guidance for the recordation format and program selected.

Before construction, consultation shall be initiated with the SHPO and other relevant parties to the MOA to identify the appropriate type of documentation. In general, photography should capture views of the historic property from multiple views, and could include reproduction of historic images as well. All fieldwork necessary for photographic documentation, architectural or engineering drawings, cartography, and/or digital recordation through geographic information or global positioning systems (GIS and GPS, respectively) shall be completed before project construction begins. The written data will include a historic narrative for the historic property that will utilize inventory, evaluation, and/or nomination documents to the extent possible.

Preparation of the photo documentation may require coordination with an interdisciplinary team, and may include an architectural historian, a historian, and/or a photographer. The BETP shall detail the required personnel and qualification standards for these preparers. FRA and the Authority shall submit the documentation to the SHPO for review and comment. The BETP shall also identify the distribution of printed and electronic copies of the photo documentation, as well as permanent archival disposition of the record, if applicable.

#### **PROPERTY-SPECIFIC MEASURES AND CONDITIONS**

The following section identifies the avoidance and mitigation measures to be implemented for each historic property currently determined to be adversely affected by the Project. One property (the Salon Juarez Traditional Cultural Property) was found to not be adversely affected, due to commitments made to implement conditions which would avoid any adverse effects. For that property, conditions to avoid effects are listed below.

<p><b>Property: South Van Ness Entrance Gate</b> Location: 2208 S. Van Ness Avenue, Fresno (vicinity)</p>	<p><b>Effect: Adverse Effect – Indirect</b></p>		
<p><b>Mitigations</b></p>	<p>A. <b>Relocate Van Ness Gate to another Fresno Street.</b> The South Van Ness Entrance Gate shall be relocated to another location in the City of Fresno to avoid its destruction and minimize the direct adverse effect of physical damage or alteration. This treatment will partly mitigate the indirect adverse effect caused by the permanent closure of South Van Ness Avenue, and would avoid demolition of the structure, but the relocation would require evaluation under the criteria of adverse effect and the property may still be adversely affected by the project. A relocation plan shall be prepared prior to relocation implementation. The relocation plan will include input from consulting parties regarding relocation of the Van Ness Gate structure to provide a comprehensive and thorough approach that will best meet the needs of the parties and the property. The relocation plan for the historic property will take into account its historic site and layout. The plan shall also provide for stabilization of the structure before, during, and after the move, as well as repair of inadvertent damage caused by the relocation.</p> <p>B. <b>Prepare Recordation/Documentation.</b> Recordation documentation of the South Van Ness Entrance Gate shall be prepared, including current photographs and reproduction of historic images, to mitigate the indirect adverse effect from the construction of the project. Photography would capture views of the gate at its location on S. Van Ness Avenue to document it as a structure that spans an active roadway and may be used in the relocation plan and/or the preparation of interpretive or educational materials. (See "General Mitigation #2 – Recordation/Documentation" for a more detailed description of this mitigation measure). The fieldwork necessary for this mitigation measure (e.g., photography and reproduction of historic images), shall be conducted before construction begins. Details of the specifications and implementation of this mitigation measure shall be presented in the BETP.</p> <p>C. <b>Prepare Interpretive or Educational Materials.</b> The Van Ness Gate historic property shall be subject to historic interpretation or preparation of educational materials regarding its history. The interpretive or educational materials will provide information regarding this specific historic property and the aspects of its significance that would be affected by the project. Interpretive or educational materials could include, but are not limited to: brochures, videos, websites, study guides, teaching guides, articles or reports for general publication, commemorative plaques, or exhibits. The interpretive or educational materials will utilize images, narrative history, drawings, or other material produced for the mitigation described above, including the additional recordation prepared, and/or archival sources. The interpretive or educational materials may be advertised and shall be made available to the public. The interpretive materials may be made available in physical or digital formats, at local libraries, historical societies, or public buildings. SHPO shall have 30 days to review and comment on draft interpretive/educational materials prior to finalization and/or publication.</p>	<p><b>Timing</b></p> <p>Sufficiently prior to construction for deconstructing, storing, and reconstructing as per BETP; reconstructing may take place during or after construction</p> <p>Prior to construction</p> <p>Prior, during, or after construction</p>	<p><b>Party</b></p> <p>CHSRA</p> <p>CHSRA</p> <p>CHSRA</p>



<b>Property: Washington Colony Canal (Contributor to WICRHL)</b> Location: Fresno County		<b>Effect: Adverse Effect – Direct</b>	
<b>Mitigations</b>		<b>Timing</b>	<b>Party</b>
The Washington Colony Canal is a contributing element of the Washington Irrigated Colony Rural Historic Landscape and is subject to the treatments proposed above for the larger historic landscape and its contributing elements.		Various; see WICRHL above	CHSRA

<b>Property: North Branch of Oleander Canal (Contributor to WICRHL)</b> Location: Fresno County		<b>Effect: Adverse Effect – Direct</b>	
<b>Mitigations</b>		<b>Timing</b>	<b>Party</b>
The North Branch of Oleander Canal is a contributing element of the Washington Irrigated Colony Rural Historic Landscape and is subject to the treatments proposed above for the larger historic landscape and its contributing elements.		Various; see WICRHL above	CHSRA

<b>Property: Residence at 7870 South Maple Avenue (Contributor to WICRHL)</b> Location: Fresno County		<b>Effect: Adverse Effect – Indirect</b>	
<b>Mitigations</b>		<b>Timing</b>	<b>Party</b>
The property at 7870 South Maple Avenue is a contributing element of the Washington Irrigated Colony Rural Historic Landscape and is subject to the treatments proposed above for the larger historic landscape and its contributing elements.		Various; see WICRHL above	CHSRA

<b>Property: Residence at 7887 South Maple Avenue (Contributor to WICRHL)</b> Location: Fresno County		<b>Effect: Adverse Effect – Indirect</b>	
<b>Mitigations</b>		<b>Timing</b>	<b>Party</b>
The property at 7887 South Maple Avenue is a contributing element of the Washington Irrigated Colony Rural Historic Landscape and is subject to the treatments proposed above for the larger historic landscape and its contributing elements.		Various; see WICRHL above	CHSRA

<b>Property: Peoples Ditch</b> Location: Kings County	<b>Effect: Adverse Effect – Direct</b>	
<b>Mitigations</b>	<b>Timing</b>	<b>Party</b>
<p>A. <b>Develop Protection and Stabilization Measures.</b> Protection and stabilization measures shall be developed before project construction for the segments of the Peoples Ditch that will be retained adjacent to project work that will alter the canal. This treatment will ensure that adverse effects on this historic property will be minimized to the extent possible during work that will alter a segment of the canal structure. Such mitigation measures will include, but are not necessarily limited to protection of the above ground historic canal from construction activities, specifically the demolition, re-alignment, and/or underground piping of a section of the canal.</p> <p>B. <b>Prepare Recordation/Documentation.</b> Recordation documentation of the adversely affected portion of People’s Ditch shall be prepared to mitigate the adverse effect from the construction of the project. Photography will capture views of the canal within the context of the larger historic landscape to which it contributes and may be used in the preparation of interpretive or educational materials. (See “General Mitigation #2 – Recordation/Documentation” for a more detailed description of this mitigation measure). The fieldwork necessary for this mitigation measure (e.g., photography and reproduction of historic images), will be conducted before construction begins. Details of the specifications and implementation of this mitigation measure will be presented in the BETP.</p> <p>C. <b>Prepare Interpretive or Educational Materials.</b> Peoples Ditch shall be subject to historic interpretation or preparation of educational materials regarding its history. The interpretive or educational materials will provide information regarding this specific historic property and the aspects of its significance that would be affected by the project. Interpretive or educational materials could include, but are not limited to: brochures, videos, websites, study guides, teaching guides, articles or reports for general publication, or exhibits. The interpretive or educational materials will utilize images, narrative history, drawings, or other material produced for the mitigation described above, including the additional recordation prepared, and/or archival sources. The interpretive or educational materials shall be made available to, and/or disseminated to the public. The interpretive materials may be made available in physical or digital formats at local libraries, historical societies, or public buildings. SHPO shall have 30 days to review and comment on draft interpretive/educational materials prior to finalization and/or publication.</p> <p>D. <b>Plan Repair of Inadvertent Damage.</b> A plan for repair of inadvertent damage of the Peoples Ditch shall be prepared and implemented as a treatment to minimize adverse effects caused by project construction activities on the portions of the canal structure adjacent to the project. (See “General Mitigation #1 – Plan for Inadvertent Damage” for a more detailed description of this mitigation measure). The plan would be developed before construction begins. The plan may use the preconstruction photographic documentation prepared for the photo recordation (above) as the baseline condition for assessing damage and will include the protocols for documentation of inadvertent damage (should it occur), notification, coordination, and reporting to the SHPO and to the landowners or land-owning agencies.</p>	<p>Before construction</p> <p>Fieldwork completed before construction</p> <p>Before construction</p>	<p>CHSRA</p> <p>CHSRA</p> <p>CHSRA</p>



<p><b>Property: Lakeside Cemetery</b> Location: Kent Avenue, Kings County</p>	<p><b>Effect: Adverse Effect – Indirect</b></p>		
<p><b>Mitigations</b></p>	<p><b>A. <u>General Mitigation.</u></b> The Lakeside Cemetery shall be subject to mitigation measures to minimize noise and vibration effects (see General Avoidance Measures #1 and #2), as well as a the preparation of a plan for repair of inadvertent damage and historic recordation/documentation (see General Mitigation Measures #1 and #2). The noise reduction measure is proposed because operational noise has the potential to cause indirect adverse effects on the Lakeside Cemetery, which has an inherent quiet quality that is part of its historic character and significance (36 CFR 800.5[a][2][iv] and [v]). Preliminary project design options, such as sound walls, have been developed to help reduce noise impacts and follow FRA methodologies for noise abatement. Details of the specifications and implementation of this mitigation measure will be presented in the BETP.</p> <p>Updated recordation documentation of the Lakeside Cemetery shall be prepared to mitigate the indirect adverse effect from the construction of the project. Photography will capture views of the property and its character-defining features and may be used in the preparation of protection plan. (See "General Mitigation #2 – Recordation/Documentation" for a more detailed description of this mitigation measure). The fieldwork necessary for this mitigation measure (e.g., photography, mapping, and reproduction of historic images), will be conducted before construction begins. Details of the specifications and implementation of this mitigation measure will be presented in the BETP.</p> <p><b>B. <u>Develop Protection and Monitoring Measures.</u></b> Protection measures for the Lakeside Cemetery shall be developed prior to construction of the project. This mitigation would ensure that inadvertent adverse effects on this historic property will either be avoided entirely, or minimized to the extent possible. Such treatment measures could include, but are not necessarily limited to, the following: installation of protective barriers around the historic property to prevent accidental damage from construction activities (e.g., excavation, grading, construction equipment, or laydown areas).</p> <p><b>C. <u>Prepare Archival Photo Documentation.</u></b> Recordation/documentation of the Lakeside Cemetery shall be prepared to mitigate the indirect adverse effect from the construction of the project. Photography should capture views of and from the cemetery to show the existing context of the property and its relationship to Kent Avenue and the surrounding area. The fieldwork necessary for this mitigation measure (e.g., photography, as-built drawings, cartography, or digital recordation) will be implemented before construction begins. (See General Mitigation Measure #2 for a more detailed description of the recordation/documentation mitigation measure).</p> <p><b>D. <u>Visual Screening.</u></b> The Lakeside Cemetery shall be subject to visual screening planting that will consist of the installation of trees and/or shrubs placed to minimize the view of the project from the property. This treatment will help reduce or minimize adverse effects on the cemetery. Plant species will be selected on the basis of their mature size and shape, growth rate, and drought tolerance. No species that is listed on the Invasive Species Council of California's list of invasive species will be planted. Visual screen planting may be undertaken in the form of boundary planting on the affected property, planting at affected viewpoints, and/or planting on project property as appropriate. This treatment will be developed in consultation with the landowner or land-owning agencies, as well as the SHPO and the MOA signatories. The visual screen planting treatment will include preparation of a planting plan that utilizes evergreen tree or shrub species and will take into account the growth rate, growth habit, and ultimate height and width for the selected species, to ensure that the visual screen can be accomplished effectively. Details of the specifications and implementation of this mitigation measure will be presented in the BETP.</p>	<p><b>Timing</b></p> <p>Various; see below</p> <p>Fieldwork completed before construction</p> <p>Before construction</p> <p>Fieldwork completed before construction</p> <p>Before, during, or after construction</p>	<p><b>Party</b></p> <p>CHSRA</p> <p>CHSRA</p> <p>CHSRA</p> <p>CHSRA</p> <p>CHSRA</p>

Effect: Adverse Effect – Indirect	
<b>Property: Stark/Spencer Residence</b> Address: 1321 N Street, Bakersfield	
Mitigations	Party
<p><b>A. Prepare Recordation/Documentation.</b> Recordation documentation of the Stark/Spencer Residence shall be prepared to mitigate the indirect adverse effect from the construction of the project. Photography will capture views of and from the house and its relationship to the existing neighborhood. The documentation may include reproduction of historic views of the residence as well. See Section 4.1.4 for a description of the recordation documentation measure. The fieldwork necessary for this mitigation measure (e.g., photography, as-built drawings, cartography, or digital recordation) would be implemented before construction begins. (See General Mitigation Measure #2 for a more detailed description of the recordation/documentation mitigation measure). Additional details regarding the specifications and implementation of this mitigation measure will be presented in the BETP.</p> <p><b>B. Visual Screening.</b> The Stark/Spencer Residence shall be subject to visual screening planting that will consist of the installation of trees and/or shrubs placed to minimize the view of the project from the property. This treatment will help reduce or minimize adverse effects on the historic property. Plant species will be selected on the basis of their mature size and shape, growth rate, and drought tolerance. No species that is listed on the Invasive Species Council of California's list of invasive species will be planted. Visual screen planting may be undertaken in the form of boundary planting on the affected property, planting at affected viewpoints, and/or planting on project property, as appropriate. This treatment will be developed in consultation with the landowner, as well as the SHPO and the MOA signatories. The visual screen planting treatment will include preparation of a planting plan that utilizes evergreen tree or shrub species and will take into account the growth habit, growth rate, and ultimate height and width for the selected species, to ensure that the visual screen can be accomplished effectively. Details of the specifications and implementation of this mitigation measure will be presented in the BETP.</p>	<p>Fieldwork completed before construction</p> <p>During or after construction</p>
	CHSRA
	CHSRA

<b>Property: Salon Juarez (Traditional Cultural Property)</b> Address: 1321 N Street, Bakersfield	<b>Effect: No Adverse Effect (through implementation of conditions)</b>	
<b>Conditions</b>	<b>Timing</b>	<b>Party</b>
<p>A. <b>Create Parking and a New Entrance to the Sal3n Ju3rez.</b> The primary project condition for the Sal3n Ju3rez shall be to provide legal parking to help avoid effects from the permanent closure of East 18<sup>th</sup> Street. The Sal3n Ju3rez can accommodate 300 people, and currently has approximately 50 events per year. Existing parking is along adjacent streets and informal parking takes place in the unpaved area adjacent to the freight rail line north and across E. 18<sup>th</sup> Street from Sal3n Ju3rez. One of two options for parking will be implemented (see Figure 4-35 in <i>Draft Section 106 Findings of Effect</i>, November 2013). Option A is to acquire the four parcels directly to the east of Sal3n Ju3rez to provide for parking. This option is preferred by the Sal3n Ju3rez Board because it would increase the visibility of the Sal3n Ju3rez from the busy intersection of East 18th and Beale streets. This option will be implemented if the land to the east of the Sal3n can be acquired. Option B would be undertaken if the land considered under Option A cannot be acquired. Option B would include providing parking on three lots directly to the west of Sal3n Ju3rez. These three parcels will be acquired by the project because they will lose access to/from East 18th Street. Access to the Option B parking would be reestablished to the parking lot from a cul-de-sac on King Street. Regardless of which option (A or B) is ultimately implemented, there is also the possibility of establishing overflow parking underneath and immediately north of the elevated rail platform, within HST right-of-way.</p>	<p>Prior to construction in vicinity of Sal3n Juarez</p>	<p>CHSRA</p>
<p>B. <b>Address Proximity of Sal3n Ju3rez Entrance to the HST Project.</b> Current plans are to permanently close East 18<sup>th</sup> Street at the Sal3n Ju3rez entrance and construct a cul-de-sac. Visual simulations showing the proximity of the elevated structure to the north faade of Sal3n Ju3rez demonstrate that the proximity of the HST project to the front entrance could diminish the desirability of use or rental of the facility. To avoid this effect, the project shall provide the Sal3n Ju3rez with a new entrance on either the eastern or western side of the main Sal3n Ju3rez building to be combined with the new parking lot (Condition #1 listed above; see also Figure 4-35 in <i>Draft Section 106 Findings of Effect</i>, November 2013). The eastern entrance is preferred by the Sal3n Ju3rez Board because it would increase the visibility of their facility from the busy intersection of East 18th and Beale streets. This option will be implemented if the land to the east of the Sal3n can be acquired. Otherwise the western parking lot and entrance will be implemented.</p>	<p>Prior to construction in vicinity of Sal3n Juarez</p>	<p>CHSRA</p>
<p>C. <b>Maintain Front Entrance.</b> The current front entrance at the northern end of the main building shall be preserved and can stay open for additional access and to provide for hearse access during funerals.</p>	<p>N/A</p>	<p>CHSRA</p>
<p>D. <b>Miscellaneous other facility improvements.</b> Additional conditions include: replacing as many as 12 existing windows in the main building, and as many as 3 existing double-doors and 2 existing single-doors in the main building; and establishing an outdoor children's play area in a location to be determined by SJMM members (southwest side of main building is currently-favored location). Other conditions could include (depending on the outcome of future parcel acquisition as described in item "B" above): providing advertisement assistance for event promotion, installation of a sign at the corner of Beale and East 18th Street, installation of an exterior commemorative plaque, and/or providing an entrance design that includes outdoor space in conjunction with the new entrance and parking.</p>	<p>Varies depending on possible condition</p>	<p>CHSRA</p>
<p>E. <b>Kitchen Area.</b> A modern kitchen shall be installed in the north end of the main building in order to enhance SJMM's current practice of serving food and drink in this location, functions which are integral to their existing cultural practices. The installation will minimally include: a serving counter for food and a serving counter for a bar area; modern kitchen appliances (i.e., lighting, stove, sinks with hot and cold water, refrigerator); utility improvements (i.e., plumbing and/or electrical and/or gas) needed to adequately operate those appliances and other standard food-preparation equipment. It is recognized that the existing food-serving and bar areas will probably need to be reconfigured and enlarged slightly (as much as 6' in width for the whole length of the existing kitchen/bar area) to accommodate the installation of a modern kitchen in this location, and that this reconfiguration and the assorted finishing details associated with it (walls, flooring, paint, etc.) are part of this condition.</p>	<p>Prior to construction in vicinity of Sal3n Juarez</p>	<p>CHSRA</p>
<p>F. <b>Renovation of Existing Bathrooms.</b> The three existing bathrooms in the main building shall be renovated with modern fixtures, lighting, finishing details, and improvements as needed to the existing electrical and plumbing systems to operate the improved fixtures and lighting.</p>	<p>Fieldwork completed prior to construction</p>	<p>CHSRA</p>

The bathroom most easily accessed by handicapped individuals and most easily made ADA-compliant will be made ADA-compliant.

G. **Prepare and Submit Historic Documentation with Oral Histories.** Historic documentation of the Salón Juárez shall be prepared. The written portion of the documentation will address the history of the property and its importance to the Mexican American community of Bakersfield and surrounding areas. Photographic documentation will include present views of the Salón Juárez and its relationship to the surrounding neighborhood, and, if they can be acquired, reproductions of historic images of the Salón Juárez as well. (See General Mitigation Measure #2 for a more detailed description of the recordation/documentation mitigation measure). The documentation shall be produced in a format that can easily be published as a public educational booklet that can be reproduced and sold by the SJMM organization. Details of the specifications and implementation of this condition will be presented in the BETP.

**Appendix B:**  
USFWS Biological Opinion  
and Amendment



# United States Department of the Interior



FISH AND WILDLIFE SERVICE  
Sacramento Fish and Wildlife Office  
2800 Cottage Way, Room W-2605  
Sacramento, California 95825-1846

In Reply Refer To:  
08ESMF00-2012-F-0247

**FEB 28 2013**

David Valenstein  
Chief, Environmental and Systems Planning Division  
U.S. Department of Transportation  
Federal Railroad Administration  
1200 New Jersey Avenue, SE  
Washington, D.C. 20590

Subject: Biological Opinion on the California High-Speed Train System: Fresno to Bakersfield Section Project, Fresno, Tulare, Kings, and Kern Counties

Dear Mr. Valenstein:

This is in response to the Department of Transportation, Federal Railroad Administration (FRA), July 6, 2012, letter requesting formal consultation with the U.S. Fish and Wildlife Service (Service) on the California High-Speed Train System: Fresno to Bakersfield Section (CHST-FB) Project, located in Fresno, Tulare, Kings, and Kern Counties, California. Your request was received in our office on December 1, 2011. The Authority determined that the proposed CHST-FB Project may affect, but is not likely to adversely affect the Fresno kangaroo rat, and requested the Service's concurrence with their determination. This document represents the Service's biological opinion on the effects of the action on the San Joaquin kit fox (*Vulpes macrotis mutica*), Fresno kangaroo rat (*Dipodomys nitratooides exilis*), the Tipton kangaroo rat (*Dipodomys nitratooides nitratooides*), the blunt-nosed leopard lizard, the vernal pool tadpole shrimp and its critical habitat (*Lepidurus packardii*), the California jewelflower (*Caulanthus californicus*), the Kern mallow (*Eremalche kernensis*), the San Joaquin woolly threads (*Monolopia congdonii*), Federally listed as endangered; the central California Distinct Population Segment of the California tiger salamander (*Ambystoma californiense*) (central California tiger salamander), the vernal pool fairy shrimp and its critical habitat (*Branchinecta lynchi*), the Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), the Hoover's spurge (*Chamaesyce hooveri*), Federally listed as threatened. in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq) (Act). Critical habitat for the vernal pool fairy shrimp and the vernal pool tadpole shrimp has been designated and occurs within the project

action area. Critical habitat for the Fresno kangaroo rat, the central California tiger salamander, the Valley elderberry longhorn beetle, and the Hoover's spurge has been designated but does not occur within the proposed CHST-FB Project action area. Critical habitat has not been designated for the San Joaquin kit fox, the Tipton kangaroo rat, the blunt-nosed leopard lizard, the California jewelflower, the Kern mallow, and the San Joaquin woolly threads.

The Service has determined that the CHST-FB Project, as proposed, may affect but is not likely to adversely affect the designated critical habitat for the vernal pool fairy shrimp and the vernal pool tadpole shrimp. This determination is based on the on the following:

1. The portion of designated critical habitat for these species that occurs within the project action area is located outside of the project footprint and the 250-foot area on both sides of the project footprint, where permanent effects to the hydrology of vernal pool habitat could occur. Therefore, we do not anticipate permanent effects to the Principle Constituent Elements of the designated critical habitat.
2. Permanent destruction or alteration of the critical habitat is not expected to occur as a result of the CHST-FB Project, as proposed.

The Service agrees with the Authority's determination that the CHST-FB Project, as proposed, may affect, but is not likely to adversely affect the Fresno kangaroo rat. This biological opinion serves as our written concurrence with this finding. This determination is based on the on the following:

1. Existing populations of the Fresno kangaroo rat have not been identified within this portion of its historic range.
2. Potential habitat for this species is located outside of the recovery zones identified in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (Service 1998).
3. The Authority has proposed conservation measures the Fresno kangaroo to avoid take of this species.

This biological opinion is based on: (1) California High-Speed Train: Fresno to Bakersfield, Potential Wetlands and Waters of the U.S., dated February 8, 2010; (2) *Fresno to Bakersfield Preliminary Jurisdictional Waters and Wetlands Delineation Report, Volumes 1, 2, 3, and 4*, dated June 2011; (3) *Draft Fresno Bakersfield Section Biological Resources*, July 2011; (4) *Draft Fresno to Bakersfield Draft EIR/EIS, Volumes I, II, and III*, dated August 2011; (5) *Draft Fresno to Bakersfield Section Compensatory Mitigation Plan*, dated September 2011; (6) *Draft Fresno to Bakersfield Biological Assessment*, dated September 2011; (7) *Draft Fresno to Bakersfield Biological Assessment*, dated June 2012; (8) *Revised Draft Fresno to Bakersfield Draft EIR/EIS, Volumes I, II, and III*, dated July 2012; (9) *Revised Draft Fresno to Bakersfield Draft EIR/EIS, Executive Summary*, dated July 2012; (10) *Assessment of the Use of Agricultural Lands by San Joaquin Kit Foxes* memo, dated February 7, 2013; (11) GIS data files; (12) *Assessment of Adequacy of Proposed Crossing Structures for San Joaquin Kit Foxes in the Biological*

*Assessment for the Fresno-Bakersfield Segment of the California High-Speed Train* memo, dated February 9, 2013; and (13) other information available to the Service.

### **Consultation History**

- |                       |   |
|-----------------------|---|
| July 6, 2012          | The Service received the biological assessment and request for formal consultation for the CHST-FB Project from the FRA.  |
| July, 17, 2012        | The Service participated in a meeting with URS at the Sacramento Fish and Wildlife Office.  |
| July 19, 2012         | The Service requested review of a draft project description proposed for inclusion in the biological opinion for the CHST-FB Project and requested for further information via electronic mail.                                 |
| September 26, 2012    | The Service requested information and submitted an <i>Information Checklist</i> template to the Authority and URS via electronic mail.  |
| September 27, 2012    | The Service received information requested on September 26, 2012 and a completed <i>Information Checklist</i> for the CHST-FB Project from the Authority and URS via electronic mail.   |
| September 28, 2012    | The Service requested the current Draft Compensatory Mitigation Plan and GIS files for the CHST-FB Project via electronic mail.   |
| October 1, 2012       | The Service received the Draft Compensatory Mitigation Plan and prospectuses for proposed properties for the CHST-FB Project via electronic mail.   |
| October 16, 2012      | The Service requested review and consideration of consistency for conservation measures that will be implemented for species that occur among multiple sections of the California High-Speed Train Project via electronic mail. |
| November 8 to 9, 2012 | The Service participated in a site visit with the FRA, the Authority, California Department of Fish and Wildlife (CDFW), and URS.   |
| November 14, 2012     | The Service requested supplemental information, including a review of the project description submitted to the Authority and URS on July 19, 2012 via electronic mail.  |



- December 3, 2012 The Service notified the FRA, the Authority, CDFW, and URS via electronic mail that Kern mallow may be present in Tulare County based on new information, and requested revised estimates of habitat loss for plant species that will be affected by the CHST-FB Project.
- December 10, 2012 The Service received updated prospectuses for proposed properties for the CHST-FB Project via electronic mail.
- December 14, 2012 The Service attended a meeting with the FRA, the Authority, CDFW, URS, AECOM, and Dr. Brian Cypher, to discuss planning for a report to be drafted by Dr. Brian Cypher regarding the status of San Joaquin kit fox throughout its range.
- January 3, 2013 The Service provided a summary of pending information action items necessary for completing the biological opinion to the Authority via electronic mail.
- January 15, 2013 The Service received supplemental information regarding botanical resources from the Authority via electronic mail.
- January 17, 2013 The Service received an electronic mail memo drafted by Dr. Brian Cypher to the Authority regarding his review of proposed locations of dedicated wildlife crossings for the San Joaquin kit fox, and a revised project description from the Authority via electronic mail.
- January 28, 2013 The Service participated in a meeting with the Authority at the Sacramento Field Office.
- January 29, 2013 The Service received the requested GIS files from URS, and submitted revisions and comments to Authority regarding the proposed conservation measures via electronic mail.
- January 30, 2013 The Authority submitted the 2010 memos from Dr. Brian Cypher to the Service via electronic mail.
- February 5, 2013 The Service participated in a meeting with the Authority at their office to discuss revisions to proposed conservation measures.
- February 8, 2013 The Service received revised conservation measures from the Authority via electronic mail.
- February 11, 2013 The Service received the *Assessment of the use of agricultural lands by San Joaquin kit foxes* memo, dated February 7, 2013, from Dr. Brian Cypher to the Authority via electronic mail.

- February 13, 2013                    The Service received the *Assessment of Adequacy of Proposed Crossing Structures for San Joaquin Kit Foxes in the Biological Assessment for the Fresno-Bakersfield Segment of the California High-Speed Train* memo, dated February 9, 2013, from Dr. Brian Cypher to the Authority via electronic mail. The Service corresponded with Authority and URS regarding estimates of the project action area via electronic mail.
- February 15, 2013                    The Service received requested information regarding plant surveys conducted in 2010 from the Authority via electronic mail. The Service requested further information regarding wildlife crossing opportunities for the San Joaquin kit fox from Dr. Brian Cypher
- February 15, 2013 to                The Service participated in email correspondence regarding February 20, 2013                    wildlife crossings with Dr. Brian Cypher and the Authority.
- February 22, 2013                    The Service received proposed revisions to the conservation measures from the Authority via electronic mail.
- February 25, 2013                    The Service received additional proposed revisions to the conservation measures from the Authority via electronic mail.
- July 2012 to                            The Service participated in weekly conference calls February 2013                    with the FRA, CHSRA, CDFW, and URS/HMM/Arup Joint Venture (URS).

## **PROJECT DESCRIPTION**

### **Description of the Proposed Action**

The proposed project is described as the Burlington Northern Santa Fe Railway (BNSF) Alternative Alignment, and consists of a single alignment for the entire length of the rail line, that will ultimately be determined from a combination of alternatives under consideration within the length of the primary alignment. These alternatives include two west of Hanford alternatives, each with two variations, at-grade and below-grade; one alternative alignment within the city of Corcoran; three separate alternative alignments around the cities Corcoran, Allensworth, and Wasco; and three alternatives within urban Bakersfield.

The Authority may begin construction activities at any point along the initial operating segment-first construction (IOS-first construction) of the statewide HST alignment. The IOS-first construction is approximately 130 miles long and mostly overlaps with the Fresno to Bakersfield section. A 25-mile portion of the IOS-first construction is in the Merced to Fresno Section. Currently, the IOS-first construction is divided into four separate construction packages. Ground

disturbance may occur concurrently within any of the construction packages and in more than one location at a time. A description of general project components, project alignment, and construction methods are included below. Additional project details are located in the biological assessment.

The proposed project includes construction, operation, and maintenance of an approximately 117-mile long rail line to support an intercity High-Speed Train (HST) from Fresno to Bakersfield in the Central Valley of California. The Fresno to Bakersfield section is one of nine sections of the overall HST system. The HST system will be a state-of-the-art electrically powered, high-speed, steel-wheel-on-steel-rail system. Trains will be capable of operating at speeds of up to 220 miles per hour on a fully grade-separated, dedicated track alignment. The entire rail alignment will be fenced or walled in order to control access for safety and security.

## **General Project Elements**

### *Trainsets*

The HST system will be designed to accommodate a typical train 9 to 11 feet in width with a total length of 660 feet and consisting of eight cars. A typical train consisting of two trainsets will seat up to 1,000 passengers and be approximately 1,320 feet long. Trains will operate up to 220 miles per hour.

### *Rail Line*

The proposed project will consist of a fully dedicated rail line, constructed from continuous welded steel rail. The rail line will be in a double-track formation, with one track. In some areas, such as near regional passenger stations, at least four tracks will be constructed to allow trains to pass one another. The following four general rail line profiles will be constructed: 1) At-grade tracks will be constructed at existing ground levels; 2) elevated tracks will be placed on retained fill; 3) aerial tracks will be placed on bridge structures; and 4) below-grade tracks will be constructed within retained cuts. The general rail profiles are discussed in further detail below.

1. At-grade rail line will be fixed to concrete cross ties that will be bedded in either crushed rock or a concrete slab. The top of the rail will be constructed at a minimum 4.5 feet above the 100-year floodplain. The height of the at-grade profile will vary based on topography and necessary clearance for culverts and other water conveyance structures. Drainage will be accomplished by constructing a 3-foot-wide drainage swale on either side of the rail line, which will be intercepted at regular intervals by culverts. Additional paired 30-inch-wide culverts will be used to prevent ponding along the alignment. Ducts will be constructed alongside the tracks to convey low voltage power cables and fiber optic lines to power trackside signaling and serve communications systems. Duct covers will serve as safety walkways for detraining passengers in the case of emergencies. An 8-foot high security fence will be installed on the outer edge of the HST right-of-way. The overall width of the right-of-way will be approximately 120 feet where the rail line is at grade. The proposed project will include between 79 and 91 miles of at-grade rail line

(1,149 to 1,324 acres).

2. Rail line elevated on retained fill will be used when necessary to narrow the right-of-way within a constrained corridor. Retaining walls will be built above existing ground level and backfilled.
3. Aerial tracks will be used in urban areas where extensive road networks need to be maintained. Aerial tracks will have a minimum clearance of approximately 16.5 feet over roadways and 24 feet over railroads. Pier supports will be approximately 10 feet in diameter at ground level. This type of rail line may also be used to cross riparian areas and other water features. The proposed project will include 22-33 miles of elevated and aerial rail line combined (160 to 240 acres).
4. Below-grade tracks will be used when the rail alignment crosses under existing rail tracks, roads, or highways that are at-grade. This rail type will be used only for short distances in highly constrained situations. Retaining walls will typically be needed to protect adjacent properties. Below-grade crossings will also be used for roadways when it is preferable for them to go below the rail track. The proposed project will include up to 3 miles of below-grade tracks (47 acres).

### *Road Crossings*

To maintain local traffic and agricultural access while maintaining grade separation with the HST tracks, the proposed project will include between 172 and 197 road crossings, depending on the selected alignment. Most road crossings will be constructed as overpasses, and each structure will have a footprint ranging 0.62 acres to 137.42 acres, with a median of approximately 24.5 acres, including the footprint of the HST track profiles.

### *Wildlife Crossings*

To maintain permeability and connectivity for wildlife along the rail line where it is at-grade, a variety of wildlife crossings will be constructed. Wildlife crossings will typically consist of modified culverts, and will be approximately 73 feet long, 10 feet wide, and 3 feet high. To accommodate variations in topography, the height of the at-grade profile may require wildlife crossing structures be depressed up to 1.5 feet below-grade. These crossings will yield a calculated “openness factor” (Bremner-Harrison et al. 2007) of 0.41, which is a calculation of the function of height, width, and crossing distance. At locations where storm water swales parallel the embankment, or localized flooding may occur, the approach to wildlife crossing structures will be designed to avoid ponding within the structures.

Additional wildlife crossing structure designs may include circular or elliptical pipe culverts, and longer culverts with crossing distances of up to 100 feet. These culverts will be at least 3 feet high, depressed no more than 1.5 feet below-grade, and meet or exceed a minimum 0.41 openness factor.

Additional wildlife crossing opportunities will be available along elevated portions of the alignment, at bridges over riparian corridors, road crossings, and drainage structures (i.e. large culverts). Dedicated wildlife crossings will be located approximately every 0.3 miles along the rail line between Cross Creek in Kings County and Poso Creek in Kern County. This section of the alignment is located adjacent to the Allensworth Ecological Reserve and the Pixley National Wildlife Refuge which are important areas for wildlife dispersal, particularly the San Joaquin kit fox. Dedicated wildlife crossings will be located on both the north and south sides of major river and creek crossings. There will be between 73 and 98 dedicated wildlife crossings constructed, depending on which rail alignment alternatives are selected.

### *Stations*

Stations will be sited and designed to allow for connection to local transit, airports, and highways. All stations will include the following elements:

1. Station buildings of 40,000 to 100,000 square feet (0.92 to 3.30 acres) that are two to three stories high and contain passenger boarding platforms, ticketing, waiting areas, passenger amenities, employee areas, and baggage and freight areas.
2. Parking facilities from 1.5 to 9 acres in Fresno and Bakersfield and 3.5 to 17.25 acres at the potential Kings/Tulare Regional Station.
3. Waiting areas and queuing space for taxis and buses.
4. Pedestrian connections.

The proposed project will include the construction of up to three train stations, one each in Fresno and Bakersfield, and a potential third Kings/Tulare Regional Station (Regional station) located either east or west of Hanford. One location is being considered for the Fresno station, three potential locations for the Regional station, and three locations are being considered for the Bakersfield station. Station locations will be based according to which rail alignments are selected. The stations will range in size from 18.5 to 20.5 acres for the Fresno Station, 25 to 48 acres for the Regional Station, and 19 to 24 acres for the Bakersfield station. Details of each Station alternative are discussed below.

### **Fresno Station**

The location for the Fresno station is:

1. **The Fresno Station-Mariposa Alternative:** This station will be located in downtown Fresno, less than 0.5 mile east of State Route (SR) 99 along the BNSF Alternative. This station will be centered on Mariposa Street and bordered by Fresno Street to the north, Tulare Street on the south, H Street on the east, and G Street on the west, and occupy approximately 20.5 acres.

### **Kings/Tulare Regional Station**

The three potential locations for the Regional station include:

1. The Regional Station-East Alternative: This station will be located east of SR 43 and north of the San Joaquin Valley Railroad on the BNSF Alternative, and occupy approximately 27 acres.
2. The Regional Station-West Alternative: This station will be located east of 13<sup>th</sup> Avenue and north of the San Joaquin Valley Railroad on the Hanford West Bypass 1 and 2 Alternatives, and occupy approximately 48 acres.
3. The Regional Station-West Alternative Below-Grade: This station will be in the same location and similar to the Regional Station West Alternative, except that the platform will be located below-grade. This proposed station will occupy approximately 48 acres.

### **Bakersfield Station**

The three potential locations for the Bakersfield station include:

1. The Bakersfield Station-North Alternative: This station will be located in downtown Bakersfield, at the corner of Truxtun Avenue and Union Avenue, east of an existing Amtrak station and corresponds with the BNSF Alternative Alignment, and occupy approximately 19 acres.
2. The Bakersfield Station-South Alternative: This station will be situated in the same general area as the Bakersfield-North Alternative, but will be located south of the BNSF right-of-way. This station will occupy approximately 20 acres.
3. The Bakersfield Station-Hybrid Alternative: This station will be located in the same general area as the Bakersfield-North and Bakersfield-South Alternatives, at the corner of Truxtun Avenue and Union Avenue, and occupy approximately 24 acres.

### *Electrical System*

The components of the electrical system include the following:

The overhead contact system (OCS), which is the wiring above the track that electrifies the train. OCS poles will be spaced approximately every 200 feet along straight portions of rail and every 70 feet in tight-turn areas.

1. Traction power substations, which provide power to the OCS, will be located approximately every 30 miles and will occupy 0.73 acres each within a 2-acre parcel (total occupied area = 3.65 acres). Five substations are planned. Each station will

include a 20 foot-wide access road from the nearest street access, and a protective perimeter fence will be installed.

2. Switching stations will be located approximately every 15 miles between traction power substations, and will occupy 0.22 acre each. Five switching stations are planned (total occupied area = 1.1 acres). Switching stations allow adjacent power sections to maintain power in the event of an outage.
3. Paralleling stations will be located approximately every five miles between the traction power substations and switching stations, and serve to stabilize current flow. Seventeen stations are planned, and each will occupy 0.18 acre for a total of 94 acres.

Additional elements of the electrical system will include backup and emergency power sources, which will consist of generators or batteries located at passenger stations. Also, signaling and train control huts will be located within the rail line right-of-way.

#### *Heavy Maintenance Facility*

One Heavy Maintenance Facility (HMF) will be constructed between the cities of Merced and Bakersfield in order to support the start-up and maintenance of the trainsets and overall system operation. The HMF will occupy at least 154 acres, and it is not known at this time if it will be located within the footprint of the proposed project or within the Merced to Fresno HST section. Five potential HMF sites are being considered within the Fresno Bakersfield section. The HMF will operate 24 hours a day, 7 days a week, with up to 1,500 employees working at a given time. An Operations Control Center will be co-located with the HMF.

#### *Maintenance-of-Way Facility*

A Maintenance-of-Way (MOW) facility will be constructed within the footprint of the proposed project. The MOW will be used for housing equipment and vehicles necessary for accessing the rail alignment and right-of-way for repairs and upgrades. If the HMF is constructed as part of the proposed project, the MOW will be co-located adjacent to the HMF. If the HMF is not constructed in the proposed project, the MOW will be located within the project footprint. The MOW will occupy approximately 26 acres.

#### **Project Alignment**

The BNSF Alternative Alignment will extend from Fresno to Bakersfield and will be sited adjacent to the existing BNSF right-of-way to the extent feasible. Several minor deviations from the existing BNSF right-of-way are necessary to accommodate engineering constraints for high-speed trains. The BNSF Alternative Alignment will not follow the BNSF right-of-way within the city of Fresno; rather, the BNSF Alternative will run east of and adjacent to the Union Pacific Railroad (UPRR) right-of-way. The alignment will also veer from the BNSF right-of-way near

the cities of Laton and Hanford, and rejoin the BNSF right-of-way near the city of Corcoran. The alignment will generally follow the BNSF corridor through Bakersfield to the project terminus at Oswell Street.

### *Fresno County*

The BNSF Alternative Alignment will begin at the north end of the Fresno station tracks adjacent to the western side of the UPRR right-of-way in the vicinity of Amador Street. The alignment will be below grade for approximately 140 yards as it crosses the Fresno Bee railroad spur. The alignment will return to grade and continue southeast through Fresno on the western side of the UPRR until reaching East Jensen Avenue. A temporary rerouting of existing railroad tracks (known as a shoofly track in railroad parlance) will be required between Fresno Street and SR41.

The temporary track from the shoofly will be removed after the new track is installed and service is restored to the existing track. An intrusion protection barrier approximately 1 mile in length will be required within the project footprint from approximately Stanislaus Street to Ventura Avenue due to the proximity of the UPRR and HST rights-of-way. An intrusion barrier is a safety wall erected between two rail lines to prevent a derailed train from entering the adjacent rail line. The alignment will again be below grade in a shallow trench as it travels underneath East Jensen Avenue, then curve to the south and be elevated over Golden State Boulevard and State Route (SR) 99. The elevated structure will span just over 1 mile and will reach a maximum height of approximately 55 feet. The alignment will return to grade and join the BNSF corridor on its western side at East Malaga Avenue south of Fresno. The BNSF Alternative will continue through Fresno County along the BNSF right-of-way in an area composed mostly of agricultural land.

Approximately 24 miles of track will be located in Fresno County. Nearly all of the alignment, roughly 22 of the 24 miles, will be at-grade. The HST alignment will be elevated where it crosses from the western side to the eastern side of the BNSF tracks near East Conejo Avenue. The elevated structure will span approximately 1 mile and will reach a maximum height of approximately 42 feet as it crosses over the BNSF tracks. A total of approximately 5.5 miles of BNSF tracks will be realigned from approximately East Sumner Avenue to East Huntsman Avenue and approximately East Rose Avenue to East Kamm Avenue to accommodate the HST alignment. Another 0.5 miles of BNSF tracks will be realigned in the vicinity of South Peach Avenue. The alignment will be at-grade with bridges where it crosses Cole Slough and the Kings River into Kings County. These bridges will clear the Cole Slough and Kings River levees by approximately 3 feet. Dedicated wildlife crossing structures will be placed between 100 and 500 feet to the north and south of Cole Slough and the Kings River. There will be approximately 2 to 4 wildlife crossing structures in Fresno County, depending on the rail alignment alternative selected.

### *Kings County*

Approximately 28 miles of the BNSF Alternative will be in Kings County. The rail line will pass east of the city of Hanford, parallel to and approximately 0.5 mile east of SR 43 (Avenue 8). South of Hanford in the vicinity of Idaho Avenue, the BNSF Alternative will curve to the west



and then south toward the BNSF right-of way. The alignment was refined in this area to avoid aquatic features north of Corcoran and east of the BNSF tracks. The alignment will rejoin the BNSF right-of-way on its western side just north of Corcoran and travel through the eastern edge of the city of Corcoran. The majority of this part of the alignment will pass through agricultural land except where it travels through the city of Corcoran. The alignment in Corcoran encompasses a number of land uses, including residential, commercial, and industrial. A total of approximately 8 miles of track within Kings County will be elevated. The first elevated portion will be located just east of the city of Hanford, and will span a length of 2.5 miles, beginning just south of Fargo Avenue and ending just north of Hanford Armona Road. This portion of the alignment will pass over the San Joaquin Valley Railroad and SR 198. The structure will reach a height of approximately 50 feet aboveground. The potential Kings/Tulare Regional Station will be located along this structure near the SR 43 and SR 198 interchange.

The alignment will continue at-grade south of Hanford Armona Road for approximately 10 miles, and then ascend onto an elevated structure over Cross Creek and the BNSF right-of-way. The structure will span a length of approximately 2.5 miles, beginning just before Cross Creek and returning to grade just before Nevada Avenue. The elevated structure will reach a maximum height above ground of 40 feet. The alignment will then continue at-grade and require an intrusion protection barrier within the project footprint from approximately Nevada Avenue to approximately North Avenue. The barrier will be approximately 2 miles in length. At Patterson Avenue, the alignment will again ascend onto an elevated structure over Brokaw Avenue, Whitley Avenue, a BNSF Railway spur, and agricultural facilities at the southern end of the city of Corcoran. The elevated structure will span approximately 1.7 miles. The alignment will be constructed on a retained embankment as it crosses into Tulare County, from north of 4<sup>th</sup> Avenue to Avenue 136. Approximately 0.3 miles of BNSF tracks will be realigned at Oregon Avenue, south of Corcoran.

Dedicated wildlife crossing structures will be provided from approximately Cross Creek south to the Tulare County line in at-grade portions of the railroad embankment at intervals of approximately 0.3 miles. The BNSF Alternative will also include dedicated wildlife crossing structures placed between 100 and 500 feet to the north and south of each of the following river/creek crossings: Dutch John Cut (Slough), Kings River, and Cross Creek. There will be approximately 10 to 18 wildlife crossing structures in Kings County, depending on the rail alignment alternative selected.

### *Tulare County*

The BNSF Alternative will cross approximately 22 miles of Tulare County. The alignment will travel through the county adjacent to the western side of the BNSF right-of-way. The majority of the alignment will be at-grade, with only a combined total of 4 miles elevated where the alignment crosses the Tule River, and then both Deer Creek and the Stoil railroad spur from the BNSF Railway. The elevated structure will reach a height of approximately 50 feet. This alignment will cross over Lakeland Canal.

Dedicated wildlife crossing structures will be provided throughout at-grade portions of the railroad embankment at intervals of approximately 0.3 miles. The BNSF Alternative will also include dedicated wildlife crossing structures placed between 100 and 500 feet to the north and south of each of the following river/creek crossings: Tule River and Deer Creek. There will be approximately 68 to 72 wildlife crossing structures in Tulare County, depending on the rail alignment alternative selected.

### *Kern County*

The Kern County portion of the BNSF Alternative is approximately 44 miles long and will pass through the cities of Wasco and Shafter on its way to Bakersfield. The alignment will closely follow the western side of the BNSF corridor until just south of Wasco, where it will cross over to the eastern side of the BNSF tracks. Approximately 4 miles of BNSF tracks will be realigned in the vicinity of 4<sup>th</sup> Street, from 8<sup>th</sup> Street to Poso Avenue, and from Jackson Avenue to Merced Avenue to accommodate the HST alignment. The alignment will continue on the eastern side of the BNSF right-of-way through Shafter and then cross over once more to the western side of the BNSF right-of-way. Approximately 8 miles of Santa Fe Way will be shifted west of the proposed alignment to accommodate the HST right-of-way, from north of Riverside Street to south of Renfro Road. Approximately 1.5 miles of the BNSF's Lone Star Rail Spur will be realigned from Riverside Street to south of Burbank Street. The alignment will generally follow the BNSF corridor through Bakersfield to the project terminus at Oswell Street. Approximately 2.5 miles of BNSF tracks will be realigned in Bakersfield from Jomani Drive to Glenn Street and from Oak Street to C Street to accommodate the alignment. Within this portion of the alignment, approximately 27 miles will be at-grade, and the remainder of the alignment will be elevated. Specifically, three elevated sections will occur along this section of the BNSF Alternative in the cities of Wasco, Shafter, and Bakersfield. The alignment will be at-grade with a bridge where it crosses Poso Creek.

The first elevated structure will begin at 1st Street, pass through Wasco for about 3 miles and return to grade north of Kimberlina Road. This structure will reach a height of approximately 45 feet to the top of the rail. From approximately Kimberlina Road, the alignment will continue at-grade for approximately 5 miles to just north of Shafter Avenue where it will again ascend onto an elevated structure.

The second elevated structure will run through Shafter for a distance of about 3.5 miles, between Shafter Avenue and Cherry Avenue. This structure will pass over a BNSF Railway yard within the city, and reach a maximum height of approximately 45 feet to the top of the rail. After returning to grade just south of Cherry Avenue, the alignment will travel approximately 10 miles to Country Breeze Place where it will ascend onto another elevated structure through Bakersfield.

The third elevated structure will run from Country Breeze Place through the Bakersfield Station to the terminus of the BNSF Alternative at Oswell Street. The elevated structure through Bakersfield will pass over the transportation corridor improvement projects, SR 99, the Kern River, and a BNSF Railway yard. The structure will range in height from 50 to 90 feet to the top of the rail. The highest elevations in the city of Bakersfield will be reached between Rosedale

Highway and SR 99. From SR 99 to the terminus of the BNSF Alternative, the structure will range in height from 50 to 70 feet to the top of the rail.

Dedicated wildlife crossing structures will be provided in at-grade portions of the railroad embankment at intervals of approximately 0.3 miles. The BNSF Alternative will also include dedicated wildlife crossing structures placed between 100 and 500 feet to the north and south of the Poso Creek crossing. There will be approximately 12 to 16 wildlife crossing structures in Kern County, depending on the rail alignment alternative selected. Dedicated wildlife crossing structures will not be installed between 100 and 500 feet to the north and south of the Kern River, because the BNSF Alternative will be elevated.

### **Alternative Alignments and Bypasses**

In addition to the BNSF Alternative, the Authority and FRA are considering seven other alternative alignments for portions of the Fresno to Bakersfield Section. The Authority developed these alternatives to avoid environmental, land use, or community impacts identified for portions of the BNSF Alternative.

#### *Hanford West Bypass 1 Alternative*

The Hanford West Bypass 1 Alternative Alignment will parallel the BNSF Alternative from East Kamm Avenue to approximately East Elkhorn Avenue in Fresno County. At East Conejo Avenue where the BNSF Alternative crosses to the eastern side of the BNSF tracks to pass the city of Hanford to the east, the Hanford West Bypass 1 Alternative continues south on the western side of the BNSF tracks. The Hanford West Bypass 1 will diverge from the BNSF corridor just south of East Elkhorn Avenue and ascend onto an elevated structure just south of East Harlan Avenue, cross over the Kings River complex and Murphy Slough, and passing the community of Laton to the west. The elevated structure will be approximately 0.8 miles in length and reach a maximum height of approximately 40 feet to the top of the rail. The Hanford West Bypass 1 Alternative will return to grade just north of Dover Avenue. The alignment will continue at-grade, curve gently to the east, and travel between the community of Armona to the west and the city of Hanford to the east. The Hanford West Bypass 1 Alternative rejoins the BNSF corridor on its western side at about Lansing Avenue. The alignment will then ascend onto another elevated structure, and travel over Cross Creek and the special aquatic features that exist north of the city of Corcoran. The elevated structure will span approximately 3 miles and reach a maximum height of approximately 20 feet to the top of the rail. This alignment will return to grade just north of Nevada Avenue and will connect to the BNSF Alternative traveling through Corcoran at-grade, on the western side of the BNSF corridor. The total length of the Hanford West Bypass 1 Alternative will be approximately 28 miles.

The Hanford West Bypass 1 Alternative includes a design option where the alignment will be below-grade between Grangeville Boulevard and Houston Avenue. The alignment will travel below-grade in an open cut with side slopes as it transitions to a retained-cut profile, approximately 40 feet below ground level. As the alignment transitions back to grade just north of Houston Avenue, the open cut profile will be used once more. The alignment will cross SR

198 and several local roads. South Peach Avenue, East Clarkson Avenue, East Barrett Avenue, Elder Avenue, and South Tenth Avenue will be closed at the HST right-of-way, while the other roads will be realigned and/or grade-separated from the HST with overcrossings or undercrossings. Grade separations at Grangeville Boulevard, 13th Avenue, and West Lacy Boulevard will be determined based on the alignment design option selected (at-grade or below-grade).

The potential Kings/Tulare Regional Station–West Alternative will be sited along this alignment east of 13<sup>th</sup> Avenue, between Lacey Boulevard and the San Joaquin Valley Railroad spur. This potential station includes at-grade and below-grade design options as well.

#### *Hanford West Bypass 2 Alternative*

The Hanford West Bypass 2 Alternative Alignment will be the same as the Hanford West Bypass 1 Alternative from East Kamm Avenue to just north of Jackson Avenue, but at this point the Hanford West Bypass 2 Alternative will curve away to the east from the Hanford West Bypass 1 alignment. The Hanford West Bypass 2 Alternative will then travel over Kent Avenue, the BNSF right-of-way, and Kansas Avenue on an elevated structure approximately 1.5 miles in length. The structure will reach a maximum height of 55 feet to the top of the rail before returning to grade north of Lansing Avenue and continuing along the BNSF corridor. Similar to the Hanford West Bypass 1 Alternative, the Hanford West Bypass 2 Alternative will travel over Cross Creek and the special aquatic features north of Corcoran and return to grade north of Nevada Avenue; however, the Hanford West Bypass 2 Alternative will be on the eastern side of the BNSF tracks to connect to either the Corcoran Elevated Alternative or the Corcoran Bypass Alternative. Like the Hanford West Bypass 1 Alternative, the Hanford West Bypass 2 Alternative will have a total length of approximately 28 miles.

The Hanford West Bypass 2 Alternative includes the same below-grade design option as the Hanford West Bypass 1 Alternative between Grangeville Boulevard and Houston Avenue as well as both at-grade and below-grade options at the potential Kings/Tulare Regional Station–West Alternative. Similar to the Hanford West Bypass 1 Alternative, the Hanford West Bypass 2 Alternative will cross SR 198 and several local roads. Road closures will be the same as those for the Hanford West Bypass 1 Alternative, and roadway modifications at Grangeville Boulevard, 13th Avenue, and West Lacey Boulevard will depend on the alignment design option selected.

#### *Corcoran Elevated Alternative*

The Corcoran Elevated Alternative Alignment will be the same as the corresponding section of the BNSF Alternative from approximately Nevada Avenue south of Hanford to Avenue 136, except that it will pass through the city of Corcoran on the eastern side of the BNSF right-of-way on an aerial structure. The aerial structure begins at Niles Avenue and returns to grade south of 4th Avenue. It will reach a maximum height of approximately 51 feet to the top of the rail. The total length of the Corcoran Elevated Alternative will be approximately 10 miles. An intrusion protection barrier will be required in the at-grade portion of the alignment from north of Nevada

Avenue to just north of Niles Avenue due to the proximity of the BNSF and HST rights-of-way. This barrier will be approximately 2 miles in length. Approximately 0.2 miles of BNSF tracks will be realigned at Patterson Avenue.

Dedicated wildlife crossing structures will be provided from approximately Cross Creek south to Avenue 136 in at-grade portions of the railroad embankment at intervals of approximately 0.3 mile. Dedicated wildlife crossing structures will also be placed between 100 and 500 feet to the north and south of each of the Cross Creek and Tule River crossings.

This alternative alignment will cross SR 43 and pass over several local roads on an elevated aerial structure. Santa Fe Avenue will be closed at the HST right-of-way.

#### *Corcoran Bypass Alternative*

The Corcoran Bypass Alternative Alignment will diverge from the BNSF Alternative at Nevada Avenue and swing east of Corcoran, rejoining the BNSF Railway route at Avenue 136. The total length of the Corcoran Bypass will be approximately 10 miles. An intrusion protection barrier will be required in the vicinity of Nevada Avenue due to the proximity of BNSF and HST rights-of-way. Similar to the corresponding section of the BNSF Alternative, the majority of the Corcoran Bypass Alternative will be at-grade. However, one elevated structure will carry the HST over SR 43, the BNSF tracks, and the Tule River. The structure will reach a maximum height of approximately 45 feet to the top of the rail.

Dedicated wildlife crossing structures will be provided from approximately Cross Creek south to Avenue 136 in the at-grade portions of the railroad embankment at intervals of approximately 0.3 mile. Dedicated wildlife crossing structures will also be placed between 100 and 500 feet to the north and south of each of the Cross Creek and Tule River crossings.

This alternative alignment will cross SR 43, Whitley Avenue/SR 137, and several local roads. SR 43, Waukena Avenue, and Whitley Avenue will be grade-separated from the HST with an overcrossing or undercrossing; other roads, including Niles Avenue, Orange Avenue, and Avenue 152, will be closed at the HST right-of-way.

#### *Allensworth Bypass Alternative*

The Allensworth Bypass Alternative Alignment will pass west of the BNSF Alternative to avoid the Allensworth ER and the Colonel Allensworth State Historic Park. The total length of the Allensworth Bypass Alternative Alignment will be approximately 21 miles; the alternative will begin at Avenue 84 and rejoin the BNSF Alternative at Elmo Highway. The Allensworth Bypass Alternative will be constructed on an elevated structure only where the alignment crosses Deer Creek and the Stoil railroad spur. The majority of the alignment will pass through Tulare County at-grade.

Dedicated wildlife crossing structures will be provided from approximately Avenue 84 to Poso Creek at intervals of approximately 0.3 mile. Dedicated wildlife crossing structures will also be placed between 100 and 500 feet to the north and south of both the Deer Creek and the Poso Creek crossings.

The Allensworth Bypass will cross several roads, including County Road J22, Avenue 24, Garces Highway, Woollomes Avenue, Magnolia Avenue, Pond Road, and Elmo Highway. Avenue 24, Woollomes Avenue, and Elmo Highway will be closed at the HST right-of-way, and the other roads will be realigned and/or grade-separated from the HST with overcrossings.

#### *Wasco-Shafter Bypass Alternative*

The Wasco-Shafter Bypass Alternative Alignment will diverge from the BNSF Alternative between Taussig Avenue and Zachary Avenue, cross over to the eastern side of the BNSF tracks and bypassing Wasco and Shafter to the east. The Wasco-Shafter Bypass Alternative will be at-grade except where it travels over 7th Standard Road and the BNSF tracks to rejoin the BNSF Alternative. This aerial structure will reach a maximum height of 75 feet to the top of the rail. Approximately 4 miles of Santa Fe Way will be shifted to the west of the proposed alignment from approximately Galpin Street to south of Renfro Road to accommodate the HST right-of-way. The total length of the alternative alignment will be 21 miles.

The Wasco-Shafter Bypass will cross SR 43, SR 46, East Lerdo Highway and several local roads. Some roads, such as SR 46, Kimberlina Road, Shafter Avenue, Beech Avenue, Cherry Avenue, and Kratzmeyer Road will be grade-separated from the HST with overcrossings/undercrossings; other roads will be closed at the HST right-of-way.

#### *Bakersfield South Alternative*

From the Rosedale Highway (SR 58) in Bakersfield, the Bakersfield South Alternative alignment parallels the BNSF Alternative at varying distances to the north. At Chester Avenue, the Bakersfield South Alternative curves south and parallels California Avenue. As with the BNSF Alternative, the Bakersfield South Alternative will begin at-grade and become elevated starting at Country Breeze Place through Bakersfield to its terminus at Oswell Street. The elevated section will range in height from 50 to 90 feet to the top of the rail. The realignment of the BNSF tracks from Jomani Drive to Glenn Street in Bakersfield will be required, as it is for the BNSF Alternative. Dedicated wildlife crossing structures will not be installed between 100 and 500 feet to the north and south of the Kern River, because the Bakersfield South Alternative will be elevated.

The Bakersfield South Alternative will be approximately 12 miles and will cross the same roads as the corresponding portion of the BNSF Alternative. This alternative includes the Bakersfield Station-South Alternative.

#### *Bakersfield Hybrid Alternative*

From Rosedale Highway (SR 58) in Bakersfield, the Bakersfield Hybrid Alternative follows the Bakersfield South Alternative as it parallels the BNSF Alternative at varying distances to the

north. At approximately A Street, the Bakersfield Hybrid Alternative diverges from the Bakersfield South Alternative, crosses over Chester Avenue and the BNSF right-of-way in a southeasterly direction, and then curves back to the northeast to parallel the BNSF tracks toward Kern Junction. After crossing Truxtun Avenue, the alignment curves to the southeast to parallel the UPRR tracks and Edison Highway to its terminus at Oswell Street. As with the BNSF and Bakersfield South alternatives, the Bakersfield Hybrid Alternative will begin at-grade and become elevated starting at Country Breeze Place through Bakersfield to Oswell Street. The elevated section will range in height from 30 to 90 feet to the top of the rail. The realignment of the BNSF tracks from Jomani Drive to Glenn Street in Bakersfield will be required, as it is for both the BNSF and the Bakersfield South alternatives. Dedicated wildlife crossing structures will not be installed between 100 and 500 feet to the north and south of the Kern River, because the Bakersfield Hybrid Alternative will be elevated.

The Bakersfield Hybrid Alternative will be approximately 12 miles long and will cross many of the same roads as the BNSF and Bakersfield South alternatives. This alternative includes the Bakersfield Station-Hybrid Alternative.

## **Construction Methods**

### *Pre-Construction Activities*

During final design, the Authority and its contractor will conduct a number of pre-construction activities to determine how best to stage and manage the actual construction. These activities will include the following:

1. Conducting geotechnical investigations which will focus on defining precise geology, groundwater, seismic, and environmental conditions along the alignment. The results of this work will guide final design and construction methods for foundations, underground structures, tunnels, stations, grade crossings, aerial structures, systems, and substations.
2. Identifying staging areas and precasting yards which will be needed for the casting, storage, and preparation of precast concrete segments, temporary spoil storage, workshops, and the temporary storage of delivered construction materials. Field offices and/or temporary jobsite trailers will also be set up at the staging areas.
3. Initiating site preparation and demolition, such as clearing, grubbing, and grading, followed by the mobilization of equipment and materials. Demolition will require strict controls to ensure that adjacent buildings or infrastructure are not damaged or otherwise affected by the demolition efforts.
4. Relocating utilities, where the contractor will work with the utility companies to relocate or protect in place such high-risk utilities as overhead tension wires, pressurized transmission mains, oil lines, fiber optics, and communications prior to construction.

5. Implementing temporary, long-term, and permanent road closures to re-route or detour traffic away from construction activities. Handrails, fences, and walkways will be provided for the safety of pedestrians and bicyclists.
6. Siting the temporary batch plants that will be required to produce the Portland cement concrete or asphaltic concrete needed for roads, bridges, elevated structures, retaining walls, and other large structures. These plants generally consist of silos containing fly ash, lime, and cement; heated tanks of liquid asphalt; sand and gravel material storage areas; mixing equipment; aboveground storage tanks; and designated areas for sand gravel truck unloading, concrete truck loading, and concrete truck washout. The contractor will be responsible for implementing procedures for reducing air emissions, mitigating noise impacts, and reducing the discharge of potential pollutants into storage drains or watercourses from the use of equipment, materials, and waste products.
7. Conducting other studies and investigations, as needed, such as local business surveys to identify business usage, delivery, shipping patterns, and critical times of the day or year for business activities. This information will help develop construction requirements and worksite traffic control plans, and will identify potential alternative routes, cultural resource investigations, and historic property surveys.

### **Major Construction Activities**

Four major types of construction activities (earthwork; construction of bridges, aerial structures, and road crossings; construction of railroad systems; and construction of stations) are briefly described below.

#### *Earthwork*

Earth support is an important factor in constructing the deep excavations that will be encountered on several alignment sections. It is anticipated that the following excavation support systems may be used along the route. The three general excavation support categories are described below.

1. **Open Cut Slope:** Open cut slope is used in areas where sufficient room is available to open-cut the area and slope the sides back to meet the adjacent existing ground. The slopes are designed similar to any cut slope (i.e., the natural repose angle of adjacent ground material and global stability are taken into account).
2. **Temporary:** Temporary excavation support structures are designed and installed to support vertical or near vertical excavation faces in areas where room to open-cut does not exist. These structures do not contribute to the final load carrying capacity of the trench structure and they are either abandoned in place or dismantled as the excavation is being backfilled. Generally, a temporary excavation support structure consists of soldier piles and lagging, sheet pile walls, slurry walls, secant piles, or tangent piles.



3. **Permanent:** Permanent structures are designed and installed to support vertical or near vertical excavation faces in areas where room to open-cut does not exist. These structures form part of the permanent final structure. Generally permanent structures consist of slurry walls, secant piles, or tangent pile walls.

#### *Construction of Bridge, Aerial Structure and Road Crossing*

Each bridge or aerial structure will contain two tracks (one in each direction). There will be four tracks (two for local trains that stop at the station and two for express trains that pass through) at the elevated station alternatives in Fresno and Bakersfield (the potential Kings/Tulare Regional Station will at-grade or below grade). Station tracks will be 6,000 feet long with the station at the center. Of the four tracks passing through the station, the two express tracks (for trains that do not stop at the station) will be separated from those that stop at the station and platforms. In constructing the station tracks, more than one dual track aerial structure may be necessary. Similar to existing high-speed rail systems around the world, it is anticipated that the bridges and aerial structures will be designed and built as single box segmental girder. Where needed, other structural types will be considered and used, including steel girders, steel truss, and cable-supported structures. Basic construction elements of bridges, aerial structures, and road crossings are listed below:

1. **Foundations:** A typical aerial structure foundation pile cap is supported by an average of 4 large diameter bored piles with diameters ranging from 5 to 9 feet. The depth of the piles depends on geotechnical site conditions. Pile construction can be achieved by using rotary drilling rigs, and either bentonite slurry or temporary casings may be used to stabilize pile shaft excavation. The estimated pile production rate is 4 days per pile installation. Additional pile installation methods available to the contractor include bored piles, rotary drilling cast-in-place piles, driven piles, and a combination of pile jetting and driving. On completing the piles, pile caps can be constructed using conventional methods. For pile caps constructed near existing structures (e.g., the railway, bridges, underground drainage culverts), temporary sheet piling can be used to minimize disturbances to adjacent structures. It is anticipated that sheet piling installation and extraction is achieved using hydraulic sheet piling machines.
2. **Substructure:** Aerial structures with pier heights ranging from 20 to 90 feet may be constructed using conventional jump form and scaffolding methods. A self-climbing formwork system may be used to construct piers and portal beams over 90 feet high. The self-climbing formwork system is equipped with a winched lifting device, which is raised up along the column by hydraulic means with a structural frame mounted on top of the previous pour. In general, a 3-day cycle for each 12-foot pour height can be achieved. The final size and spacing of the piers depends on the type of superstructure and spans they are supporting.
3. **Superstructure:** It will be necessary to consider the loadings, stresses, and deflections encountered during the various intermediate construction stages, including changes in static scheme, sequence of tendon installation, maturity of concrete at loading, and load

effects from erection equipment. As a result, the final design will depend on the contractor's means and methods of construction and can include several different methods, such as a span-by-span, incrementally launched, progressive cantilever, and balanced cantilever.

### *Construction of Railroad Systems*

The railroad systems are to include trackwork, traction electrification, signaling, and communications. After completion of earthwork and structures, trackwork is the first rail system to be constructed, and it must be in place to start traction electrification and railroad signaling installation.

Trackwork construction generally requires the welding of transportable lengths of steel running onto longer lengths (approximately 0.25 mile), which are placed in position on crossties or track slabs and field-welded into continuous lengths. Both tie and ballast as well as slab track construction will be used. Tie and ballast construction, which will be used for at-grade and minor structures, typically uses cross ties and ballasts that are distributed along the trackbed by truck or tractor. In sensitive areas, such as where the HST is parallel to or near streams, rivers, or wetlands, and in areas of limited accessibility, this operation may be accomplished by using the established right-of-way with material delivery via the constructed rail line. For major civil structures, slab track construction will be used. Slab track construction is a non-ballasted track form employing precast track supports.

The traction electrification equipment to be installed will include traction power substations and the OCS. Traction power substations are typically fabricated and tested in a factory, then delivered by tractor-trailer to a prepared site adjacent to the alignment. It is assumed that substations are to be sited every 30 miles along the alignment. The OCS will be assembled in place over each track and will include poles, brackets, insulators, conductors, and other hardware.

The signaling equipment to be installed includes wayside cabinets and bungalows, wayside signals (at interlocking), switch machines, insulated joints, impedance bounds, and connecting cables. The equipment will support automatic train protection, automatic train control, and positive train control to control train separation, routing at interlocking, and speed.

### *Construction of Stations*

The typical construction sequence will be:

1. **Demolition and Site Preparation:** The contractor will be required to construct detour roadways, new station entrances, construction fences and barriers, and other elements required because the existing facilities on the worksite are taken out of service. The contractor will be required to perform street improvement work, site clearing and

earthwork, drainage work, and utility relocations. Substations and maintenance facilities are assumed to be newly constructed structures. For platform improvements or additional platform construction, the contractor may be required to realign existing track.

2. **Structural Shell and Mechanical/Electrical Rough-Ins:** For these activities, the contractor will construct foundations and erect the structural frame for the new station, enclose the new building, and/or construct new platforms and connect the structure to site utilities. The contractor will also rough-in electrical and mechanical systems and install specialty items such as elevators, escalators, and ticketing equipment.
3. **Finishes and Tenant Improvements:** The contractor will install electrical and mechanical equipment, communications and security equipment, finishes, and signage. The contractor may also install other tenant improvements, if requested.

### **Construction Materials and Equipment**

The materials required for construction will include steel rails, building materials for the maintenance facilities, control buildings, and power supply facilities; concrete; reinforcing steel; ballast; cement; aggregates; specialized train system components; fuel; and water. The materials will be delivered and stored at the project site for use.

Fill material will be excavated from local borrow sites and hauled by truck to the rail alignment. Railroad ballast will be drawn from existing, permitted quarries in various locations, from the Bay Area to Southern California. Ballast will be delivered by a combination of rail and trucks. All materials will be suitable for construction purposes and free from toxic pollutants in toxic amounts in accordance with Section 307 of the Clean Water Act.

Various types of construction equipment will be used in the different phases of the project. The types of equipment associated with the different construction phases are listed in Appendix A of the biological assessment.

### **Construction Staging**

To the extent practical, construction staging will utilize the same areas that will ultimately be occupied by permanent HST facilities. For example, staging areas will be placed at the future locations of the HST maintenance yards in Fresno and Bakersfield. Five additional staging areas will be set up at various points along the HST right-of-way. These staging areas will be spaced roughly evenly between Fresno and Bakersfield, and will be chosen for their easy access to the local road network and highways. All proposed construction staging areas are contained within the limits of the project footprint.

### **Construction Schedule**

Project construction will generally occur in 8-hour shifts between 7 a.m. and 7 p.m., 6 days per week. Occasionally, double shifts may also be required and will be subject to local regulations

regarding construction hours. The proposed CHST-FB Project, including construction of the various components may extend up to 7 years (Table 1).

**Table 1. Proposed construction schedule for the CHST-FB Project.**

Phase	Tasks	Duration
Right-of-Way Acquisition	Per Assembly Bill 3034, proceed with right-of-way acquisitions once State Legislature appropriates funds in annual budget	TBD
Survey and Preconstruction	Locate utilities, establish right-of-way and project control points and centerlines, and establish or relocate survey monuments	TBD
Mobilization	Mobilize safety devices and special construction equipment	April 2014–July 2014
Site Preparation	Relocate utilities; clear/grub right-of-way; establish detours and haul routes; prepare construction equipment yards, stockpile materials, and establish precast concrete segment casting yard	July 2014–October 2014
Earth Moving	Prepare excavations and earth support structures	November 2014–November 2016
Construction of Road Crossings	Prepare surface street modifications and grade separations	November 2014–November 2016
Construction of Aerial Structures	Construct aerial structures and bridge foundations, substructures, and superstructures	November 2014–January 2017
Track Laying	Lay tracks, including backfilling operations and drainage facilities	November 2016–August 2017
Systems	Prepare train control systems; paralleling, switching, and traction power systems; overhead contact system; communication system; signaling equipment	June 2017–May 2019
Demobilization	Demobilize, including site cleanup	October 2016–April 2017
HMF Phase 1 <sup>a</sup>	Assemble test track and prepare storage	May 2017–November 2018
Maintenance-of-Way Facility	Potentially co-located with HMF <sup>a</sup>	May 2017–November 2018
HMF Phase 2 <sup>a</sup>	Assemble test track	May 2017–November 2018
HMF Phase 3 <sup>a</sup>	Assemble HMF	June 2018–November 2018
HST Stations	Prepare/conduct demolition, site preparation, foundations, structural frame, electrical and mechanical systems, finishes	Fresno: June 2017–April 2020 Kings/Tulare Regional: TBD <sup>b</sup> Bakersfield: June 2018–April 2021
Notes:		
<sup>a</sup> HMF would be sited in either the Merced to Fresno Section or the Fresno to Bakersfield Section.		
<sup>b</sup> Right-of-way would be acquired for the Kings/Tulare Regional Station once it is decided that it will be constructed; however, the station itself		
HMF = heavy maintenance facility		
HST = high-speed train		
TBD = to be determined		

## **Operations and Maintenance**

This section describes the train schedule, lighting, and maintenance and inspection activities.

### *Train Service*

Three categories of trains will be operated: express, limited-stop, and all-stop trains. Express trains will run between major stations (e.g., San Francisco, Los Angeles, San Diego). An express train could make the trip between San Francisco and Los Angeles in 2 hours and 40 minutes. Limited-stop trains will skip selected stops along the route to provide faster service between stations. All-stop trains will focus on regional service.

### *Lighting*

In general, the right-of-way will not be lighted except at stations and associated maintenance and electrical facilities. Station lighting will be designed to provide safety for arriving and departing passengers within urban areas. Maintenance and electrical facilities will have permanent lighting for both interior and exterior areas, as needed to support operations, including those operations that require lighting 24 hours per day. Typically, exterior lights will be mounted on tall masts, towers, or poles and illuminate the area with sodium- or mercury-vapor light. The lights will be angled toward the ground to limit reflectance on the surrounding community.

### *Maintenance and Inspection Activities*

During operation of the HST system, programmed inspection and maintenance will be performed to verify that the project components are functioning as required. The Authority will regularly perform maintenance along the track and railroad right-of-way as well as the power systems, train control, signaling, communications, and other vital systems required for the safe operation of the HST system. Maintenance for the HST will include the following activities:

1. Inspection and repair of the rail line, the power supply system, structures (including dedicated wildlife crossings), signaling/control components, stations and the maintenance facilities.
2. Drain cleaning, vegetation control, and litter removal along the right-of-way, aerial structures, and bridge sections.
3. Long-term maintenance may include intermittent activities, such as replacing short lengths of rail or ballast. A maintenance-of-way program will be instituted to schedule inspection and maintenance activities.

## Conservation measures

The project proponent proposes to avoid or minimize effects to listed species and their respective habitats through the following conservation measures:

### General Conservation Measures

1. **Qualified Project Biologists and Biological Monitors:** At least 15 days prior to the onset of activities, the Authority will submit the name(s) and resumes of biologists and other qualified staff (e.g. biological monitors) who will conduct activities specified in the following measures. No project ground-disturbance activities will begin until proponents have received written approval from the Service that the biologists are approved to conduct the work, which approval shall be provided in 15 (calendar) days except under unusual or extraordinary cases. Qualified restoration ecologists, landscape architects, and special-status species experts may also be contracted, after Service approval, for assistance with implementation of proposed conservation measures.
2. **Regulatory Agency Access:** The contractor will allow access by the Service or other resource agency staff to the construction site. Due to safety concerns, all visitors will check in with the resident engineer prior to accessing the construction site.
3. **Prepare and Implement a Worker Environmental Awareness Program:** Construction contractor personnel who work onsite will attend a Worker Environmental Awareness Program (WEAP) training session. The environmental training will cover general and specific biological and legal information on federally listed species and their respective habitats. The training sessions will be given prior to the initiation of construction activities and repeated, as needed. Upon completion of the WEAP training, construction crews will sign a form stating that they attended the training and understand and will comply with the information presented. Updates and synopsis of the training will be provided 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. A fact sheet prepared by the Service-approved project biologist conveying this information will be prepared for distribution to the construction crews. Maintenance crews will be required to attend a contractor education and environmental training class annually.
4. **Prepare and Implement a Restoration and Revegetation Plan.** During final design, the Service-approved project biologist will prepare a restoration and revegetation plan (RRP) for upland communities. The RRP will be submitted to the Service for review and approval. This will be a complement for site restoration in addition to the temporary effects for riparian plant communities and for jurisdictional waters. The RRP will address impacts to habitat subject to temporary ground disturbances, such as de-compaction or regrading. The Service-approved project biologist will approve the seed mix for revegetation.

During construction activities, the contractor will implement the RRP in temporarily disturbed areas. The Service-approved project biologist will prepare and submit compliance reports to document implementation of this measure to the Service.

5. **Prepare and Implement a Biological Resources Management Plan.** Prior to construction activities, the Service-approved project biologist will prepare the Biological Resources Management Plan (BRMP) and assemble the biological resources conservation and mitigation measures.
6. **Prepare and Implement a Weed Control Plan:** Prior to construction activities, the contractor will prepare and implement a Weed Control Plan (WCP) to minimize or avoid the spread of weeds during construction activities. The contractor will implement the guidelines in the WCP during the project period and require that maintenance crews follow the guidelines in the WCP during the project period. The Authority or its designee will appoint the responsible party for implementing the WCP during the operations period. The WCP will include the following:
  - a. Schedule for conducting noxious weed surveys to be conducted in coordination with the BRMP.
  - b. Success criteria for noxious and invasive weed control as established by a qualified biologist.
  - c. Based on monitoring results, additional or revised measures may be needed to ensure the introduction and spread of noxious weeds is not promoted by the construction of the HST.
  - d. Provisions to ensure that the development of the WCP will be coordinated with development of the RRP so that measures to reduce the spread and establishment of noxious weeds and incorporates percent cover of noxious weeds into revegetation performance standards may be incorporated in the RRP.
7. **Pre-Construction Surveys.** The Service-approved project biologist will conduct preconstruction surveys for all properties not previously surveyed due to lack of access. All survey data will be provided to the Service prior to the initiation of ground disturbing activities. These surveys will determine the amount of direct and indirect effects to each species. Compensatory mitigation is proposed based on actual acres of direct effects and associated required compensatory mitigation.
8. **Biological Monitoring during Construction Activities.** The Service-approved project biologist will direct the work of Service-approved biological monitors who will be present onsite during key construction activities, including during ground disturbance activities and for all construction activities conducted within or adjacent to identified Environmentally Sensitive Areas (ESAs), wildlife exclusion fence zones (WEF), or non-

disturbance zones to oversee permit compliance and monitoring efforts. The Service-approved biological monitor(s), as hired by the Design/Build Contractor, will advise the contractor on methods that may minimize or avoid impacts on federally-listed species.

9. **“Take” Notification and Reporting.** The Service and the California Department of Fish and Wildlife (CDFW) will be notified within 24 hours, via telephone and email, after discovery of a project-related accidental death or injury to a federally or state-listed species during project-related activities. The BRMP will determine all Service-approved individuals responsible for take notification and reporting. .
10. **Environmentally Sensitive Areas, Wildlife Exclusion Fencing and Non-Disturbance Zones.** Fencing will be used to establish non-disturbance exclusion zones to restrict construction equipment and personnel from ESAs or restrict federally-listed wildlife species from entering the construction areas. The non-disturbance zones will be determined through consultation and permitting with the various natural resources regulatory agencies.

Two types of fencing, high visibility ESA fence and WEF, will be used for these purposes. ESA fencing will be identified and depicted on the project plans and delineated in the field by the Service-approved project biologist or Service-approved biological monitor (s). The contractor will ensure that all ESA areas are off-limits to construction personnel and equipment.

11. **Monofilament Restrictions.** During construction activities, the Service-approved biological monitor(s) will verify that the Contractor is not using plastic mono-filament netting (erosion-control matting) or similar material in erosion control materials. Non mono-filament substitutes including coconut coir matting, tackified hydroseeding compounds, rice straw wattles (e.g., Earthsaver wattles: biodegradable, photodegradable, burlap), reusable erosion, sediment, and wildlife control systems that may be approved by the regulatory agencies (e.g., ERTEC Environmental Systems products) may be used.
12. **Avoidance of Entrapment.** At the end of each work day, all excavated, steep-walled holes or trenches that are more than 8 inches deep will be covered at the close of each day with plywood or similar materials or provided a minimum of one escape ramp per 10 feet of trenching constructed of fill earth. Before such holes or trenches are filled, they will be thoroughly inspected for trapped wildlife by the Service-approved biological monitor(s). All culverts or similar enclosed structures with a diameter of 4 inches or greater that are stored at a construction site will be inspected for wildlife before the pipe is subsequently used or moved.



**13. Artificial Dens Along the Wildlife Exclusion Fencing and Non-Disturbance Zones.**

To mitigate the temporary impacts of ESA and WEF fencing on federally-listed species and their movement/migration corridors during construction, artificial dens will be installed along the outer perimeter of the ESA and WEF fencing. Artificial dens will also be installed at dedicated wildlife crossing structures to prevent predation by larger predators at wildlife undercrossings and to provide escape cover for wildlife, particularly the San Joaquin kit.

**14. Equipment Staging Areas.** Construction staging areas for storage of equipment and materials would be set up in areas that would ultimately be occupied by permanent HST facilities, such as the station sites or the HMF site. Additional staging areas may be sited based on the contractor's needs, access to local road networks, and highway access.

Prior to construction activities, the contractor under the supervision of the Service-approved project biologist, will locate staging areas for construction equipment that are outside of areas of sensitive biological resources, including habitat for federally listed species, habitats of concern, and wildlife movement corridors, to the maximum extent possible. The Service-approved project biologist will prepare a memorandum documenting compliance with this measure.

**15. Construction Utility Requirements and Waste Disposal.** Contractors would temporarily store excavated materials produced by construction activities in designated areas at or near the construction site. Wherever possible, they would return excavated soil to its original location to be used as backfill and would dispose of waste materials associated with construction in local landfills permitted to take those types of materials. Material unsuitable for reuse would be hauled offsite to a permitted location in conformance with the Act.

**16. Cleaning Of Construction Equipment.** During construction, all equipment will be washed to remove mud and plant materials to avoid introduction of invasive species when working in areas that could support federally-listed species.

**17. Dewatering and Water Diversion.** If construction occurs where open or flowing water is present, a strategy approved by the resource agencies (e.g., Service, U.S. Army Corps of Engineers (Corps), State Water Resources Control Board (SWRCB) and CDFW) will be used to dewater or divert water from the work area.

**18. Construction Site Speed Limits.** To minimize dust levels and the potential for construction equipment to strike federally listed species, the Service-approved project biologist will restrict project vehicle traffic within the project footprint to established roads, construction areas, and other designated areas during ground-disturbing activities. The Service-approved project biologist will establish vehicle traffic in locations disturbed

by previous activities to prevent further adverse effects, require observance of a 15-mph speed limit for construction areas with potential special-status species habitat, clearly flag and mark access routes, and prohibit off-road traffic.

19. **Work Stoppage.** During construction activities, the Service-approved project biologist or Service-approved biological monitors shall have stop work authority to protect any federally listed wildlife species within the project footprint. This work stoppage will be coordinated with the Authority or its designee. The contractor will suspend ground-disturbing activities in the immediate construction area where the potential construction activity could result in “take” of listed species; work may continue in other areas. The contractor will continue the suspension until the individual leaves voluntarily, is relocated to an approved release area using Service- and/or DFW-approved handling techniques and relocation methods, or as required by the Service and the CDFW.
20. **Post-Construction Compliance Reports.** A post-construction compliance report, consistent with Service protocols and in compliance with the Act, will be submitted to the Service upon completion of each construction package, construction phase, permitting phase, or other portion of the HST section as defined by Authority-contractor design/build contracts. The BRMP will determine the individual responsible for post-construction compliance reporting.
21. **Restoration of Temporarily Disturbed Areas.** Temporarily disturbed biological communities or habitats that could support federally-listed species or wetlands and other waters of the U.S. will be restored to pre-project conditions.
22. **Compensatory Mitigation.** Habitat compensation for impacts to federally-listed species may include the creation, restoration, enhancement, and/or preservation of habitat. Habitat compensation may be accomplished by: 1) purchasing “credits” from a Service-approved conservation bank with a service area covering the impact area; 2) by acquiring appropriate properties in fee-title; or 3) by establishing a conservation easement over a property. If options 2 or 3 are selected, an endowment fund or comparable funding instrument will be established in order to manage the property for the benefit of federally-listed species in perpetuity. Success criteria will be developed with the Service if compensatory mitigation is done through the creation, restoration or enhancement of suitable habitats. Additionally, a long-term management plan will be developed for the property. This plan will identify the monitoring, maintenance, management, and reporting requirements for the compensation site. All proposed habitat compensation sites, bank purchases, long-term management plans, conservation easements, and endowments will be submitted to the Service for review and approval before the plans are finalized and implemented. The proposed habitat compensation ratios for each species are discussed in the Species Specific Conservation Measures section below.

*San Joaquin kit fox*

1. The Authority will follow the Service's *Standard Measures for Protection of the San Joaquin Kit Fox Prior to or During Ground Disturbance* (Kit Fox Guidance) (Service 1999). Minimization measures included in that document are summarized below.
  - a. Prior to the start of construction activities, the Service-approved project biologist will conduct pre-construction surveys in accordance with the *San Joaquin Kit Fox Survey Protocol for the Northern Range* (Service 1999c). Pre-construction surveys for the kit fox will be conducted between May 1 and September 30 within the project in suitable habitat areas (alkali desert scrub, annual grassland, pasture, barren, and compatible-use agricultural lands) to identify known or potential San Joaquin kit fox dens. Pre-construction surveys will be conducted by a Service-approved project biologist within 30 days prior to the start of construction or ground disturbing activities and will be phased with project build-out. Reports for each survey will be submitted to the Service and the CDFW within 30 days of completion.
  - b. Disturbance to all kit fox dens will be avoided to the maximum extent possible.
  - c. During the breeding season (December 1 through July 31), all construction activities will be prohibited within the following limits:
    - i. Non-natal den exclusion zone of 100 feet surrounding occupied/non-occupied non-natal dens.
    - ii. Natal den exclusion zone of 200 feet for surrounding occupied/non-occupied natal dens.
  - d. All construction activities near any occupied dens will cease one-half hour before sunset and will not begin earlier than one-half hour after sunrise, when feasible.
  - e. A minimum of 5 days of den-monitoring is required to allow animals to vacate, during which time passive harassment measures (i.e., partially blocking den entrances with soil) may be pursued to encourage movement out of the den.
  - f. After a non-natal den is determined to be unoccupied, it may be excavated under the direction of a Service-approved biological monitor at any time of year.
  - g. Vacant natal dens may be excavated only between August 15 and November 1. If a kit fox is observed at the den during this period and construction activities within the non-disturbance exclusion zone of active San Joaquin kit fox burrows cannot be avoided, a Service-approved project biologist may initiate passive harassment measures in accordance with the Service's Kit Fox Guidance. Prior to

passive harassment efforts, the project biologist will contact the Service and CDFW for approval.

- h. If construction activities within the non-disturbance exclusion zone of active San Joaquin kit fox burrows cannot be avoided during the breeding and pupping season, the Service-approved project biologist will implement measures in accordance with the *Standardized Recommendations for Protection of the San Joaquin kit fox Prior to or During Ground Disturbance* following approval from the Service (Service 1999). Destruction of any known natal or pupping den will not occur without approval from the Service. A minimum of five days of den-monitoring is required to allow animals to relocate, during which time passive harassment measures (i.e., partially blocking den entrances with soil) may be pursued to encourage relocation. After a non-natal den is determined to be unoccupied, it may be excavated under the direction of a Service-approved project biologist following Service approval.
  - i. All construction pipes, culverts, or similar structures with a diameter of 4 inches or greater that are stored at a construction site for one or more overnight periods will be thoroughly inspected for kit foxes before the pipe is subsequently buried, capped, or otherwise used or moved in any way. If a kit fox is discovered inside a pipe, that section of pipe will not be moved until the Service has been contacted for guidance. If necessary, and under the direct supervision of the Service-approved biological monitor, the pipe may be moved once to remove it from the path of construction activity, until the fox has escaped.
2. If a San Joaquin kit fox is detected within the project footprint during construction, a Service-approved biologist, in accordance with agency guidance, will request approval from the Service and CDFW to capture and relocate the kit fox.
  3. The Authority, in collaboration with the Service and CDFW, will develop and implement a monitoring program for use of the dedicated wildlife crossings by San Joaquin kit fox. The final monitoring plan will be reviewed and approved by the Service prior to implementation. The goal of the monitoring program will be to collect data on use of dedicated wildlife crossings by the San Joaquin kit fox, and other wildlife species. The data will also be used to determine the efficacy of the wildlife crossing in facilitating movement of San Joaquin kit fox under the HST and inform future wildlife crossing design alternatives that could be installed in other segments. The monitoring plan will be implemented for five years and may be continued by mutual agreement between the Authority, the Service, and the CDFW.
  4. A Summary of the proposed habitat compensation, per conservation measures # 22, for the kit fox is provided below in Table 2.

**Table 2. Proposed San Joaquin kit fox habitat compensation ratios.**

San Joaquin kit fox Area	Habitat	Mitigation Ratio
Southwestern Tulare County Satellite Areas	Natural	3:01
	Developed	0.5:1
Metropolitan Bakersfield Satellite Area	Natural	3:01
	Developed	0.1:1
Recovery Plan-Linkage	Natural	3:01
	Developed	0.5:1
Other Areas (outside of Recovery Areas)	Natural	2:01
	Developed	0.1:1
Note:		
Natural includes: alkali desert scrub, annual grasslands, pasture, barren, and valley oak woodland habitats.		
Developed includes: agricultural lands (croplands, dryland grain fields, irrigated grain fields, irrigated row crops, orchards, hayfields, and vineyards) and urban areas.		

*Fresno Kangaroo rat*

1. **Implement Avoidance Measures for Fresno Kangaroo Rat.** Prior to the start of ground-disturbing activities, the Service-approved project biologist will conduct a habitat assessment on the identified parcels within the project footprint that may support the Fresno kangaroo rat to determine presence of kangaroo rat burrows or their sign.
2. If no burrows or signs of kangaroo rats are detected and kangaroo rats are confirmed to be absent from the project footprint, the following actions will be implemented:
  - a. The Service-approved project biologist will install, maintain, and monitor exclusion fencing along the perimeter of the project footprint to ensure that no take of Fresno kangaroo rat or destruction of their potential habitat outside of the project footprint occurs.
  - b. The Contractor will trim and clear vegetation to the ground by hand, using hand-operated equipment, or grazing animals (sheep, goats) to discourage small-mammal presence in the project footprint. The cleared vegetation will remain undisturbed by project construction equipment for 14 days to allow other small-mammal species to passively relocate through the one-way exit/escape points along the wildlife exclusion fencing.

3. In the unlikely event that kangaroo rat individuals, their burrows, or signs of them are found within the project footprint during the habitat assessment, the Service and CDFW will be notified immediately and the FRA will reinitiate consultation to identify appropriate conservation measures to be implemented for this species.

*Tipton Kangaroo rat*

1. Prior to construction, a habitat assessment will be conducted in potentially suitable habitat (alkali desert scrub, annual grassland, pasture, barren) within the project footprint by the Service-approved project biologist to determine presence of kangaroo rat burrows or sign. The habitat assessment surveys will be conducted within 2 years, and again no more than 14 days prior to the start of construction or ground disturbing activities, and may be phased with project build-out. If no burrows or sign of kangaroo rats are detected, no further measures will be required. Protocol-level surveys for the Tipton kangaroo rats will be conducted by Service-approved biologists with a valid 10(a)(1)(a) permit, in potentially suitable habitat areas where any burrows or sign are observed. The Service and the CDFW will be immediately notified if any Tipton kangaroo rats are discovered. A report for each protocol level survey for Tipton kangaroo rats will be submitted to the Service and the CDFW within 30 days of completion of the survey.
2. In areas where kangaroo rat burrows or sign are present, non-disturbance exclusion zones will be established at least 14 days prior to construction or ground disturbing activities. The fencing will be installed under the supervision of the Service-approved project biologist along the project footprint in potentially suitable habitat (alkali desert scrub, pasture, annual grassland, barren). Fencing will be composed of a combination of both ESA fencing and WEF with one way exit/escape points.
3. The following additional measures may be implemented after the exclusion fencing is installed:
  - a. In areas where kangaroo rat burrows or sign are present, vegetation will be trimmed and cleared to the ground by hand, hand operated equipment, or grazing animals (sheep, goats) to discourage Tipton kangaroo rat presence in the project footprint. The cleared vegetation will remain undisturbed by project construction equipment for 14 days to allow the species to passively relocate through the one way exit/escape points along the wildlife exclusion fencing, OR;
  - b. A small mammal trapping and relocation plan in general accordance with the survey protocols in the California Valley Solar Ranch Project: Plan for Relocation of Giant Kangaroo Rats (*Dipodomys ingens*) (H.T. Harvey & Associates, 2011) will be prepared for Service review and approval and will incorporate agency recommended species specific measures as applicable. The small mammal trapping surveys would occur within the project footprint in potentially suitable habitat (alkali desert scrub, pasture, annual grassland, and barren) that contain kangaroo rat burrows or sign. Trapping, with Service approval, will be conducted

prior to construction and phased with project build-out; trapping would be limited to the dry, summer months on evenings when the nightly low temperature is forecast to exceed 50 °F. Small mammal trapping and relocation will be performed by a Service-approved biologist(s) with a valid 10(a)(1)(a) permit.

4. Impacts to suitable habitat for the Tipton kangaroo rat will be compensated for, per conservation measure # 22, at a 3:1 ratio through the purchase of Service-approved bank credits or through preservation of occupied habitat in perpetuity.

*Central California tiger salamander*

1. Prior to construction activities, the Service-approved project biologist will conduct a pre-construction survey of potential breeding and suitable upland habitat in the Cross Creek grassland region to determine the presence or absence of central California tiger salamanders within the project footprint. Surveys will be conducted no more than 30 days before the start of ground-disturbing activities and will be phased with project build-out. If any central California tiger salamanders are found, the Service-approved project biologist will immediately notify the Service.
2. The measures listed below will be implemented in the Cross Creek grassland region to avoid and minimize potential adverse effects to this species:
  - a. The Service-approved project biologist will work in coordination with the Service to install, maintain, and monitor exclusion fencing along the perimeter of the project footprint to ensure that no take of central California tiger salamander or destruction of their potential habitat outside of the project footprint occurs.
  - b. The Service-approved project biologist will install exclusion barriers (e.g. silt fences) to exclude central California tiger salamanders from construction areas. Exclusion fencing will be maintained by the contractor throughout the central California tiger salamander's entire active period (November to April) or until all construction activities are completed, whichever occurs first. Exclusion fencing must be trenched into the soil at least four inches in depth, with the soil compacted against both sides of the fence for its entire length to prevent central California tiger salamanders from passing under the fence. Barriers must be inspected by the Service-approved project biologist at least twice weekly on non-consecutive days outside of the breeding season. Barriers will be inspected daily following any rain event, and during months when juvenile central California tiger salamanders are most likely emigrating from their breeding ponds in search of burrows in surrounding upland habitat. Barriers will be installed by the contractor with turn-arounds at any access openings needed in the fencing, to redirect central California tiger salamanders away from openings.

3. Non-disturbance exclusion zones will be established, maintained, and monitored by the Service-approved biological monitor(s) to ensure that take of central California tiger salamanders or destruction their potential habitat does not occur outside of the project footprint; fencing will be composed of a combination of high-visibility ESA fence and/or WEF.

Impacts to suitable upland habitat for the central California tiger salamander will be compensated for, per conservation measure # 22, at a 3:1 ratio through the purchase of Service-approved bank credits or through preservation of occupied habitat in perpetuity.

*Blunt-nosed leopard lizard*

1. Protocol-level surveys will be conducted by a Service-approved project biologist(s) in all suitable habitats (alkali desert scrub, annual grassland, barren, valley foothill riparian) within the project alignment one year prior to the start of construction following the California Department of Fish and Game's *Approved Survey Methodology for the Blunt-Nosed Leopard Lizard* (CDFG 2004).
2. The Service-approved biological monitor(s) will conduct visual preconstruction surveys within the project footprint in areas of potential blunt-nosed leopard lizard habitat no more than 30 days prior to ground disturbing activities. The Service-approved biological monitor(s) will conduct daily surveys prior to construction activities to ensure blunt-nosed leopard lizards are not within the project footprint. Reports for each survey will be submitted to the Service and the CDFW within 30 days of completion.
3. During the active season (April 15 through October 15), in areas where blunt-nosed leopard lizards or blunt-nosed leopard lizard signs are present, the following measures will be implemented:
  - a. Following the preconstruction survey for blunt-nosed leopard lizard within the project footprint, if active burrows or egg clutch sites are identified within the project footprint, the Service-approved Project Biologist will establish, maintain, and monitor 50-foot buffers around active burrows and egg clutch sites. The 50-foot buffers will be established around the active burrow and clutch sites in a manner that allows for a connection between the burrow site and the suitable natural habitat adjacent to the footprint so that blunt-nosed leopard lizard may leave the project footprint after the young have hatched. Project activities within the 50-foot buffers, including vegetation clearing and grubbing (as described below), will be prohibited until the eggs have hatched and blunt-nosed leopard lizard have been allowed to leave the project footprint, as determined by the Project Biologist.
  - b. Following the preconstruction survey for blunt-nosed leopard lizard within the project footprint, if no active burrows or egg clutch sites are identified within the project footprint, the Service-approved Project Biologist will conduct vegetation



clearing and grubbing activities with hand tools. Cleared vegetation will be cut to 4 inches above the ground level, and all trimmings will be removed from the project footprint. The vegetation-free work area will be allowed to sit undisturbed for a minimum of 72 hours to allow blunt-nosed leopard lizards to passively vacate the site. A follow-up preconstruction survey will be conducted in the vegetation-free work area to look for blunt-nosed leopard lizards or their sign. Any blunt-nosed leopard lizards observed during the follow-up survey will be allowed to leave the work site on their own accord. Immediately after the follow-up preconstruction survey of the vegetation-free work area, the project footprint will be delineated with high-visibility ESA fence and wildlife exclusion fence. The vegetation-free work area within the wildlife exclusion fence will be maintained and monitored daily by the Project Biologist.

- c. The Contractor will conduct ground-disturbing activities when air temperatures are between 75 and 95 degrees Fahrenheit. The temperature range corresponds to the period when this species is moving around and can avoid danger.
4. During the non-active season (October 16 through April 14), suitable blunt-nosed leopard lizard burrows identified during protocol-level and preconstruction surveys will be avoided by the Contractor. A 50-foot no-work buffer will be established around burrows to prevent impacts until the active season, when blunt-nosed leopard lizards will be able to leave the vegetation-free work area on their own accord. The no-work buffer will be established by routing the high-visibility ESA fence and wildlife exclusion fence around the suitable burrow sites in a manner that allows for a connection between the burrow site and the suitable natural habitat adjacent to the footprint so that blunt-nosed leopard lizard can leave the project footprint during the active season. If construction activities are required during this period, the appropriate measures will be established through consultation with the USFWS and CDFW.
5. If blunt-nosed leopard lizards are observed at any time during protocol-level surveys, preconstruction surveys, or the construction period, USFWS and CDFW will be contacted. Appropriate measures to avoid take of the species will be established through consultation with the USFWS and CDFW.
6. Non-disturbance exclusion zones will be established along the project footprint in potentially suitable areas (alkali desert scrub, annual grassland, barren, valley foothill riparian); fencing will be composed of a combination of both ESA high-visibility ESA fencing and wildlife exclusion fencing.
7. Non-disturbance exclusion zones will be maintained and monitored by the Service-approved biological monitor(s) to avoid the possibility for take of lizards, their burrows/nests, or the species' habitat outside of the project footprint.

8. Impacts to suitable upland habitat for the lizard will be compensated for at a 3:1 ratio through the purchase of Service-approved bank credits or through preservation of occupied habitat in perpetuity. Where possible, habitat preservation, per conservation measure # 22, will occur adjacent to the Pixley NWR and the Allensworth ER in order to ensure that large, contiguous blocks of blunt-nosed leopard lizard habitat are conserved.

*Vernal pool fairy shrimp and vernal pool tadpole shrimp*

To avoid and minimize potential adverse effects to the vernal pool crustaceans, the measures listed below will be implemented in the project footprint plus a 250-foot buffer where suitable habitat (e.g., vernal pools, seasonal wetlands) occurs and the species have potential to occur.

1. Non-disturbance exclusion zones will be maintained and monitored by a Service-approved biological monitor to ensure that take of vernal pool crustaceans or destruction their habitat does not occur outside of the project footprint and the 250-foot buffer where suitable habitat (e.g., vernal pools, seasonal wetlands) occurs and the species have potential to occur.
2. Initial construction activities in wetlands and other waters of the U.S. (e.g., vernal pools, seasonal wetlands, seasonal riverine areas, and riparian areas) will be restricted during the rainy season (October 15 to June 1). Construction may occur in these areas when there is no inundation, or the resource is dry or lacks flowing or standing water. In the event that construction work window restrictions cannot be conducted, dewatering, water diversions, or additional BMPs will be employed as determined through consultation with the Service, the Corps, CDFW, and the SWRCB, as applicable by regulating authority.
3. If construction activities must occur during the October 15 – June 1 period, initial ground disturbance activities will be scheduled to begin during the dry season, June 2 – October 14, to minimize the effects to vernal pool crustaceans and their habitat. If any work remains to be completed after October 15, exclusion fencing and erosion control materials will be installed to reduce sedimentation into vernal pool habitat.
4. Compensatory mitigation, per conservation measure # 22, will be provided for direct and indirect effects to vernal pool crustacean habitat. The ratios for these species will be based on whether the proposed mitigation is preservation or creation and on whether it occurs at an approved conservation bank or at a non-bank location. The compensatory mitigation ratios may range from 1.1:1 to 2:1 based on the guidance proposed in the 1996 U.S. Army Corps of Engineers, *Programmatic Formal Endangered Species Act Consultation on Issuance of 404 Permits for Projects with Relatively Small Effects on Listed Vernal Pool Crustaceans Within the Jurisdiction of the Sacramento Field Office, California* (USFWS 1996a).

*Valley elderberry longhorn beetle*

1. Protocol level presence/absence surveys for elderberry shrubs and signs of valley elderberry longhorn beetle exit holes, per the Service's *Conservation Guidelines for the Valley Elderberry Longhorn Beetle* (USFWS 1999b), will be conducted prior to construction activities within the project footprint and a surrounding 100-foot buffer.
2. If protocol-level surveys determine that elderberry shrubs occur within the project footprint plus a 100-foot buffer, then the contractor will install non-disturbance exclusion zone fences consisting of high-visibility ESA fence in compliance with the Service's 1999 *Conservation Guidelines for the Valley Elderberry Longhorn Beetle*. The Service-approved project biologist ensure that the protective measures set-forth in the *Conservation Guidelines for the Valley Elderberry Longhorn Beetle* will be implemented within the 100-ft buffer.
3. The compensatory mitigation ratios, per conservation measure # 22, for this species may vary from 1:1 to 8:1, depending on the presence of exit holes, and may include the planting of additional associated native plants and the transplanting of directly affected elderberry shrubs during the dormancy period, as described within the *Conservation Guidelines for the Valley Elderberry Longhorn Beetle* (USFWS 1999).

*California jewelflower, Hoover's spurge, Kern mallow, and San Joaquin woolly threads*

1. The Service-approved Project Biologist will prepare a plan before the start of ground-disturbing activities to address monitoring, salvage, relocation, and propagation of federally listed plant species. The plan will include provisions that address the techniques, locations, and procedures required for the successful establishment of the plant populations. The plan will include provisions for performance that address survivability requirements, maintenance, monitoring, implementation, and the annual reporting requirements. The plan will be submitted to the Service for concurrence.
2. Protocol level, pre-construction botanical surveys for federally listed plants species will be conducted prior to any ground disturbing activities in areas where permission to enter was not available or where full protocol level botanical surveys were not conducted. Botanical surveys will be conducted in areas of suitable habitat.
3. Portions of the project footprint that support federally listed plants that will be temporarily disturbed will be restored on-site to pre-construction conditions. Prior to disturbance, pre-construction conditions will be documented detailing species composition, species richness, percent cover of key species, and photo points will be established.

4. All populations of federally listed plants species that will be directly affected will be documented. Documentation will include the density and percent cover of the species and key habitat characteristics including soil type, associated species, hydrology, topography, and photo documentation of pre-construction conditions.
5. If a federally listed plant species is observed during protocol level, pre-construction surveys, compensatory mitigation will be provided at a 1:1 ratio based on actual acres of direct effects within the project footprint. Compensation would be accomplished by:
  - a. Identification of suitable sites to receive the listed plants.
    - i. Pixley National Wildlife Refuge, Allensworth Ecological Reserve/State Historic Park, Kern National Wildlife Refuge, Atwell Island, Alkali Sink Ecological Reserve, Semitropic Ecological Reserve, and Kern Water Bank;
    - ii. Authority proposed Permittee-Responsible Mitigation Sites;
    - iii. Or other locations approved by the Service.
  - b. Collection of seeds, plant materials, and top soil from the project footprint prior to construction impacts.

### **Analytical Framework for the Jeopardy Analysis**

In accordance with policy and regulation, the jeopardy analysis in this biological opinion relies on four components: (1) the *Status of the Species*, which evaluates the range-wide condition of the species included in this biological opinion, the factors responsible for that condition, and their survival and recovery needs of these species; (2) the *Environmental Baseline*, which evaluates the condition of the these species in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the species; (3) the *Effects of the Action*, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the species; and (4) the *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on the species.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of species current status, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the species in the wild. The jeopardy analysis in this biological opinion places an emphasis on consideration of the range-wide survival and recovery needs of the species and the role of the action area in the survival and recovery of the species as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

**Action Area**

The action area is defined in 50 CFR § 402.02, as “all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action.” For the purposes of the effects assessment, the action area includes the CHST-FB area footprint and lands surrounding it.

Several potential alignments have been identified in the Revised Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement for the proposed project. These alternatives include varying siting for not only rail alignments, but also other project infrastructure, including passenger stations, power delivery structures, maintenance-of-way facilities, operations control centers, and a HMF. Since an alternative has not been selected to date, this biological opinion includes a project description and effects analysis for all alternative alignments, and assesses effects to federally-listed species based on a range of impacts from minimum to maximum (expressed in acreages). Regardless of the final alignment selected, project impacts will be similar geographically as well as in general nature and magnitude.

The project footprint extends to the physical limits of the construction activities associated with the proposed action. The project footprint includes all areas that will be permanently or temporarily affected by the proposed action. The footprint consists of the limits of cut and fill plus all access roads and areas required for operating, storing, and refueling construction equipment. The estimated project footprint for the CHST-FB Project is expected to be no greater than approximately 4,700 acres.

The estimated length of the Fresno to Bakersfield alignment will extend up to 117 miles. The area affected by disturbance from noise and vibrations, dust, and lighting during project construction is expected to extend up to 1,000 feet from both sides of the track. Associated project structures, such as roadway improvements, overcrossings, related ancillary facilities, and other permanent project elements, are included in the estimated project action area for the CHST-FB Project. Therefore, the maximum acreage for the Fresno to Bakersfield alignment project action area, including the project footprint, is estimated to be a total of 48,451 acres, which will be considered for the purposes of this opinion.

**Status of the Species***San Joaquin kit fox*

For the most recent status of this species please refer to the 5-Year Review published in 2010 (Service 2010a).

*Tipton kangaroo rat*

For the most recent status of this species please refer to the 5-Year Review published in 2010 (Service 2010b).

*Blunt-nosed leopard lizard*

For the most recent status of this species please refer to the 5-Year Review published in 2010 (Service 2010c).

*Central California tiger salamander*

**Listing Status:** On May 23, 2003, we proposed to list the Central California Distinct Population Segment (DPS) of the central California tiger salamander as threatened (Service 2003a). At that time we also proposed reclassification of the Santa Barbara County DPS and Sonoma County DPS from endangered to threatened (Service 2003a). In the same notice we also proposed a special rule under section 4(d) of the Act to exempt take for routine ranching operations for the central California DPS and, if reclassified to threatened, for the Santa Barbara and Sonoma County DPSs (Service 2003b). On August 4, 2004, we determined that the central California DPS of the central California tiger salamander was threatened (Service 2004) and that the Santa Barbara and Sonoma County populations were threatened as well, and reclassified the central California tiger salamander as threatened throughout its range (Service 2004), removing the Santa Barbara and Sonoma County populations as separately listed DPSs (Service 2009a). In the 2004 final rule, we also finalized the special rule to exempt take for routine ranching operations for the central California tiger salamander throughout its range (Service 2004).

On August 18, 2005, as a result of litigation of the August 4, 2004, final rule on the reclassification of the central California tiger salamander DPSs (*Center for Biological Diversity et al. v. United States Fish and Wildlife Service et al.*, C 04-04324 WHA (N.D. Cal. 2005), the District Court of Northern California sustained the portion of the 2004 rule pertaining to listing the central California tiger salamander as threatened with a special rule, but vacated the portion of the 2004 rule that re-classified the Santa Barbara and Sonoma DPSs to threatened status thereby reinstating their status as endangered. On August 31, 2011, the List of Endangered and Threatened Wildlife in part 17, subchapter B of Chapter I, title 50 of the Code of Federal Regulations (CFR) was amended to reflect the vacatures contained in the 2005 court order, classifying the Santa Barbara DPS and the Sonoma DPS of the central California tiger salamander as endangered, and the Central DPS of the central California tiger salamander as threatened with a special rule to exempt routine ranching operations from take (Service 2005a and 2011a).

**Description:** The central California tiger salamander is a large, stocky, terrestrial salamander with a broad, rounded snout. Adults may reach a total length of 8.2 inches (Petranka 1998). Tiger salamanders exhibit sexual dimorphism; males tend to be larger than females. The coloration of the central California tiger salamander is white or yellowish markings against black. As adults, central California tiger salamanders tend to have the creamy yellow to white spotting on the sides with much less on the dorsal surface of the animal, whereas other tiger salamander species have brighter yellow spotting that is heaviest on the dorsal surface. The larvae have yellowish gray bodies, broad fat heads, large feathery external gills, and broad dorsal fins extending well up their back and range in length from approximately 0.45 to 0.56 inches (1.14 to 1.42 centimeters) (Petranka 1998).

**Distribution:** Historically, the central California tiger salamander inhabited low elevation grassland and oak savanna plant communities of the Central Valley, and adjacent foothills, and the inner coast ranges in California (Jennings and Hayes 1994; Storer 1925; Shaffer *et al.* 1993). The species has been recorded from near sea level to approximately 3,900 feet (1188.7 meters) in the coast ranges and to approximately 1,600 feet (487.7 meters) in the Sierra Nevada foothills (Shaffer *et al.* 2004). Along the coast ranges, the species occurred from the Santa Rosa area of Sonoma County, south to the vicinity of Buellton in Santa Barbara County. The historic distribution in the Central Valley and surrounding foothills included northern Yolo County southward to northwestern Kern County and northern Tulare County.

The central California tiger salamander occupies the Bay Area (central and southern Alameda, Santa Clara, western Stanislaus, western Merced, and the majority of San Benito counties), Central Valley (Yolo, Sacramento, Solano, eastern Contra Costa, northeastern Alameda, San Joaquin, Stanislaus, Merced, and northwestern Madera counties), southern San Joaquin Valley (portions of Madera, central Fresno, and northern Tulare and Kings Counties), and the Central Coast Range (southern Santa Cruz, Monterey, northern San Luis Obispo, and portions of western San Benito, Fresno, and Kern counties).

**Status and Natural History:** The central California tiger salamander has an obligate biphasic life cycle (Shaffer *et al.* 2004). Although the larvae salamanders develop in the vernal pools and ponds in which they were born, they are otherwise terrestrial salamanders and spend most of their postmetamorphic lives in widely dispersed underground retreats (Shaffer *et al.* 2004; Trenham *et al.* 2001). Subadult and adult central California tiger salamanders spend the dry summer and fall months of the year in the burrows of small mammals, such as California ground squirrels (*Spermophilus beecheyi*) and Botta's pocket gopher (*Thomomys bottae*) (Storer 1925; Loredo and Van Vuren 1996; Petranka 1998; Trenham 1998a). Because they spend most of their lives underground, central California tiger salamanders are rarely encountered, even in areas where they are abundant.

Central California tiger salamanders may also use landscape features such as leaf litter or desiccation cracks in the soil for upland refugia. Burrows often harbor camel crickets and other invertebrates that provide likely prey for central California tiger salamanders. Underground refugia also provide protection from the sun and wind associated with the dry California climate that can cause excessive drying of amphibian skin. Although central California tiger salamanders are members of a family of "burrowing" salamanders, they are not known to create their own burrows. This may be due to the hardness of soils in the California ecosystems in which they are found. Tiger salamanders typically use the burrows of ground squirrels and gophers (Loredo *et al.* 1996; Trenham 1998a). However, pocket gopher burrows are most often used by Sonoma central California tiger salamanders in Sonoma County (D. Cook, pers. comm., 2001). Central California tiger salamanders depend on persistent small mammal activity to create, maintain, and sustain sufficient underground refugia. Burrows are short lived without continued small mammal activity and typically collapse within approximately 18 months (Loredo *et al.* 1996).

Upland burrows inhabited by central California tiger salamanders have often been referred to as “estivation” sites. However, “estivation” implies a state of inactivity, while most evidence suggests that central California tiger salamanders remain active in their underground dwellings. A recent study has found that central California tiger salamanders move, feed, and remain active in their burrows (Van Hattem 2004). Because central California tiger salamanders arrive at breeding ponds in good condition and are heavier when entering the pond than when leaving, researchers have long inferred that central California tiger salamanders are feeding while underground. Recent direct observations have confirmed this (Trenham 2001; van Hattem 2004). Thus, “upland habitat” is a more accurate description of the terrestrial areas used by central California tiger salamanders.

Once fall or winter rains begin, the salamanders emerge from the upland sites on rainy nights to feed and to migrate to the breeding ponds (Shaffer et al. 1993; Stebbins 1989, 2003). Adult salamanders mate in the breeding ponds, after which the females lay their eggs in the water (Twitty 1941; Shaffer *et al.* 1993; Petranka 1998). Historically, the central California tiger salamander utilized vernal pools, but the animals also currently breed in livestock stockpools. Females attach their eggs singly, or in rare circumstances, in groups of two to four, to twigs, grass stems, vegetation, or debris (Storer 1925; Twitty 1941). In ponds with no or limited vegetation, they may be attached to objects, such as rocks and boards on the bottom (Jennings and Hayes 1994). After breeding, adults leave the pool and return to the small mammal burrows (Loredo et al. 1996; Trenham 1998a), although they may continue to come out nightly for approximately the next two weeks to feed (Shaffer et al. 1993). In drought years, the seasonal pools may not form and the adults cannot breed (Barry and Shaffer 1994).

Central California tiger salamander larvae typically hatch within 10 to 24 days after eggs are laid (Storer 1925). The peak emergence of these metamorphs is typically between mid-June to mid-July (Loredo and Van Vuren 1996; Trenham et al. 2000) but in some areas as early as late February or early March. The larvae are totally aquatic. The larvae feed on zooplankton, small crustaceans, and aquatic insects for about six weeks after hatching, after which they switch to larger prey (J. Anderson 1968). Larger larvae have been known to consume the pool tadpoles of Pacific treefrogs (*Pseudacris regilla*), Western spadefoot toads (*Spea hammondi*), and California red-legged frogs (*Rana draytonii*) (J. Anderson 1968; P. Anderson 1968). Central California tiger salamander larvae are among the top aquatic predators in seasonal pool ecosystems. When not feeding, they often rest on the bottom in shallow water but are also found throughout the water column in deeper water. Young salamanders are wary and typically escape into vegetation at the bottom of the pool when approached by potential predators (Storer 1925).

The larval stage of the central California tiger salamander usually last three to six months, as most seasonal ponds and pools dry up during the summer (Petranka 1998). Amphibian larvae must grow to a critical minimum body size before they can metamorphose (change into a different physical form) to the terrestrial stage (Wilbur and Collins 1973). Individuals collected near Stockton in the Central Valley during April varied from 1.88 to 2.32 inches in length (Storer 1925). Feaver (1971) found that larvae metamorphosed and left the breeding pools 60 to 94 days after the eggs had been laid, with larvae developing faster in smaller, more rapidly drying pools. The longer the ponding duration, the larger the larvae and metamorphosed juveniles are able to



grow, and the more likely they are to survive and reproduce (Pechmann *et al.* 1989; Semlitsch *et al.* 1988; Morey 1998; Trenham 1998b). The larvae will perish if a site dries before metamorphosis is complete (P. Anderson 1968; Feaver 1971). Pechmann *et al.* (1989) found a strong positive correlation with ponding duration and total number of metamorphosing juveniles in five salamander species. In Madera County, Feaver (1971) found that only 11 of 30 pools sampled supported larval central California tiger salamanders, and 5 of these dried before metamorphosis could occur. Therefore, out of the original 30 pools, only six (20 percent) provided suitable conditions for successful reproduction that year.

Size at metamorphosis is positively correlated with stored body fat and survival of juvenile amphibians, and negatively correlated with age at first reproduction (Semlitsch *et al.* 1988; Scott 1994; Morey 1998). In the late spring or early summer, before the ponds dry completely, metamorphosed juveniles leave them and enter upland habitat. This emigration occurs in both wet and dry conditions (Loredo and Van Vuren 1996; Loredo *et al.* 1996). Unlike during their winter migration, the wet conditions that central California tiger salamanders prefer do not generally occur during the months when their breeding ponds begin to dry. As a result, juveniles may be forced to leave their ponds on rainless nights. Under these conditions, they may move only short distances to find temporary upland sites for the dry summer months, waiting until the next winter's rains to move further into suitable upland refugia. Once juvenile central California tiger salamanders leave their birth ponds for upland refugia, they typically do not return to ponds to breed for an average of 4 to 5 years. However, they remain active in the uplands, coming to the surface during rainfall events to disperse or forage (Trenham and Shaffer, 2005).

**Threats:** Documented or potential central California tiger salamanders predators include coyotes, raccoons, striped skunks, opossums, egrets, great blue herons, crows, ravens, garter snakes, bullfrogs, California red-legged frogs, mosquito fish, and crayfish.

The central California tiger salamander is imperiled throughout its range due to a variety of human activities (Service 2004). Current factors associated with declining central California tiger salamander populations include continued habitat loss and degradation due to agriculture and urbanization; hybridization with the non-native eastern salamander (Fitzpatrick and Shaffer 2004; Riley *et al.* 2003); and predation by introduced species. Central California tiger salamander populations are likely threatened by multiple factors but continued habitat fragmentation and colonization of non-native salamanders may represent the most significant current threats. Habitat isolation and fragmentation within many watersheds have precluded dispersal between sub-populations. Other threats include predation and competition from introduced exotic species; possible commercial over-utilization; diseases; various chemical contaminants; road kill; and certain mosquito and rodent control operations. Currently, these various primary and secondary threats are largely not being offset by existing Federal, State, or local regulatory mechanisms. The central California tiger salamander is also prone to chance environmental or demographic events to which small populations are particularly vulnerable. The Bay Area is located within the Central Coast and Livermore vernal pool regions (Keeler-Wolf *et al.* 1998). Vernal pools within the Coast Range are more sporadically distributed than vernal pools in the Central Valley (Holland 2003). This rate of loss suggests that vernal pools in these counties are disappearing faster than previously reported (Holland 2003). Most of the

vernal pools in the Livermore Region in Alameda County have been destroyed or degraded by urban development, agriculture, water diversions, poor water quality, and long-term overgrazing (Keeler-Wolf *et al.* 1998). During the 1980s and 1990s, vernal pools were lost at a 1.1 percent annual rate in Alameda County (Holland 1998).

Due to the extensive losses of vernal pool complexes and their limited distribution in the Bay Area region, many central California tiger salamander breeding sites consist of artificial water bodies. Overall, 89 percent (124) of the identified water bodies are stock, farm, or berm ponds used by cattle grazing and/or as a temporary water source for small farm irrigation (CDFW 2011). This places the central California tiger salamander at great risk of hybridization with non-native tiger salamanders, especially in Santa Clara and San Benito counties. Without long-term maintenance, the longevity of artificial breeding habitats is uncertain relative to naturally occurring vernal pools that are dependent on the continuation of seasonal weather patterns (Shaffer *in litt.* 2003).

Shaffer *et al.* (1993) found that the East Bay counties of Alameda and Contra Costa supported the greatest concentrations of central California tiger salamander. Central California tiger salamander populations in the Livermore Valley are severely threatened by the ongoing conversion of grazing land to subdivisions and vineyards (Stebbins 2003). Central California tiger salamanders are under increasing pressure from habitat conversion and urbanization, development (i.e. Dublin Ranch, Fallon Village, Fallon Sports Park, Staples Ranch, and Shea Center Livermore), and infrastructure, utility and safety improvement projects (i.e. I-580 Eastbound HOV, I-580/Isabel Avenue Interchange, and I-580/Charro Avenue Interchange). The species' low recruitment and high juvenile mortality makes it particularly susceptible to habitat loss, fragmentation, urbanization, and construction related harm and mortality. Most of the central California tiger salamander natural historic habitat (vernal pool grasslands) available in this region has been lost due to urbanization and conversion to intensive agriculture (Keeler-Wolf *et al.* 1998). Central California tiger salamanders are now primarily restricted to artificial breeding ponds, such as bermed ponds or stock ponds, which are typically located at higher elevations (CDFW 2011).

#### *Vernal pool fairy shrimp*

For the most recent status of this species please refer to the 5-Year Review published in 2007 (Service 2007b).

#### *Vernal pool tadpole shrimp*

For the most recent status of this species please refer to the 5-Year Review published in 2007 (Service 2007c).

#### *Valley elderberry longhorn beetle*

For the most recent status of this species please refer to the 5-Year Review published in 2006 (Service 2006a).

*California jewelflower*

For the most recent status of this species please refer to the 5-Year Review published in 2013 (Service 2013).

*Hoover's spurge*

For the most recent status of this species please refer to the 5-Year Review published in 2009 (Service 2009b).

*Kern Mallow*

For the most recent status of this species please refer to the 5-Year Review published in 2013 (Service 2013).

*San Joaquin woolly-threads*

For the most recent status of this species please refer to the 5-Year Review published in 2010 (Service 2010d).

**Environmental Baseline**

*Geography, topography, and climate*

The topography of the project area is relatively flat, with elevations in the project action area ranging from 203 to 430 feet above mean sea level. The elevation gradually decreases from approximately 300 feet from Fresno to 200 feet near Allensworth. From the vicinity of Allensworth, the elevation rises gradually to Wasco and Shafter, where it plateaus briefly (~ 350 feet) and then slightly rises into Bakersfield (~ 430 feet).

The San Joaquin Valley has an arid to semi-arid climate. Summers are generally hot and dry; the majority of the rainfall occurs during the mild winter months. Over 80 percent of annual precipitation occurs between November and April. Precipitation in the San Joaquin Valley and the eastern flanks of the interior Coast Range is limited due to the rain shadow effect of the Coast Range. Generally, annual rainfall amounts decrease from north to south across the valley floor. The mean annual precipitation records for the San Joaquin Valley range from nearly 16 inches in the north to less than 5 inches in the southern reaches of the valley (U.S. Geological Survey (USGS) 1998).

During the spring and summer, snowmelt from the Sierra Nevada provides the majority of the water for the San Joaquin Valley. Warm, moisture-laden air masses generated over the Pacific Ocean condense and cool as they are pushed upward over the Sierra Nevada, resulting in heavy precipitation on the western slopes. The resulting snow pack ranges from 20 to 80 inches as elevation increases from the lower foothills to the Sierran crest.

The northern and southern portions of the San Joaquin Valley are similar with respect to daily temperatures throughout the year. Northern and southern valley temperatures were collected at the National Climate Data Center stations in Fresno and Bakersfield. The average daily temperature in the project area (as measured in the coolest and hottest months) varies annually by about 36° degrees Fahrenheit (°F) between December (average air temperature of 46°F) and July (average air temperature of 83°F). Temperature extremes in the project action area have been recorded as high as 115°F and as low as 18°F (Western Region Climate Center 2010).

The San Joaquin Valley has a drainage area of approximately 34,100 square miles and is roughly divided into a northern San Joaquin River Basin and a southern Tulare Lake Basin. The project action area is located entirely within the Tulare Lake Basin. The Tulare Lake Basin is generally flat and used extensively for agriculture. The contributing rivers are normally diverted and dewatered before reaching the southern San Joaquin Valley floor (U.S. Department of Agriculture (USDA) 1982).

Most of the Tulare Lake Basin floor is underlain by several thousand feet of sediments, including coarse-grained, water-bearing zones. Groundwater exists under both unconfined and semi-confined conditions. Groundwater levels vary with seasonal rainfall, withdrawal, and recharge. Depth to groundwater in the valley ranges from a few inches to more than 100 feet. Recharge of the groundwater occurs through percolation of applied irrigation water and leaking water from agricultural ditches and through infiltration of stream flow.

All of the streams and rivers in the project action area have been dredged, culverted, diverted, dewatered, or channelized, or have had their active floodplains severely reduced by the construction of levees or the development of agricultural lands. Pumping of groundwater for large agricultural and urban demands has resulted in groundwater subsidence in many areas of the southern San Joaquin Valley, especially the western side and southern end.

Regular flooding is now largely controlled by dams, diversions, levees, and dredging. The previous floodplain and riparian habitat have been largely replaced by agriculture or urban development (USDA 1982; Vileisis 1997). Evaporation of the historic Tulare, Buena Vista, and Kern lakes through water diversions and climate change has resulted in a wide area of saline-sodic soils on the southern San Joaquin Valley floor. Currently, this area continues to support the majority of wetlands in the project area.

Alterations to both surface water and groundwater in the region have resulted in a significant decline in the historical wetland area. This decline is reflected in the high proportion of drained or partially drained hydric soils mapped in the area. Most of the water is diverted into the irrigation canals that are found throughout the south San Joaquin Valley. Therefore, most of the water present in the project area is found in irrigation canals, water detention basins, precipitation-fed wetlands, and vernal pools; water is only occasionally found in river channels. The remaining wetlands are primarily unrelated to the historical floodplains or regional aquifers.

Vernal pools and seasonal wetlands within the project action area primarily occur in isolated depressions that receive water from precipitation and local surface and shallow subsurface flow or sheet flow. Water is retained in these depressions by a shallow perching layer (largely clay pans), and this water is unconnected or only partially connected to deeper groundwater layers.

### *Land use*

There are an estimated 26,382 to 30,624 acres of agricultural lands within the project action area (Table 3). Agricultural croplands are the largest recorded habitat type within the project action area. Seven types of agricultural lands are present in the project action area: dry land grain crops, irrigated grain crops, irrigated hayfield, irrigated row and field crops, deciduous orchard, evergreen orchard, and vineyard. Agricultural lands with undetermined uses identified during surveys were generally classified as cropland. Some agricultural lands may support federally listed species such as San Joaquin lit fox, Fresno kangaroo rat, Tipton kangaroo rat, California tiger salamander, blunt-nosed leopard lizard, and some vernal pool branchiopods, and plant species.

Urban areas include municipalities, industrial, residential, and agricultural structures (e.g., feedlots and poultry farms), and adjacent dedicated areas (e.g., yards, roads, highways, parking lots, stockpiles). Fresno, Bakersfield, and multiple smaller cities in between, constitute the second greatest land use within the project action area (9,626 to 12,012 acres; Table 3). The majority of land in these urban areas is covered by impervious materials and surfaces. Native vegetation is absent or highly disturbed within urban areas, where typical vegetation consists of a variety of planted trees, such as eucalyptus (*Eucalyptus* spp.) and mulberry (*Morus* spp.), and other nonnative or ornamental vegetation.

Annual grasslands are the third most abundant habitat (2,514 to 2,960 acres; Table 3) present within the project action area, and are typically characterized by nonnative annual grass species. Dominant species include several species of brome (*Bromus* spp.), annual fescues (*Vulpia* spp.), oats (*Avena* spp.), and barleys (*Hordeum* spp.). Native species may be present but in lower densities, including goldfields (*Lasthenia* spp.), owl's clover (*Castilleja* spp.), tarweed (*Madia* spp.), pepperweed (*Lepidium* spp.), saltgrass (*Distichlis spicata*), fiddleneck (*Amsinckia* spp.), and popcorn flower (*Plagiobothrys* spp.). On occasion, shrub species, including saltbush (*Atriplex* spp.) may occur. Most annual grasslands in the project action area have experienced some level of disturbance in the past that was associated with the various agricultural practices, such as row cropping, or grazing. Although these grasslands typically have a history of disturbance, they continue to provide suitable habitat for a number of federally listed plant and wildlife species. Annual grasslands that have experienced lower levels of disturbance more often contain vernal pool habitat.

**Table 3. Acreage of agricultural lands, urban areas, and vegetation communities within the project action area.**

Habitat Type by Vegetation Community (California Wildlife Habitat Relationship System)	Acreage <sup>a</sup>		Percent Range <sup>b</sup>
	Minimum	Maximum	
Agricultural/cropland <sup>c</sup>	26,382.12	30,624.09	63.2 - 64.9
Urban	9,626.77	12,012.08	23.7 - 24.8
Annual grassland	2,514.80	2,960.45	6.1 - 6.2
Lacustrine	576.08	703.77	1.4 - 1.5
Pasture	468.81	570.85	1.2 - 1.2
Alkali desert scrub	304.94	563.28	0.8 - 1.2
Barren	331.53	484.93	0.8 - 1
Riverine	322.37	368.74	0.8 - 0.8
Valley foothill riparian	102.24	132.84	0.3 - 0.3
Fresh emergent wetland	16.54	22.19	<0.1 - 0.1
Valley oak woodland	8.35	8.35	<0.1
Total	40,654.55	48,451.57	—

<sup>a</sup> Minimum and maximum determined acreages based on the smallest and largest amount of acreage covered by any continuous combination of alternatives.

<sup>b</sup> Percent range based on minimum and maximum values compared with sum of all minimum and maximum values. The total acres do not match the total size of the RSA because they are based on a continuous alignment as opposed to all alternatives considered.

<sup>c</sup> "Agricultural/cropland" includes dryland grain crop, deciduous orchard, evergreen orchard, irrigated grain crop, irrigated row and field crop, irrigated hayfield, vineyard, and any other undetermined cropland.

Lacustrine habitat (576 to 704 acres; Table 3) in the project action area is limited to human-made basins used for water storage and groundwater recharge. These basins typically have earthen berms, little or no emergent vegetation, and range in size from less than 1,000 square feet to hundreds of acres. No natural, permanent lakes occur in the project action area. Some basins may be partially bordered by willows (*Salix* spp.) and other riparian vegetation and support large colonies of nesting birds, such as cormorants (*Phalacrocorax* spp.) and great white egrets. Many of the smaller basins are surrounded by fences, which limit wildlife access. Although lacustrine habitats in the project action area are human-made and controlled, they provide important habitat for many wildlife species. The larger detention basins are used by a variety of water birds, swallows, and several species of duck.

The 468 to 571 acres of pasture land in the project action area consist primarily of un-irrigated fields actively grazed by cattle and horses within private property (Table 3). Generally, these areas can be characterized by a mix of annual grasses and other herbaceous species. Pastures may provide habitat to support federally listed wildlife species. Federally listed species potentially supported by pasture habitats include the San Joaquin kit fox, Fresno kangaroo rat, Tipton kangaroo rat, and some vernal pool branchiopods, and plant species.

Approximately 304 to 563 acres of alkali desert scrub occurs within the project action area, which is dominated by shrublands with understory cover of herbs and forbs and by vernal pools (seasonally inundated or saturated areas lacking a shrub layer). Primary plant species present in these communities include saltbush, iodine bush (*Allenrolfea occidentalis*), California joint-fir (*Ephedra californica*) goldenbush (*Isocoma acradenia*), and bush seepweed (*Suaeda moquinii*).

Typical herbaceous species include alkali heath (*Frankenia salina*), goldfields, Menzie's fiddleneck (*Amsinckia menziesii*), common tarweed (*Hemizonia pungens*), and saltgrass. This habitat is concentrated in the vicinity of Allensworth in relatively undisturbed areas. Alkali desert scrub provides the best example of native habitat for federally listed species in the in the project action area, such as the San Joaquin kit fox, the Fresno kangaroo rat, the Tipton kangaroo rat, and the blunt-nosed leopard lizard. Vernal pool features within alkali desert scrub may also support the California tiger salamander, the vernal pool fairy shrimp, and the vernal pool tadpole shrimp.

Any area within the project action area with less than 2 percent total vegetation cover and less than 10 percent cover by tree or shrub species was characterized as a barren area. These areas were characterized as bare earth resulting from industrial activities (e.g., gravel extraction). Barren areas may support limited native wildlife or plant species. Approximately 331 to 485 acres were classified as barren areas within the project action area (Table 3). Brewer's blackbird (*Euphagus cyanocephalus*), killdeer, and western fence lizard may be present in barren areas. Federally listed species that may use barren habitat include San Joaquin kit fox, Fresno kangaroo rat, Tipton kangaroo rat, and blunt-nosed leopard lizard.

Riverine habitat in the project action area (~332 to 369 acres) is characterized by open water areas in canals and irrigation ditches and open water areas in the flow channel of rivers (e.g., the Kings and Kern rivers) and creeks (e.g., Tule, Cross, and Poso creeks) (Table 3). Due to extensive water diversion for agricultural purposes, riverine habitats within the project action area do not exhibit natural flow regimes and may be dry throughout a given year. Vegetation is either absent or sparse along sandy bottoms due to water-level fluctuations, vehicle disturbance, or maintenance activities in an irrigation canal or ditch. Typical vegetation, when present, is dominated by weedy species, such as mustards (*Brassicaceae*), and grasses.

Valley foothill riparian vegetation occupies about 102 to 133 acres of riparian corridors and associated floodplains or terraces of the Kings River, Cross Creek, Tule River, Poso Creek, and Kern River and along their associated sloughs and side channels within the project action area (Table 3). These riparian areas are characterized by a dominance of tall trees, including Fremont cottonwood (*Populus fremontii*), western sycamore (*Platanus racemosa*), and valley oak (*Quercus lobata*). Subcanopy trees include white alder (*Alnus rhombifolia*) and ash (*Fraxinus* spp.). Understory shrub and herbaceous species typically include California blackberry (*Rubus ursinus*), elderberry (*Sambucus* spp.), and willows. In the project action area, the transition from the riparian corridor to valley foothill riparian vegetation, such as cropland or orchard is generally abrupt, resulting in narrow bands of vegetation restricted by the bordering agricultural land. Valley foothill riparian habitat provides food, water, migration and dispersal corridors, escape, nesting, and thermal cover for an abundance of wildlife.

Over 16 to 22 acres of fresh emergent wetland is present within the project action area as small patches associated with man-made structures, including detention basins, groundwater recharge reservoirs, and irrigation and drainage ditches (Table 3). Typical species in these areas include willows, rushes, bulrushes (*Scirpus* spp.), cattails (*Typha* spp.), and docks (*Rumex* spp.). A large complex of fresh emergent wetland exists in the vicinity of Cross Creek. Otherwise, fresh emergent wetland habitats outside of the Cross Creek area are typically small vegetated areas that experience year-round ponding from irrigation water or, less frequently, seasonally during winter rain events.

Approximately 8.35 acres of Valley oak woodland occurs along the floodplain of the Kings River and associated sloughs and side channels of the Hanford West Bypass 1 and 2 Alternatives (Table 3). This habitat is characterized by well-spaced stands of mature valley oak (*Quercus lobata*) with little or no sub-canopy and a well-developed herbaceous layer. Dominant herbaceous species include brome, annual fescues, oats, and barleys. Other herbaceous plants, including soap root (*Chlorogalum pomeridianum*), filaree, miner's lettuce, prickly ox-tongue (*Picris echioides*), and spiny sow thistle (*Sonchus asper*), may be present. In the project action area, valley oak woodland may intergrade with valley foothill riparian vegetation or abruptly transition to developed areas, such as cropland or orchard. Valley oak woodland provides food, cover, nesting sites, and dispersal habitat for a wide variety of wildlife. Federally listed species potentially supported by valley oak woodland habitat include San Joaquin kit fox, Fresno kangaroo rat, Tipton kangaroo rat, and central California tiger salamander.

#### *Noise environment*

The following discussion regarding the baseline noise levels within the project action area is based on information acquired through noise level studies presented in the California High-Speed Train Project Revised DEIR/Supplemental DEIS, Fresno to Bakersfield Section (Authority and FRA 2012a, pp. 3.4-17 to 3.4-25). Fresno and Bakersfield are the most densely populated cities within the proposed FB alignment, with several highways, busy local roads, UPRR, and aircraft noise contributing to the noise environment. Highway 99, Highway 180, and Highway 41 are all near the proposed HST station site in Fresno. Aircraft noise from three local airports adds to the existing noise environment in the Fresno area.

The area around the proposed station in Fresno is developed primarily with commercial and industrial land uses along with some residential land uses. The noise environment in this area is dominated by traffic on the local streets, traffic on the freeways that surround the downtown area, and noise from train operations along the Union Pacific Railroad mainline. Noise levels were measured at the noise-sensitive land uses throughout the area and the measured noise levels ranged from 61 dBA along one of the quieter streets to 72 dBA near the railroad. These noise levels are typical for urban settings dominated by vehicular traffic and railroad operations. The alternative alignment will proceed southeast from the Fresno station, pass State Route (SR) 41 and approach the BNSF rail yard. The sensitive land uses in this area are subject to more roadway and railroad noise; the noise levels measured here range from 68 to 75 dBA. A residence located adjacent to the existing railroad line experienced a noise level of 79 dBA. This site was dominated by train noise, with a total of 44 trains passing this location in a 24-hour



period. Another residence farther south located approximately 900 feet from the existing railroad experienced a noise level of 58 dBA, which was significantly quieter.

The measured ambient noise levels of agricultural lands located near train operations ranged from 64 to 77 dBA. These noise levels are to be expected in areas near freight and passenger train operations. Noise levels in rural areas with road traffic ranged from 47 to 77 dBA. The median measured noise level for agricultural lands without train operations ranged from 36 to 44 dBA, which is comparable to the inside of a house during a quiet evening. Noise levels within agricultural areas where irregular farming activities may occur ranged from 48 to 77 dBA.

Noise measurements made along the alignment through the City of Corcoran ranged from 64 to 81 dBA. These noise levels are consistent with homes adjacent to commercial and industrial sites that are exposed to highway traffic and railroad operations. Around the eastern side of Corcoran, noise levels measured at homes away from SR 43 and other major roads ranged from 48 to 61 dBA.

The noise levels measured along the Pixley Alignment ranged from 59 to 70 dBA  $L_{dn}$ . These noise levels are consistent with expectations for homes along a two-lane highway and an active rail line. In the vicinity of Allensworth, the measured noise levels for residential areas near the BNSF right-of-way ranged from 62 to 76 dBA. The noise levels measured along the BNSF Alternative through the cities of Wasco and Shafter generally ranged from 70 to 79 dBA.

The land uses within the City of Bakersfield are primarily urban with roadways, freeways, and rail lines dominating the noise environment. The noise measurements conducted near the alternative alignments and the proposed downtown Bakersfield station alternatives in this area ranged from 59 to 70 dBA, which are consistent with an urban environment.

### *Surveys*

Parcels within the project footprint that the Authority was granted permission to enter were initially surveyed by biologists in 2010, with follow up surveys in 2011 and 2012. The purpose of the surveys was to determine which habitat types were present and identify potential project effects to federally-listed species. In accordance with the Central Valley Biological Resource and Wetland Survey Plan (Authority and FRA 2009 and 2011) physical botanical and wildlife habitat assessment surveys and jurisdictional wetland delineation were conducted within the project footprint. The surveys were conducted within 60 to 120 feet of the HST footprint, depending on whether the track profile would be at-grade or elevated, and also within a 250-foot buffer around the project footprint where vernal pool habitat would be affected. Aerial photographic interpretation and windshield surveys were also conducted within a 1000-foot buffer around the project footprint to evaluate project effects to wide ranging wildlife and wildlife movement corridors.

In accordance with Service or California Department of Fish and Wildlife species-specific protocols, the study area was extended laterally from the project footprint up to 1.24 miles. Depending on target species, the extended study area identifies species-specific habitats based on aerial photographic interpretation, documented occurrences of the species, and field observations of federally listed species and their habitats.

Approximately 38 percent of the proposed project alignment has been surveyed to date. In areas that were not accessible, biologists conducted, to the extent possible, visual surveys of habitat types. Within unsurveyed areas, aerial photography was used to assess habitat types which were used to calculate the anticipated range of effects to federally-listed species habitat. The entire project alignment will be surveyed prior to construction to determine the effects of the project on federally-listed species, as described in further detail in the conservation measures above.

### *San Joaquin kit fox*

The entire project action area occurs within the known geographic and historic range of the San Joaquin kit fox (Grinnell et al. 1937; Service 1998 and 2010; CNDDDB 2012). Grinnell et al. (1937) identified three subspecies of San Joaquin kit fox based on morphological characteristics: *Vulpes macrotis mutica*, *Vulpes macrotis arsipus*, and *Vulpes macrotis macrotis*. Grinnell et al. (1937) included Fresno, Tulare, Kings, and Kern counties within the historic range of the San Joaquin kit fox (*Vulpes macrotis mutica*).

The San Joaquin kit fox in Fresno, Tulare, Kings, and Kern counties currently exists among several core populations: (1) Panoche Valley; (2) Carrizo Plain; (3) Pixley National Wildlife Refuge and Allensworth Ecological Reserve; and (4) Bakersfield (Service 2010a; B. Cypher, pers. comm., 2012; CNDDDB 2012, Wilbert and Maldonado, pers. comm., 2012). Outside of these core populations within these counties, smaller populations of San Joaquin kit fox may exist among patches of suitable and sub-marginal habitat fragmented by highways, roads, urbanization, and compatible-use agricultural lands (Cypher pers. comm., 2012).

There are 663 occurrences of San Joaquin kit fox documented within Fresno, Tulare, Kings, and Kern counties (CNDDDB 2013). The majority of these documented occurrences cluster within areas of natural habitat, such as Lokern, Carrizo Plain, Pixley National Wildlife Refuge, and Allensworth Ecological Reserve, and within and around metropolitan Bakersfield (CNDDDB 2013; Cypher pers. comm., 2013).

*more to status of species -*

Genetic studies can offer insight regarding the genetic status of populations and rates of genetically effective migration among populations within a given landscape (Schwartz et al. 2007). Population genetic studies can also provide valuable information, often unattainable through other approaches, for monitoring the baseline and status of species and contribute to conservation planning (Schwartz et al. 2007). Recent genetic studies of San Joaquin kit fox sampled from Bakersfield, Carrizo Plain, Lokern, Panoche, and Camp Roberts (archived samples from this location used) revealed high levels of genetic diversity in every sampling location (allelic richness, heterozygosity, and private alleles) (Wilbert pers. comm., 2012). Three unique genetic signatures were identified: northern type predominant in Panoche Valley, a western type

common in Camp Roberts, Carrizo Plain, and Lokern, and an eastern type mostly in Bakersfield (Wilbert pers. comm., 2012). San Joaquin kit fox samples collected from the Panoche Valley were also distinct in that approximately half of that population has a unique mitochondrial DNA (mtDNA) haplotype with a 16-basepair (bp) deletion (Wilbert pers. comm., 2012). Previous research showed little sequence variation in the control region of the mtDNA, which led the researchers to use the length of this fragment (determined by number of basepairs in the amplified sequence) of the mtDNA to indicate that scat samples submitted to their study were actually collected from San Joaquin kit foxes. However, the Panoche individuals detected from samples collected during 2009 to 2011 were split between the 235 and 251 bp haplotypes (Wilbert pers. comm., 2012). Only one individual outside of the Panoche Valley (in the Carrizo Plain) has been detected with this haplotype (Wilbert pers. comm., 2012).

The F-statistic ( $F_{st}$ ) is a measure of genetic differentiation that ranges along a continuum of 0 to 1, with a value of 0 indicating that populations are genetically identical and a value of 1 indicating that they are 100 percent genetically distinct from each other. The  $F_{st}$  value ( $F_{st} = 0.06$ ), and estimated number of genetically effective migrants per generation ( $N_m = 11$ ; estimated from the  $F_{st}$  value) between Bakersfield and the other two populations from their study suggests that while these populations exhibit genetic distinction from each other, moderate levels of gene flow among them do exist (Wilbert pers. comm., 2012).

This genetic distinction observed among San Joaquin kit fox sampled in Bakersfield and the other sites is also supported by previous research on the behavior and ecology of San Joaquin kit foxes in the urban habitat (Wilbert pers. comm., 2012; Cypher pers. comm., 2012 and 2013). Not only are these San Joaquin kit foxes living in an altered habitat, but they developed alternative behaviors, which have allowed them to adapt existence within the city (Wilbert pers. comm., 2012; Cypher pers. comm., 2012 and 2013).

The genetic data suggests that there is little effective current migration between the north group (Panoche) and other populations (Wilbert pers. comm., 2012). This is most likely due to the decreased population sizes, loss of intervening habitat, and loss of connecting populations between the north populations and the other groups sampled (Wilbert pers. comm., 2012). The remaining habitat between the western and eastern groups, although fragmented, has allowed for reduced but continued migration of individuals (Wilbert pers. comm., 2012). The highest observed rate of gene flow exists between the Bakersfield and the Lokern and Carrizo Plain populations (Wilbert pers. comm., 2012).

**Table 4. Range of potential habitat for Tipton kangaroo rat, California tiger salamander, blunt-nosed leopard lizard, vernal pool fairy shrimp, vernal pool tadpole shrimp, valley elderberry longhorn beetle, California jewelflower, Hoover's spurge, Kern mallow, and San Joaquin woolly-threads.**

Species	Habitat Type	Impact Type	Areas of Effect	
			MIN	MAX
<b>Tipton kangaroo rat</b>	Alkali desert scrub, annual grassland, barren and pasture	Direct	367.18	453.85
<b>California tiger salamander</b>	AQUATIC: Vernal pools/seasonal wetlands	Direct	—	—
	UPLAND: alkali desert scrub, annual grasslands, pasture surrounding vernal pools/seasonal wetlands	Direct	0.01	5.5
<b>Blunt-nosed leopard lizard</b>	Alkali desert scrub, annual grassland, barren and valley foothill riparian	Direct	26.57	98.06
<b>Vernal pool fairy shrimp</b>	Vernal pools / seasonal wetlands	Direct	2.33	29.77
<b>Vernal pool tadpole shrimp</b>	Vernal pools / seasonal wetlands delineated within the geographic range of the species	Direct	0.0041	0.0041
<b>Valley elderberry longhorn beetle</b>	Elderberry shrubs ( <i>Sambucus</i> spp.)	Direct and Indirect	12 shrubs	36 shrubs
<b>California jewelflower</b>	Unsurveyed alkali desert scrub, annual grassland, and pasture in Fresno County	Direct	0	15
<b>Hoover's spurge</b>	Vernal pools / seasonal wetlands in Tulare County	Direct	0	6.35
<b>Kern mallow</b>	Unsurveyed alkali desert scrub, annual grassland, and pasture in Tulare and Kern Counties	Direct	0	214.36
<b>San Joaquin woolly threads</b>	Unsurveyed alkali desert scrub, annual grassland, and pasture in Fresno, Kings, and Kern Counties	Direct	0	489.34

#### *Tipton kangaroo rat*

Over 454 acres of potentially suitable habitat, such as alkali desert scrub, annual grassland, barren and pasture land, for the Tipton kangaroo rat have been identified within the project action area (Table 4). According to the Upland Species Recovery Plan (USFWS 1998a), current populations occur in various communities along the I-99 corridor from Tipton to Pixley, and in the Allensworth Ecological Reserve (AER) and Pixley National Wildlife Refuge (PNWR), which “provides some of the best remaining habitat for Tipton kangaroo rat.” Tipton kangaroo rat was not observed during spring 2010 field surveys on properties where permission to enter was granted. Kangaroo rat sign, including active kangaroo rat-sized burrows with freshly excavated

soils, fresh scat, and fresh tracks, were observed within the project action area south of the town of Allensworth. Protocol-level surveys for this species have not been conducted within the entire project action area because of limited access to properties where suitable habitat may exist. Therefore, the status of this species within the project action area is not known at this time.

Seven occurrences of Tipton kangaroo rat have been documented within the project action area (occurrence #'s 9, 21, 24, 28, 29, 32, and 36; CNDDDB 2013). A total of 41 occurrences of this species have been reported to the CNDDDB within a 10-mile distance of the proposed project footprint (CNDDDB 2013). Nine of these occurrences of Tipton kangaroo rat are documented within 1 to 2 miles of the project action area (occurrence #'s 20, 22, 23, 31, 35, 82, 83, 84, and 86; CNDDDB 2013). Two of these 9 occurrences, documented in 1929 and 1976, are considered extirpated; however, the remaining 7 occurrences are presumed extant (CNDDDB 2013). These 7 extant occurrences were reported from 1985 through 2003, and consist of observations of adults, including males and females, burrows, and breeding, wintering, and foraging sites (CNDDDB 2013). All occurrences were observed in either alkali scrub or grassland habitat.

It is reasonably likely that the Tipton kangaroo rat may be present within the project action area because suitable habitat is present and CNDDDB records indicate the presence of this species within and around the project action area.

#### *Central California tiger salamander*

Upland (5.5 acres) habitat for the Central California tiger salamander occurs within the project action area (Table 4). There is no vernal pool habitat to support breeding for the Central California tiger salamander within the portion of the action area where this species is likely to occur (Table 4). Protocol-level surveys for this species have not been conducted within the entire project action area because of limited access to properties where suitable habitat may exist. Therefore, the status of this species within the project action area is not known at this time.

Four Central California tiger salamander occurrences have been reported to the CNDDDB within a 10-mile radius of the project footprint; of these, three have been reported within a 5-mile radius (CNDDDB 2013). Occurrence # 583 includes two records reported together, and is northeast of the city of Fresno. Occurrence # 612 is located south of the city of Kingsburg and west of the city of Hanford, between Cole Slough and the Kings River. These historical records (occurrence #'s 583 and 612; CNDDDB 2013) date back to the period between 1879 and 1936 and the occurrences are now considered extirpated. The third occurrence, # 522, was reported in 1999, in vernal pools associated with Cross Creek, located approximately about 3 miles east of the project action area (CNDDDB 2013). This occurrence consisted of California tiger salamander egg masses observed in a complex of vernal pools surrounded by nonnative annual grasslands (CNDDDB 2013). Designated critical habitat the Central California tiger salamander (Southern San Joaquin Region – Unit 5A) occurs within this same area, outside of the project action area.

It is reasonably likely that the Central California tiger salamander may be present within the project action area because suitable habitat is present and CNDDDB records indicate the presence of this species within close proximity to the project action area.

*Blunt-nosed leopard lizard*

An estimated 98 acres of potentially suitable habitat for the blunt-nosed leopard lizard, such as alkali desert scrub, annual grassland, barren lands, and valley foothill riparian have been identified within the project action area (Table 4). Although this species was not observed during the spring 2010 field reconnaissance surveys, extensive small mammal burrows, which provide suitable refugia habitat for the blunt-nosed leopard lizard, were observed in the project action area in the vicinity of the AER. Suitable habitat for the blunt-nosed leopard lizard also occurs in the project action area between Deer Creek and Poso Creek, where suitable burrows for refugia have been observed. Protocol-level surveys for this species have not been conducted within the entire project action area because of limited access to properties where suitable habitat may exist. Therefore, the status of this species within the project action area is not known at this time.

Over 50 occurrences of the blunt-nosed leopard lizard have been reported within a 10-mile distance of the project footprint. Seven of these occurrences are located within the project action area and presumed to be extant (occurrence #'s 12, 129, 194, 203, 204, 206, and 375; CNDDDB 2013). These occurrences were reported between 1974 and 2005 in alkali desert scrub and annual grassland habitats (CDFW 2012). Blunt-nosed leopard lizards have also been reported in the AER (CDFW 2012) and in the Deer Creek East Unit of the PNWR (Uptain et al. 1985; Service 2005b). In addition to the sightings at AER, blunt-nosed leopard lizard occurrences have been documented in the PNWR, near Poso Creek north of Wasco (Service 1998).

It is reasonably likely that the blunt-nosed leopard lizard is present within the project action area because suitable habitat is present and CNDDDB records indicate the presence of this species within and around the project action area.

*Vernal pool fairy shrimp*

The proposed project falls in the San Joaquin Valley Vernal Pool Region identified in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon*. Vernal pools were documented to occur in the project action area, in the vicinity of the PNWR and AER (Service 2005b). Wetland delineation surveys identified about 133 acres of seasonal wetland and vernal pool habitat that could support the vernal pool fairy shrimp (Table 4). During the spring 2010 field surveys, unidentified fairy shrimp (and seed shrimp, or common ostracods) were observed near Allensworth in vernal pools and seasonal wetlands in natural habitats dominated by alkali desert scrub and annual grassland. Protocol-level surveys for this species have not been conducted within the entire project action area because of limited access to properties where suitable habitat may exist. Therefore, the status of this species within the project action area is not known at this time.

Nine vernal pool fairy shrimp occurrences have been reported to the CNDDDB within 10 miles of the project footprint. The closest documented occurrences are located approximately 0.5 to 1 mile east of the project action area in seasonal wetlands within the PNWR and are both presumed extant (occurrence #'s 112 and 177; CNDDDB 2013). In 1993, vernal pool fairy shrimp

were found in vernal pools on the Two Well Unit of PNWR (Service 2005b), which is located approximately 3 miles east of the project footprint. The *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* also describes the species as occurring in the PNWR in Tulare County, and at isolated locations in Kings Counties (Service 2005c).

It is reasonably likely that the vernal pool fairy shrimp may be present within the project action area because suitable habitat is present and CNDDDB records indicate the presence of this species within close proximity to the project action area.

#### *Vernal pool tadpole shrimp*

Wetland delineation surveys identified about 0.06 acre of seasonal wetland and vernal pool that could support this species habitat within the project action area (Table 4). This 0.06 acre of vernal pool habitat falls within the southernmost extent of the known range of this species. High quality vernal pool habitat for the vernal pool tadpole shrimp has been documented within and around the PNWR and AER (USFWS 2005a). Portions of the project action area run parallel to the boundary of these reserves. Vernal pool tadpole shrimp were not observed during the spring 2010 field surveys for conducted for other vernal pool crustaceans (e.g., ostracods [seed shrimp] and fairy shrimp). Protocol-level surveys for this species have not been conducted within the entire project action area because of limited access to properties where suitable habitat may exist. Therefore, the status of this species within the project action area is not known at this time.

Five occurrences of vernal pool tadpole shrimp have been documented in Tulare County, two occurrences in Kings County, and three occurrences in Fresno County (CNDDDB 2013). These occurrences constitute the southernmost extent of the vernal pool tadpole shrimp's known range. Three vernal pool tadpole shrimp occurrences have been reported within 4 miles east of the project action area (occurrence #'s 129, 139, and 140; CNDDDB 2013). Hundreds of vernal pool tadpole shrimp were observed in vernal pools in a nonnative grassland area west of Cross Creek within the closest occurrence (occurrence #139; CNDDDB 2013).

It is reasonably likely that the vernal pool tadpole shrimp may be present within the project action area because suitable habitat is present and CNDDDB records indicate the presence of this species within close proximity to the project action area.

#### *Valley elderberry longhorn beetle*

Surveys conducted in 2010 identified up to 36 elderberry shrubs that could provide habitat for the valley elderberry longhorn beetle (Table 4). Additional shrubs are expected to be identified during future surveys within unsurveyed lands that contain riparian habitat within and around the project action area (Cole Slough, Dutch John Cut, etc.). Two of these elderberry shrubs were observed north of Layton, near Monmouth, outside of the riparian corridor. Ten shrubs were observed along the banks of the Kern River. Protocol-level surveys for this species have not been conducted within the entire project action area because of limited access to properties where suitable habitat may exist. Therefore, the status of this species within the project action area is not known at this time.

There are 37 occurrences of valley elderberry longhorn beetle documented in Fresno, Kings, Tulare and Kern counties, most of which are located east Highway 99. Five of these occurrences have been documented within a 10-mile distance of the project footprint. The closest reported occurrence of valley elderberry longhorn beetle is located approximately 4 miles north of Bakersfield, where many elderberry shrubs with a few exit holes were observed in a riparian area along the banks of the Kern River (occurrence # 61; CNDDDB 2013). There are two occurrences located just north of the City of Fresno near the San Joaquin River that are presumed extant (occurrence #'s 134 and 135; CNDDDB 2013). Many exit holes were observed in 14 of 20 elderberry shrubs for one of these occurrences (occurrence # 134; CNDDDB 2013). A female valley elderberry longhorn beetle and 8 exit holes were observed in along Highway 41 north of Lanes Bridge (occurrence # 135; CNDDDB 2013).

It is reasonably likely that the valley elderberry longhorn beetle may be present within the project action area because suitable habitat is present and CNDDDB records indicate the presence of this species within close proximity to the project action area.

#### *California jewelflower*

There are up to 15 acres of suitable habitat for the California jewelflower within the portion of the project action area that falls within the known range of this species (Table 4). Most of this habitat consists of alkali desert scrub, non-native and native annual grasslands, barren lands, and pasture. Protocol-level surveys for this species have not been conducted within the entire project action area because of limited access to properties where suitable habitat may exist. Therefore, the status of this species within the project action area is not known at this time.

There are 30 occurrences of California jewelflower documented in Fresno, Kings, Tulare and Kern counties (CNDDDB 2013). Two occurrences are located within the project footprint, but are considered extirpated as a result of agricultural conversion (occurrence #'s 17 and 41; CNDDDB 2013). All other CNDDDB records of this species within 10 miles of the project action area are confirmed as extirpated due to agricultural conversion and urban development, except for one, which is considered to be possibly extirpated (CNDDDB 2013). This occurrence is located about 3.8 miles from the project action area near Bakersfield, along Caliente Creek, at the foot of the Tehachapi Grade, in Kern County (occurrence # 39; CNDDDB 2013). Suitable habitat for the California jewelflower remains in the location of this occurrence (CNDDDB 2013).

It is reasonably likely that the California jewelflower is present within the project action area because suitable habitat is present and CNDDDB records indicate the presence of this species within and around the project action area.

#### *Hoover's spurge*

Hoover's spurge occurs within only one county, Tulare County, of the four surrounding the project action area. This population of Hoover's spurge is located outside of the project area and consists of 6 documented occurrences (CNDDDB 2013). However, Hoover's spurge may occur where suitable habitat is found within the project action area. Collectively, there are about 6.5



acres of potentially suitable habitat, consisting of alkali desert scrub, annual grassland, vernal pool and pasture, for Hoover's spurge within the portion of the Fresno to Bakersfield alignment that occurs in Tulare County (Table 4). Hoover's spurge was not identified during March, April, May, or July surveys conducted during 2010 in areas where access was granted. However, protocol-level surveys for this species have not been conducted within the entire project action area because of limited access to other properties where suitable habitat may exist. Therefore, the status of this species within the project action area is not known at this time.

The CNDDDB contains no documented occurrences of Hoover's spurge within 10 miles of the project action area (CDFW 2012). However, historical occurrences of this species in Tulare County were recorded east of the city of Visalia (USFWS 2005b).

It is reasonably likely that the Hoover's spurge may be present within the project action area because suitable habitat is present and CNDDDB records indicate the presence of this species within close proximity to the project action area.

#### *Kern Mallow*

There are 214 acres of suitable habitat for the Kern mallow within the project action area (Table 4). Most of this habitat consists of alkali desert scrub, non-native and native annual grasslands, barren lands, and pasture within Tulare and Kern counties. Protocol-level surveys for this species have not been conducted within the entire project action area because of limited access to properties where suitable habitat may exist. Therefore, the status of this species within the project action area is not known at this time.

One historical occurrence of Kern mallow was reported it within 1 mile of the project footprint (CNDDDB 2013). This occurrence was found in a saline valley grassland community and is presumed extant, although it was last observed in 1962. Several occurrences of Kern mallow are reported from the Lokern area, between Buttonwillow and McKittrick, and are described as a single metapopulation (Service 1998). This area is approximately 30 miles west of the project action area.

During the early season botanical surveys, botanists investigated the previously known occurrences for the species; no historically documented Kern mallow populations were found. A population of mallow identified from the Jepson Manual as *Eremalche parryi* ssp. *kernensis*, was detected near the intersection of SR 155 and SR 43 in Kern County during the botanical surveys in May 2010. The species was recorded in a fallow field outside of the project action area (less than 500 feet away). The dominant cover in the field consisted of foxtail brome and pungent tarweed (*Hemizonia pungens*). The area appeared to have been heavily disturbed in the past.

Genetic studies of *Sidalcea and Eremalche* (*Malvaceae*) did not identify sufficient genetic distinction to fully resolve subspecies distinctions among *Eremalche* (Baldwin 2005; Andreasen 2005 and 2012). The species may be in the process of slowly diverging; and additional studies that include samples collected from other areas to further resolve subspecies distinctions are necessary to fully resolve subspecies distinctions (Baldwin 2005; Andreasen 2005 and 2012).

Recent morphological studies have confirmed that the only member of the genus *Eremalche* that is gynodioecious is Kern mallow. Therefore, any herbarium specimens of *Eremalche* with pistillate flowers in Tulare County should be identified as Kern mallow. Steven Hill determined in 2001 that a specimen collected near Delano in Tulare County, is indeed Kern mallow (occurrence #51, located within the project footprint; CNDDDB 2013).

Based on the information provided by the recent genetic and morphological studies of *Eremalche*, the Service currently considers any occurrences with pistillate flowers in Tulare and Kern counties to be Kern mallow until further work provides convincing evidence that suggests we should reconsider our determinations.

It is reasonably likely that the Kern mallow is present within the project action area because suitable habitat is present and CNDDDB records indicate the presence of this species within and around the project action area.

#### *San Joaquin woolly-threads*

There are 489 acres of suitable habitat for the San Joaquin woolly-threads within the project action area (Table 4). Most of this habitat consists of alkali desert scrub, non-native and native annual grasslands, barren lands, and pasture within Fresno, Kings, and Kern counties. Protocol-level surveys for this species have not been conducted within the entire project action area because of limited access to properties where suitable habitat may exist. San Joaquin woolly-threads were not observed during floristic surveys in the project action area that were conducted within Kern County in 2010. Therefore, the status of this species within the project action area is not known at this time.

There are 12 documented occurrences of San Joaquin woolly-threads within 10 miles of the project action area (CDFW 2012). Two of these occurrences are in the project action area. Nine of the 12 recorded occurrences, including the 2 occurrences that fall within the project action area, are extirpated or possibly extirpated due to agricultural and urban development (CNDDDB 2013). Occurrence # 19, located about 10 miles southeast of the terminal end of the Bakersfield North and South segments, is presumed extant although no plants were observed at the site during 1986 and 1987 surveys of the area. Two occurrences near the Kern River, approximately 6 miles to 7 miles southwest of the Rosedale segment, were confirmed in 2009 (CNDDDB 2013).

Several metapopulations of San Joaquin woolly-threads have been identified in the western San Joaquin Valley (USFWS 1998a). The nearest of these occurrences to the project action area include populations near Lost Hills and Bakersfield in Kern County.

It is reasonably likely that the San Joaquin woolly-threads may be present within the project action area because suitable habitat is present and CNDDDB records indicate the presence of this species within and around the project action area.

### **Effects of the Proposed Action**

The CHST-FB Project will result in temporary and permanent loss of habitat for the San Joaquin kit fox, the Tipton kangaroo rat, the central California tiger salamander, the blunt-nosed leopard lizard, the vernal pool fairy shrimp, the vernal pool tadpole shrimp, the valley elderberry longhorn beetle, the California jewelflower, the Hoover's spurge, the Kern mallow, and the San Joaquin woolly-threads.

#### *San Joaquin kit fox*

##### *Construction-related effects*

Direct and indirect effects are reasonably likely to occur to the San Joaquin kit fox may within the 48,452-acre project action area (Table 3). An estimated 4,700 acres of suitable habitat (alkali scrub, grassland, pasture, urban, and compatible-use agricultural lands) for the San Joaquin kit fox will be permanently lost as a result of the CHST-FB Project. However, these potentially suitable habitats occur as fragments or patches throughout the relatively narrow, linear project action area, primarily within Fresno, Tulare, Kings, and Kern Counties. Approximately 755 acres of the 4,700 acres (~ 6 percent) of suitable habitat is considered to be highly suitable for use by the San Joaquin kit fox (summed from acres natural habitat summed from Table 5). The remaining 3,945 acres consists primarily of compatible-use agricultural lands, and urban area inhabited by San Joaquin kit fox in Bakersfield (Table 5). The 755 acres of highly suitable habitat that will be permanently lost as a result of the CHST-FB Project represents an extremely small fraction of the remaining highly suitable habitat within Fresno, Tulare, Kings, and Kern Counties (Cypher, pers. comm., 2013).

Habitat loss and alteration may occur through degradation and placement of hardscape over suitable denning or foraging habitat. It is reasonably likely that construction activities will result in the destruction of dens. Alteration and loss of suitable foraging and denning habitat will result in increased vulnerability of San Joaquin kit fox to predation and a reduction in prey availability. Injury or death may be manifested by a reduction in carrying capacity, which may result in fewer litters, increased pup mortality, reduction of the prey base, and a reduction in cover and denning habitat for the San Joaquin kit fox (White and Ralls 1993; White et al. 1995).

The proposed construction activities have the potential to expose San Joaquin kit fox to a range of adverse effects. Loud noise, lighting, and vibration caused by construction vehicles, equipment, and operation of the HST may disrupt normal breeding, feeding, or sheltering behaviors of San Joaquin kit fox individuals. Disruption of normal behaviors, as described above, may result in a likelihood of injury or mortality of San Joaquin kit fox. Direct mortality of kit fox may occur as a result of collision with construction vehicles or equipment. Displaced individuals may more vulnerable to predation. However, the Authority has proposed to

implement conservation measures such as minimizing the total area disturbed by project activities, enforcement of speed limits, and properly constructed exclusionary fencing, which will reduce the potential for mortality, injury, or harassment of the San Joaquin kit fox. Preconstruction surveys for San Joaquin kit fox will reduce the potential for injury or mortality as well. Therefore, injury or mortality from entrapment, behavioral disruption from noise and vibrations, or collision with construction equipment and vehicles is not expected to occur.

**Table 5. Range of potential habitat for the San Joaquin kit fox.**

Land Prioritization <sup>1</sup>	CWHR Vegetation Community or Wildlife Association	Impact Type	Areas of Effect (Acres) <sup>2</sup>	
			MIN	MAX
<b>Southwestern Tulare County Satellite Area</b>	<b>Natural</b>		<b>86.26</b>	<b>154.39</b>
	Annual Grassland	Direct	86.12	111.95
	Alkali Desert Scrub	Direct	0.07	37.4
	Barren	Direct	0	0
	Pasture	Direct	0.07	5.04
	Valley Oak Woodland	Direct	0	0
	<b>Agriculture</b>		<b>511.36</b>	<b>654.54</b>
	Agriculture/Crop	Direct	184.72	196.28
	Dryland Grain Crop	Direct	30.17	35.92
	Deciduous Orchard	Direct	228.81	243.09
	Evergreen Orchard	Direct	0	0
	Irrigated Grain Crop	Direct	10.69	75.75
	Irrigated Row and Field Crop	Direct	0	0
	Irrigated Hayfield	Direct	56.97	103.51
	Vineyard	Direct	0	0
	<b>Urban/BNSF</b>		<b>0</b>	<b>0</b>
	BNSF	Direct	0	0
	Urban development	Direct	0	0
<b>Metropolitan Bakersfield Satellite Area (Urban Bakersfield)</b>	<b>Natural</b>		<b>214.77</b>	<b>218.15</b>
	Annual Grassland	Direct	34.67	36.55
	Alkali Desert Scrub	Direct	10.13	11.14
	Barren	Direct	169.11	169.32
	Pasture	Direct	0.86	1.15
	Valley Oak Woodland	Direct	0	0
	<b>Agriculture</b>		<b>0</b>	<b>0</b>
	Agriculture/Crop	Direct	0	0
	Dryland Grain Crop	Direct	0	0
	Deciduous Orchard	Direct	0	0
	Evergreen Orchard	Direct	0	0
	Irrigated Grain Crop	Direct	0	0
	Irrigated Row and Field Crop	Direct	0	0
	Irrigated Hayfield	Direct	0	0
	Vineyard	Direct	0	0
	<b>Urban/BNSF</b>		<b>249.62</b>	<b>301.56</b>
	BNSF	Direct	13.5	13.67
	Urban development	Direct	236.12	287.89

Land Prioritization <sup>1</sup>	CWHR Vegetation Community or Wildlife Association	Impact Type	Areas of Effect (Acres) <sup>2</sup>	
			MIN	MAX
Linkage Area	<b>Natural</b>		<b>0</b>	<b>20.14</b>
	Annual Grassland	Direct	0	1.27
	Alkali Desert Scrub	Direct	0	0
	Barren	Direct	0	18.88
	Pasture	Direct	0	0
	Valley Oak Woodland	Direct	0	0
	<b>Agriculture</b>		<b>104.69</b>	<b>377.74</b>
	Agriculture/Crop	Direct	3.01	96.55
	Dryland Grain Crop	Direct	0	0
	Deciduous Orchard	Direct	88.81	92.49
	Evergreen Orchard	Direct	0	0
	Irrigated Grain Crop	Direct	7.9	25.8
	Irrigated Row and Field Crop	Direct	0	6.08
	Irrigated Hayfield	Direct	4.97	29.83
	Vineyard	Direct	0	126.98
	<b>Urban/BNSF</b>		<b>0</b>	<b>0</b>
	BNSF	Direct	0	0
	Urban development	Direct	0	0
Remainder Areas (Outside of Recovery Areas)	<b>Natural</b>		<b>164.34</b>	<b>361.88</b>
	Annual Grassland	Direct	111.05	183.14
	Alkali Desert Scrub	Direct	2.03	6.73
	Barren	Direct	28.58	134.24
	Pasture	Direct	22.69	37.77
	Valley Oak Woodland	Direct	0	0
	<b>Agriculture</b>		<b>1643.94</b>	<b>3262.83</b>
	Agriculture/Crop	Direct	159.49	516.12
	Dryland Grain Crop	Direct	34.85	77.8
	Deciduous Orchard	Direct	733.19	1199.27
	Evergreen Orchard	Direct	3.42	3.42
	Irrigated Grain Crop	Direct	160.47	382.44
	Irrigated Row and Field Crop	Direct	37.62	131.24
	Irrigated Hayfield	Direct	242.04	439.15
	Vineyard	Direct	272.84	513.41
	<b>Urban/BNSF</b>		<b>0</b>	<b>0</b>
	BNSF	Direct	0	0
	Urban development	Direct	0	0

1. Land Prioritization categories are based on the *Recovery Plan of the Upland Species of the San Joaquin Valley, California* (USFWS 1998) and the *San Joaquin kit fox 5-Year Review* (USFWS 2010).

2. The MIN-MAX tables presented within the Biological Assessment are not representative of any one alignment. The total acres of the table may exceed the project footprint because the sum of the maximum values is calculated across all potential project alignments.

*Movement and connectivity*

The number of genetically effective migrants ( $N_m = 11$ ) estimated from genetic studies conducted by Wilbert (pers. comm., 2012) may appear to be small; however, what this value represents is a relative number of genetically-effective individuals that were able to move among the Bakersfield population and the western populations (Lokern and Carrizo Plains) and successfully breed over multiple generations. According to Mills et al. (1996) a minimum of one and a maximum of 10 migrants per generation would be an appropriate general rule of thumb for minimizing the rate of loss of genetic diversity. Therefore, according to the data from Wilbert's genetic studies (pers. comm., 2012), these San Joaquin kit fox populations currently fit well within the parameters of these recommendations. Under a metapopulation model, several genetically distinct populations with moderate migration among them is nearly an ideal situation for maintaining overall high levels of genetic diversity and minimizing adverse effects of demographic stochasticity, which is fundamental to the conservation of any species (Allendorf and Luikart 2007; Mills 2007). Therefore, maintaining these current levels of connectivity is crucial for the long-term survival and recovery of the San Joaquin kit fox.

The Authority has proposed construction of 73 to 98 dedicated wildlife crossings to ensure connectivity for the San Joaquin kit fox within areas identified as movement corridors and linkages to core recovery areas. Elevated portions of the alignment, bridges over riparian corridors, road overcrossings and undercrossings, and large drainage structures (e.g., large-diameter culverts 60 to 120 inches in diameter and 60 feet long) may also facilitate movement of San Joaquin kit foxes. Dedicated wildlife crossings, as proposed in the project description for the San Joaquin kit fox will be spaced at approximately 0.3-mile intervals within the core, linkage, and satellite areas identified in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (Service 1998).

The spacing and location of dedicated wildlife crossings for the Fresno to Bakersfield Section was based on (1) existing land uses; (2) existing and proposed infrastructure not associated with the CHST-FB Project; (3) previously identified wildlife movement corridors; (4) consistency with the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (Service 1998); and (5) comments provided by Cypher (in litt. 2010, 2011, and 2013; and pers. comm., 2012 and 2013). The highest density of dedicated wildlife crossing structures is proposed for the segment of the alignment between Cross Creek in Kings County and Poso Creek in Kern County. Other wildlife crossings in areas where adjacent land uses are relatively conducive to wildlife movement (e.g., grazing land, grain, orchards, hay, and idle pasture) will be constructed as large drainage culverts (60 inches in diameter and 60 feet long; OF = 0.33). Dedicated wildlife crossings are not proposed to be constructed within the 5 to 6-mile wide linkage area near Poso Creek that intersects with the HST. However, three of the large drainage culverts are proposed for the BNSF alternative and a portion of the Wasco-Shafter alternative will be constructed as elevated track within this area. These proposed culvert structures or portions of elevated track may provide opportunity for movement of San Joaquin kit fox within this linkage area (Cypher, in litt. 2013; and pers. comm., 2013).

Crossing opportunities for the San Joaquin kit fox south of the Poso Creek linkage area down into urban Bakersfield will consist of up to 9 road overcrossings within this 18 to 20-mile portion of the alignment. About 27 to 40 small drainage culverts (30 inches in diameter and 60 feet long) are also proposed to be constructed within this portion of the alignment. It is unlikely that San Joaquin kit fox will use these structures for crossing under the HST because the very small OF (0.08) (Cypher in litt. 2010, 2011; Cypher, pers. comm., 2012 and 2013). However, this stretch of the alignment consists of dense agricultural development and San Joaquin kit fox have not been documented to use this area for movement among highly suitable habitats (Cypher in litt. 2010, 2011; Cypher, pers. comm., 2012 and 2013).

Existing highways, roads, the BNSF rail line, urban development, and incompatible agricultural land uses may restrict movement of individuals and connectivity among existing San Joaquin kit fox populations (Service 2010; Spencer et al. 2010). Greater than 79 percent of the CHST-FB Project (~82 miles) will be installed at-grade. Portions of at-grade tracks will occur through areas that currently facilitate connectivity. Security fencing will be installed wherever the tracks are at-grade. Without the incorporation of wildlife crossing structures into the project design, the installation of long expanses of at-grade tracks with security fencing could potentially result in further loss and fragmentation of habitat and severely limit connectivity among San Joaquin kit fox habitats and populations, and preclude recolonization of currently unoccupied historic habitat. Therefore, the proposed wildlife crossings are crucial for maintaining connectivity among existing San Joaquin kit fox populations within and around the project action area.

The proposed design for the wildlife crossing is based on studies of use of highway undercrossings by San Joaquin kit fox, and other medium-sized mammals, such as the swift fox. Studies sponsored by the California Department of Transportation on highway undercrossings offered some insight into a minimum OF (as defined in conservation measure 1.a.) for San Joaquin kit foxes, but the results of these studies were not conclusive (Bremner-Harrison et al. 2007). In one study, use of crossing structures under four-lane divided highways by San Joaquin kit foxes was examined at three study sites: one each along Interstate 5, SR 58, and SR 14. San Joaquin kit foxes were confirmed to be present at all three sites (Bremner-Harrison et al. 2007). A total of 45 undercrossing structures were monitored at the three separate sites. OFs ranged from 0.001 to 5.70, with most values estimated at the lower end of this range. Although San Joaquin kit foxes explored the entrances to some of these structures, no evidence was found of foxes crossing completely through any of the structures. However, evidence that San Joaquin kit foxes preferred the use of road overcrossings at all three study sites was incidentally discovered during the study.

In another study, use of crossing structures by swift foxes (*Vulpes velox*) was examined along four-lane divided highways in Colorado and South Dakota (Clevenger et al. 2010). At the Colorado site, 24 structures were monitored. Swift foxes were detected completely crossing through several 213-foot long culverts with OFs ranging from 0.12 to 0.45. At the South Dakota site, 49 structures were monitored. Swift foxes were detected completely crossing through six structures, all of which were round culvert designs with OFs ranging from 0.23 to 0.81.



Arizona Game and Fish Department (AGFD) guidelines for crossing structures recommend a minimum OF of 0.4 for medium-sized mammals, including foxes (AGFD 2006). The AGFD guidelines also recommend spacing wildlife crossings every 500 to 1,000 feet in areas designated as movement corridors for medium-sized mammals when the expanse of a road or highway will exceed at least one-half mile. An opening of at least 30-square feet (3 feet x 10 feet) was recommended for wildlife crossings that will have a length of 75 feet (AGFD 2006).

The proposed design for all wildlife-designated crossing structures for the HST is based on the findings of the swift fox study by the Clevenger et al. (2010) study and AGFG recommendations, and consists of box culverts and short-span slab bridges (constructed for tracks to cross over hydraulic features), and will be located below the HST tracks. Box culverts will be installed where the track elevation is 9.5 feet or greater above the grade of the existing ground, and a short-span bridge will be installed when tracks are less than 9.5 feet above that grade. The proposed crossing structures will provide an opening that is either 3 feet or 6 feet high, 10 feet wide, and 73 feet long (OF = 0.41 or 0.82, respectively). The invert or bottom of the structure opening may extend below the existing grade to accommodate variations in the topography. However, all wildlife crossings will have at least 50 percent of the vertical clearance above grade of the approaches to the opening. This will allow San Joaquin kit foxes entering the crossing to see through to the opening at the opposite end of the structure.

Other structures that will be constructed for the Fresno to Bakersfield alignment, such as road overcrossings, spans, and bridges, may provide opportunities for movement of San Joaquin kit fox. The Fresno to Bakersfield alignment will include 172 to 197 road overcrossings to accommodate existing two-lane roads that will intersect with the HST. These road overcrossings provide opportunities for a variety of terrestrial wildlife species to cross over the alignment, especially on roads with low traffic volume. San Joaquin kit fox have been documented to use road overcrossings to gain access across highways (Bremner-Harrison et al. 2007; Cypher in litt. 2010 and 2011, and Cypher pers. comm., 2012). Therefore, the proposed road overcrossings will provide numerous opportunities for movement of San Joaquin kit fox across the HST (Cypher in litt. 2010 and 2011, and Cypher pers. comm., 2012).

Several large bridges and elevated spans that will be constructed across rivers, creeks, and other aquatic or land features may also provide opportunities for movement of San Joaquin kit fox (Cypher in litt. 2010 and 2011, and Cypher pers. comm., 2012). About 18 to 24 bridge structures of various sizes are proposed for construction of the CHST-FB Project. In addition, approximately 22 to 33 linear miles of elevated track is proposed for the Fresno to Bakersfield alignment, which could allow for movement of San Joaquin kit fox.

#### *Exposure to predators and infectious diseases*

The wildlife crossings may be used by other motile species such as coyotes, bobcats, feral cats and stray dogs to gain access across the HST tracks. Therefore, it may be likely that San Joaquin kit foxes may experience increased encounters with potential predators when using the proposed crossing structures. There may be potential for mortality if San Joaquin kit fox encounter predators while traveling parallel to the rail line in search of a crossing opportunity. However,

artificial escape structures will be installed within the crossing structures that will provide temporary escape. Four sections of CMP, 20 feet long and 10 inches in diameter, will be anchored at equal intervals on the floor of each crossing structure. The openings of both ends of all CMPs will be narrowed to a 4 to 6 inch diameter. San Joaquin kit foxes may find temporary refuge opportunities within the CMPs in the event they encounter a larger predator. The Authority has proposed to construct 17 to 24 dedicated wildlife crossings at 0.3-mile intervals, which should provide numerous opportunities for San Joaquin kit fox to gain access across the HST while minimizing the risk of encountering predators. Therefore, the potential for encounters with predators within and around wildlife crossings will be minimized through installation of the proposed wildlife crossings and artificial denning habitat, and mortality from predation is not expected to occur within these structures.

The installation of the proposed wildlife crossing structures and escape dens, as described above, will also provide refuge that will allow San Joaquin kit fox to minimize or avoid contact with animals carrying transmissible infectious diseases when using the crossing structures. Increased interface between rural areas, agricultural lands and urban development may result in higher densities of wild and domestic species that benefit from human activities in these areas (Bradley and Altizer 2006). Raccoons, coyotes, skunks, red foxes, gray foxes, feral cats, and stray dogs may occur at higher densities than San Joaquin kit fox within and around the project action area where an interface between agricultural lands and urban development exists within and around the Cities of Fresno and Bakersfield (Cypher et al. 2005; Smith et al. 2006; Service 2010a). These animals, especially raccoons and other small species may use the proposed crossing structures. For example, raccoons were detected at highway undercrossings in southern California more frequently than any other wild mammal species (Ng et al. 2004). Skunks, cats, and dogs were also detected using these undercrossings (Ng et al. 2004). These wild and domestic animals may carry transmissible infectious diseases, such as rabies, canine distemper virus, sarcoptic mange, and canine parvovirus (Cypher et al. 1998; Burton and Doblar 2004; Riley et al. 2004; Cummings et al. 2009). The number of crossing structures proposed and spacing intervals will provide sufficient opportunities for movement of San Joaquin kit foxes across the HST and minimize the probability of exposure to infected animals. Therefore, it is extremely unlikely for San Joaquin kit fox to be exposed to infected animals while using the proposed wildlife crossing structures.

#### *Exposure to increased noise levels*

San Joaquin kit fox currently experience noise disturbance from highway and road traffic. In addition to noise generated by highway and road traffic, San Joaquin kit fox that reside in metropolitan Bakersfield experience noise disturbance from a wide range of sources such as construction and human disturbance. The operation of the CHST-FB may result in additional noise disturbance that may temporarily impair behavioral patterns of this species and their prey. According to the proposed schedule for train operations, northbound and southbound trains will travel at least two to three times per hour from 6:00 a.m. to 12:00 a.m. However, noise disturbance from operation of the HST will not occur during nocturnal activities of San Joaquin kit fox in areas adjacent to the alignment from 12:00 am through 5:00 a.m. (~ 6 hours). - The FRA has established noise exposure limits for all wildlife at a sound exposure level (SEL) of

100 dBA from passing trains. Construction equipment, such as bulldozers, may produce noise in the range of 85 dBA (Burgland and Lindvall 1995). Assuming no intervening structures and maximum speeds of 220 mph, the Authority has estimated that 100 dBA SEL will occur within 100 feet from the trackway centerline for at-grade crossings, and estimated 15 feet from the centerline for elevated sections on structures. This noise level is comparable to a helicopter operating at the same distance (Service 2006c). The Authority has estimated that the 100 dBA SEL will be exceeded consistently throughout all alternatives for an estimated 50 feet outside the at-grade crossings on both sides.

All areas of the HST that are at-grade within suitable habitat are expected to experience increased noise exposure that may exceed the 100 dBA SEL threshold and potentially elicit a temporary startle, avoidance or negative behavior from San Joaquin kit fox and their prey. However, San Joaquin kit fox studied in Bakersfield, which appear to have adapted to the urban environment, have been observed denning near major roads (Bjurlin et al. 2005). Several San Joaquin kit fox were also observed using culverts and other road structures as dens in this same study (Bjurlin et al. 2005). Therefore, it is likely that San Joaquin kit fox will become quickly adapted to the increased noise disturbance generated by operation of the HST.

#### *Conservation measures for the San Joaquin kit fox*

The Authority has proposed to mitigate for the maximum estimate of permanent habitat loss for the San Joaquin kit fox. This will be accomplished through the acquisition of permittee-responsible mitigation sites that will be protected in perpetuity through conservation easements. These lands will be protected and managed for the conservation of the San Joaquin kit fox in perpetuity. These protected lands will provide habitat for breeding, feeding, or sheltering commensurate with or better than habitat lost as a result of the proposed project. As described in the CMP, implementation of the mitigation proposal will preserve natural habitat for the San Joaquin kit fox within core, linkage, and satellite areas identified in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (Service 1998). The proposed permittee-responsible mitigation sites identified in the 2012 Draft CMP, which support potential foraging and dispersal habitat for this species, are located within these core, linkage, and satellite areas.

#### *Tipton kangaroo rat*

##### *Effects associated with construction activities*

Mortality, injury, or harassment of Tipton kangaroo rats could occur from being crushed by project related equipment or vehicles, or construction debris within the action area during construction activities. The collapse of small mammal burrows could expose individuals to predation or adverse environmental conditions. Tipton kangaroo rats could fall into trenches, pits, or other excavations, and may be directly killed or unable to escape and be subjected to desiccation, entombment, or starvation. This disturbance and displacement may increase the potential for predation, desiccation, competition for food and shelter, or strike by vehicles on roadways. However, implementation of conservation measures proposed specifically for the Tipton kangaroo rat, such as minimizing the total area disturbed by project activities, conducting

pre-construction surveys, and inspecting burrows to make sure individuals are not inadvertently crushed, providing escape ramps in trenches, and properly constructed exclusionary fencing will minimize mortality, injury, or harassment.

Construction of the CHST-FB Project will result in the permanent loss of up to 454 acres of potential habitat for the Tipton kangaroo rat (Table 4). At the time of listing, habitat loss associated with agricultural development was identified as the main factor contributing to the decline of the Tipton kangaroo rat (Service 1988). The *Recovery Plan for Upland Species of the San Joaquin Valley, California* also cited habitat loss as the main reason for the decline for the Tipton kangaroo rat (Service 1998). In addition, the Tipton kangaroo rat is threatened by further habitat loss and fragmentation as a result of infrastructure development (Service 2010b). Between 1997 and 2010, the total of permanent loss of habitat was estimated to be about 14,824 acres (Service 2010b).

As of 2010, the total acreage of lands protected for the Tipton kangaroo rat under compensation agreements was estimated to be about 40,700 acres (Service 2010b). Approximately 37 percent of these lands occur within and around the project action area. The PNWR (~ 10,300 acres), managed by the Service, has several small patches of high quality habitat (alkaline plains sparsely covered with annual grasses and saltbush) that could support Tipton kangaroo rat (Service 2010b). The AER (~ 4,936 acres), managed by the CDFW, contains high quality habitat that could support the Tipton kangaroo rat as well (Service 2010b). The CHST-FB Project may intersect with these areas depending on the alternative that is finally selected, which would result in loss of habitat for this species within these preserves, decreased carrying capacity of habitat patches, and potentially subdivide existing populations.

#### *Effects associated with operation of the HST*

In the event that Tipton kangaroo rats are discovered within the project action area during pre-construction surveys or become accidentally trapped within the project action area, the Authority will immediately contact the Service. The Authority has agreed to prepare and implement a Service-approved small mammal trapping and relocation plan in general accordance with the survey protocols in the *California Valley Solar Ranch Project: Plan for Relocation of Giant Kangaroo Rats*. Tipton kangaroo rats may become disorientated after translocation, which can result in drastically increased vulnerability to mortality as a result of predation and competition with cohorts for resources (Germano 2010). However, implementation of Service-approved relocation plan will minimize effects of disorientation and the risk of mortality from translocation. In addition, translocation of Tipton kangaroo rats under a Service-approved relocation plan would minimize the risk of mortality as a result of construction activities and assist in expanding existing populations into unoccupied habitat.

### *Exposure to increased noise levels*

The operation of the Fresno to Bakersfield Section may result in additional noise disturbance that may temporarily impair behavioral patterns of this species. According to the proposed schedule for train operations, northbound and southbound trains will travel at least two to three times per hour from 5:00 a.m. to 12:00 a.m.. However, noise disturbance from operation of the HST will not occur during nocturnal activities of Fresno and Tipton kangaroo rats in areas adjacent to the alignment from 12:00 am through 5:00 a.m. (~ 5 hours).

The FRA has established noise exposure limits for all wildlife at a sound exposure level (SEL) of 100 dBA from passing trains. Construction equipment, such as bulldozers, may produce noise in the range of 85 dBA (Burgland and Lindvall 1995). Assuming no intervening structures and maximum speeds of 220 mph, the Authority has estimated that 100 dBA SEL will occur within 100 feet from the trackway centerline for at-grade crossings, and estimated 15 feet from the centerline for elevated sections on structures. This noise level is comparable to a helicopter operating at the same distance (Service 2006c). According to the Authority, it is expected that the 100 dBA SEL will be exceeded consistently throughout all alternatives for an estimated 50 feet outside the at-grade crossings on both sides.

Non-auditory communication is important for many mammalian species. Some mammals use vibration by drumming feet, teeth or heads or stamping feet to denote territorial advertisement, agonistic interactions, co-coordinate mating interactions, sub-ordinance and unwillingness to interact, and alert their cohorts to potential danger (Randall and Lewis 1997; Randall 1997; Randall, 2001.) *Dipodomys* species, such as the Tipton kangaroo rat, are known to use footdrumming as a means of communication and attracting mates (Randall and Lewis 1997; Randall 1997; Randall 2001). These species are also known to have highly-developed auditory senses capable of detecting low-frequency sound. The temporal bone of the kangaroo rat, which is characterized by an enlarged middle ear known as the auditory bulla, is commonly believed to be responsible for the improved low-frequency sensitivity (Shaffer and Long 2004). The Tipton kangaroo rat species are known to have enlarged auditory bulla relative to their small size.

### *Conservation measures for the Tipton kangaroo rat*

Implementation of the proposed conservation measures will significantly reduce adverse effects to Tipton kangaroo rats during project construction, maintenance, and operational activities. However, some mortality of Tipton kangaroo rats may still occur because they may be difficult for operators of maintenance equipment and vehicles to observe. The CHST-FB Project will result in the permanent loss of up to 454 acres of habitat for the Tipton kangaroo rat (Table 4). The Authority has proposed to mitigate for the maximum estimated permanent habitat loss through the acquisition of permittee-responsible mitigation sites within Fresno, Tulare, Kings, and Kern counties that will be protected in perpetuity through conservation easements. These lands will be protected and managed for the conservation of the Tipton kangaroo rat and provide habitat for breeding, feeding, or sheltering commensurate with or better than habitat lost as a result of the proposed project. Several permittee-responsible mitigation sites identified in the 2012 Draft CMP support habitat with documented occurrences of this species are proposed.

*Central California tiger salamander**Effects associated with construction activities*

Mortality, injury, or harassment of central California tiger salamanders may occur from being crushed by project related equipment or vehicles, or construction debris within the action area during construction activities. These small, cryptic animals are at risk from being crushed by project related equipment or vehicles, or construction debris within the action area. The collapse of small mammal burrows could expose individuals to predation or adverse environmental conditions. Central California tiger salamanders could fall into trenches, pits, or other excavations, and may be directly killed or unable to escape and be subjected to desiccation, entombment, or starvation. Disturbance from construction activities may increase the potential for predation, desiccation, competition for food and shelter, or strike by vehicles on roadways. However, implementation of conservation measures proposed specifically for the central California tiger salamander, such as minimizing the total area disturbed by project activities, conducting pre-construction surveys, and inspecting burrows to make sure individuals are not inadvertently crushed, providing escape ramps in trenches, and properly constructed exclusionary fencing will minimize mortality, injury, or harassment. Approximately 5.5 acres of upland habitat for the central California tiger salamander will be permanently lost as a result of construction of the CHST-FB Project.

In the event that central California tiger salamanders are discovered during pre-construction surveys or become accidentally trapped within the project action area, the Authority will immediately contact the Service. Capture and relocation of central California tiger salamanders is not currently proposed or authorized as a conservation measure for this project.

*Conservation measures for the central California tiger salamander*

Implementation of the proposed conservation measures will significantly reduce adverse effects to Central California tiger salamanders during project construction, maintenance, and operational activities. However, some mortality of central California tiger salamanders may still occur because they may be difficult for operators of maintenance equipment and vehicles to observe. The CHST-FB Project will result in the permanent loss of up to 5.5 acres of upland habitat for the central California tiger salamander (Table 4). The Authority has proposed to mitigate for the maximum estimated permanent habitat loss the acquisition of permittee-responsible mitigation sites within Fresno, Tulare, Kings, and Kern counties that will be protected in perpetuity through conservation easements. These lands will be protected and managed for the conservation of the central California tiger salamander and provide habitat for breeding, feeding, or sheltering commensurate with or better than habitat lost as a result of the proposed project. The proposed permittee-responsible mitigation sites identified in the 2012 Draft CMP support suitable breeding and aestivation habitat with documented occurrences of this species in all of its life stages.

*Blunt-nosed leopard lizard**Effects associated with construction activities*

Mortality, injury, or harassment of blunt-nosed leopard lizards may occur from being crushed by project related equipment or vehicles, or construction debris within the action area during construction activities. These small animals are at risk from being crushed by project related equipment or vehicles, or construction debris within the action area. The collapse of small mammal burrows could expose individuals to predation or adverse environmental conditions. Blunt-nosed leopard lizards could fall into trenches, pits, or other excavations, and may be directly killed or unable to escape and be subjected to desiccation, entombment, or starvation. Disturbance and displacement may increase the potential for predation, desiccation, competition for food and shelter, or strike by vehicles on roadways. However, implementation of conservation measures proposed specifically for the blunt-nosed leopard lizard, such as minimizing the total area disturbed by project activities, conducting pre-construction surveys, daily clearance surveys, and inspecting burrows to make sure individuals are not inadvertently crushed, providing escape ramps in trenches, and properly constructed exclusionary fencing will minimize mortality, injury, or harassment.

Access to suitable upland dispersal and refugia habitat such as alkali scrub habitat, grasslands, alfalfa fields, and pastures will become restricted or permanently lost due to permanent structures associated with the CHST-FB Project. Movement of blunt-nosed leopard lizards within the project action may be altered as a result of these effects.

*Conservation measures for the blunt-nosed leopard lizard*

Implementation of the proposed conservation measures will significantly reduce adverse effects to blunt-nosed leopard lizards during project construction, maintenance, and operational activities. However, some mortality of blunt-nosed leopard lizards may still occur because they may be difficult for operators of maintenance equipment and vehicles to observe. The CHST-FB Project will result in the permanent loss of up to 98 acres of suitable habitat for the blunt-nosed leopard lizards (Table 4). The Authority has proposed to mitigate for the maximum estimated permanent habitat loss the acquisition of permittee-responsible mitigation sites within Fresno, Tulare, Kings, and Kern counties that will be protected in perpetuity through conservation easements. These lands will be protected and managed for the conservation of the blunt-nosed leopard lizard and provide habitat for breeding, feeding, or sheltering commensurate with or better than habitat lost as a result of the proposed project. Several permittee-responsible mitigation sites identified in the 2012 Draft CMP support habitat with documented occurrences of this species are proposed.

*Vernal pool habitat for vernal pool fairy shrimp, vernal pool tadpole shrimp, and Hoover's spurge*

For the purposes of the impact assessment for vernal pool habitat, the Authority has considered that permanent effects will occur as a result of excavation or fill to vernal pool habitat within the footprint of the HST, and any vernal pool habitat within 250 feet of the footprint. Adverse effects from HST construction and operation activities will be caused by erosion, soil compaction, increased siltation/sedimentation, fractures in the hardpan soils, destruction of native vegetation, and significant alteration of hydrology for vernal pools or seasonal wetlands that provide habitat for vernal pool species. The hydrology of vernal pools may be altered from the loss of a watershed, up-slope destruction of the water restricting layer, and changes in surface topography. Published scientific works conducted in vernal pool landscapes have proven that vernal pools depend not just on rain falling into the pool basin and water flowing overland, but also water flowing below the soil surface (Rains et al. 2006; Rains et al. 2008; Williamson et al. 2005). The proposed project may result in up-slope and or down-slope destruction of the water restricting soil layers and changes in surface topography. When functioning properly, this perched groundwater system flows from the upland landscape to vernal pools and stabilizes vernal pool water levels, causing them to be inundated over larger areas for longer period of time than will be the case if they were recharged only by precipitation (Rains et al. 2006). This subsurface flow occurs on top of the claypan or hardpan that equipment has been perforated or excavated. Excavation of areas with higher elevation inter-mound areas or hardpan perforation in lower areas effectively serves to drain this water from the soil before it enters the vernal pools. Therefore, alteration of the hydrology of vernal pool habitat for the vernal pool fairy shrimp and the vernal pool tadpole shrimp, and the Hoover's spurge are reasonably likely to occur as a result of the proposed project.

Further effects to vernal pool habitat include the introduction or further spread of invasive plant species that could potentially affect pool hydrology, and long-term degradation of both vernal pool and upland plant communities. It may be difficult to limit the spread of existing non-native plant species within vernal pool habitat during construction activities. Some invasive species may inadvertently be introduced through seeds carried on workers clothing and shoe wear. However, the introduction of plant species into vernal pool and wetland habitat by construction equipment and vehicles will be limited, to the maximum extent feasible, through implementation of the WCP. All disturbed areas of upland habitat will be restored and revegetated with native plants and seeds following construction under the guidance of the RRP. Construction vehicles and equipment will be mostly limited to existing roads and other developed areas within the project action area.

The implementation of BMPs and the SWWPP will avoid adverse effects from fuel or chemical spills, sedimentation, and runoff from construction areas into vernal pool and wetland habitat for the vernal pool species. Therefore, adverse effects to vernal pool habitat from spills, sedimentation, and runoff are not expected to occur.



*Vernal pool fairy shrimp and vernal pool tadpole shrimp*

Vernal pool habitat occurs within the project action area that may be suitable for vernal pool fairy shrimp and vernal pool tadpole shrimp. The Service anticipates that direct and indirect effects to these species will occur in areas where vernal pool habitat is identified within the project action area. Effects to each of these listed branchiopod species was calculated by summing the acreage of potentially suitable vernal pool habitats within the project action area, and linking these habitats to CNDDDB records for each species within specific USGS 7.5-minute quadrangles as they occur within the Fresno to Bakersfield Section of the HST. The construction and operation of the Fresno to Bakersfield Section may result in direct effects on populations of vernal pool fairy shrimp and vernal pool tadpole shrimp through degradation or loss of seasonally inundated depressions such as vernal pools that support the reproductive cycle of these species. Direct adverse effects, such as harm or mortality from heavy equipment, may also occur during construction of the CHST-FB Project. Construction of the CHST-FB Project may result in disruption of upland areas surrounding vernal pool branchiopod habitat that will alter water retention and flow within the landscape and influence the timing and intensity of inundation necessary to support the life cycle of these species.

*Conservation measures for the vernal pool fairy shrimp and the vernal pool tadpole shrimp*

Implementation of the proposed conservation measures, such as pre-construction surveys, installation of exclusion fencing around vernal pool habitat, and use of erosion control materials, will reduce adverse effects to the vernal pool fairy shrimp and the vernal pool tadpole shrimp during project construction, maintenance, and operations. It is expected that all vernal pool and wetland habitat for the vernal pool fairy shrimp and the vernal pool tadpole shrimp within the alignment foot print and 250 feet of the footprint will be permanently lost as a result of the direct and indirect effects that will occur from construction of the HST. Up to 29.77 acres of suitable vernal pool habitat for the vernal pool fairy shrimp and .004 acre for the vernal pool tadpole shrimp may be permanently lost as a result of the proposed CHST-FB Project (Table 4). The Authority has proposed to mitigate for the direct effects to habitat for the vernal pool fairy shrimp and the vernal pool tadpole shrimp through acquisition of permittee-responsible mitigation sites within Fresno, Tulare, Kings, and Kern counties that will be protected in perpetuity through conservation easements and/or through purchase of credits at a Service-approved conservation banks. These lands will be protected and managed for the conservation of the vernal pool fairy shrimp and the vernal pool tadpole shrimp and provide habitat for breeding, feeding, or sheltering commensurate with or better than habitat lost as a result of the proposed project.

*Valley elderberry longhorn beetle*

Approximately 132 acres of suitable riparian habitat that could support elderberry shrubs and the valley elderberry longhorn beetle will be permanently affected as a result of the CHST-FB Project (Table 4). At least 36 elderberry shrubs have been identified within the project footprint that may be lost and could be subject to Service transplantation guidelines (Table 4). Other elderberry stands that may be identified within the project action area may be subject to removal or damage during construction activities. Surveys for the valley elderberry longhorn beetle and

suitable habitat for this species have not been completed throughout most of the project action area because of limited access. Elderberry shrubs within the construction footprint will be permanently lost as a result of the CHST-FB Project.

Negative effects to elderberry shrubs may directly affect the survival of valley elderberry longhorn beetle because they are host-specific to this plant species. Valley elderberry longhorn beetle populations may be temporarily affected, both directly and indirectly, by construction, maintenance, and operational activities within the project action area. Construction, maintenance, and operational activities may result in direct effects on valley elderberry longhorn beetle through the removal or partial destruction of elderberry shrubs within the project action area. Valley elderberry longhorn beetle mortality may occur from collisions or crushing by vehicles, equipment, human destruction or disturbance of occupied elderberry shrubs, or destruction of native riparian habitat.

*Conservation measures for the valley elderberry longhorn beetle*

Implementation of the proposed conservation measures will significantly reduce adverse effects to the valley elderberry longhorn beetle during project construction, maintenance, and operations. The Authority will follow compensatory mitigation measures provided within the *Conservation Guidelines for the Valley Elderberry Longhorn Beetle* (Table 5) (Service 1999a). The Authority has proposed to implement compensatory mitigation for this species at several permittee-responsible mitigation sites identified in the 2012 Draft CMP. These sites, located within Fresno, Tulare, Kings, and Kern counties, will be acquired, protected in perpetuity through conservation easements, protected and managed for the conservation of valley elderberry longhorn beetle, and provide habitat for breeding, feeding, or sheltering commensurate with or better than habitat lost as a result of the proposed project. Implementation of these mitigation measures and proposed revegetation of disturbed areas will enhance and protect habitat that will support the survival and recovery of the valley elderberry longhorn beetle.

**Table 5. Summary of proposed compensation for permanent effects to suitable habitat for the Valley elderberry longhorn beetle.<sup>a</sup>**

Stem Size Class (maximum diameter at ground level, in inches)	Exit Holes on Shrub <sup>b</sup>	Elderberry Seedling/Cutting Ratio <sup>c</sup>	Associated Native Plant Ratio <sup>d</sup>
<b>Riparian Habitat</b>			
Stems 1 to 3	Yes	1:01	1:01
	No	2:01	2:01
Stems 3 to 5	Yes	2:01	1:01
	No	4:01	2:01
Stems > 5	Yes	3:01	1:01
	No	6:01	2:01
<b>Non-Riparian Habitat</b>			
Stems 1 to 3	Yes	2:01	1:01
	No	4:01	2:01
Stems 3 to 5	Yes	3:01	1:01
	No	6:01	2:01
Stems > 5	Yes	4:01	1:01
	No	8:01	2:01

<sup>a</sup> Compensation was determined following the guidelines in the *Conservation Guidelines for the Valley Elderberry Longhorn Beetle* (Service 1999a).

<sup>b</sup> All stems measuring at least 1 inch in diameter at ground level on a single shrub are considered occupied when exit holes are present anywhere on the shrub.

<sup>c</sup> Ratios in the *Elderberry Seedling Ratio* column correspond to the number of cuttings or seedlings to be planted per elderberry stem (at least 1 inch in diameter at ground level) affected by the proposed project.

<sup>d</sup> Ratios in the *Associated Native Plant Ratio* column correspond to the number of associated native species to be planted per elderberry (seedling or cutting) planted.

### *California jewelflower, Hoover's spurge, Kern mallow, and San Joaquin woolly-threads*

Direct and indirect effects to California jewelflower, Hoover's spurge, Kern mallow, and San Joaquin woolly-threads will be presumed where suitable habitat occurs within the project action area. Effects to each of these listed plant species was calculated by summing the acreage of potentially suitable habitats within the project action area, and linking these habitats to CNDDDB records for each plant species within specific USGS 7.5-minute quadrangles as they occur within the Fresno to Bakersfield Section of the HST. The proposed project will result in the permanent loss of potential habitat for California jewelflower (15 acres), Hoover's spurge (6.35 acres), Kern mallow (214 acres), and San Joaquin woolly-threads (489 acres) (Table 4).

### *Effects associated with operation and maintenance activities*

In some areas, where the track is at-grade and drainage swales will be constructed, suitable habitat for California jewelflower, Hoover's spurge, Kern mallow, and San Joaquin woolly-threads may occur within swales and portions of the right-of-ways, which may become recolonized by these species. If operation and maintenance activities occur where any of these

species have recolonized, or immediately adjacent to the right-of-way, indirect effects may occur where ground disturbing, clearing, or grubbing are necessary, negative effects similar to those described for construction activities may occur during maintenance activities. However, California jewelflower, Hoover's spurge, Kern mallow, and San Joaquin woolly-threads, and other native vegetation, will be allowed to reestablish after construction in some areas (primarily associated with temporary construction easements), from the natural soil seed bank.

*Conservation measures for California jewelflower, Hoover's spurge, Kern mallow, and San Joaquin woolly-threads*

Implementation of the proposed conservation measure, such as pre-construction surveys, installation of exclusion fencing around vernal pool habitat, and use of erosion control materials, will reduce adverse effects to California jewelflower, Hoover's spurge, Kern mallow, and San Joaquin woolly-threads during project construction, maintenance, and operations. It is expected that all suitable habitat quantified in Table 4 for the California jewelflower, Hoover's spurge, Kern mallow, and San Joaquin woolly-threads within the alignment footprint (and 250 feet of the footprint for vernal pool habitat for the Hoover's spurge) will be permanently lost as a result of the direct and indirect effects that will occur from construction of the HST.

The Authority has proposed to mitigate for the maximum estimated permanent habitat loss for each of these species through acquisition of permittee-responsible mitigation sites within Fresno, Kings, Tulare, and Kern counties that will be protected in perpetuity through conservation easements, and/or through purchase of credits at a Service-approved conservation bank. These lands will be protected and managed for the conservation of the California jewelflower, Hoover's spurge, Kern mallow, and San Joaquin woolly-threads and provide habitat for these species commensurate with or better than habitat lost as a result of the proposed project.

The proposed permittee-responsible mitigation sites identified in the 2012 Draft CMP will be located within core areas identified in the *Recovery plan for upland species of the San Joaquin Valley, California* and the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (Service 1998 and 2005). The protection of both occupied and suitable habitat within these core areas is identified as important criteria for the delisting and/or recovery of these species. Implementing the mitigation proposal described in the 2012 Draft CMP would preserve and restore suitable habitat in the same recovery area affected by constructing and operating the CHST-FB Project.

### **Cumulative Effects**

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

While we are not aware of any specific non-federal actions that are reasonably likely to occur in the 48,452-acre project action area, we believe it is reasonable to assume that land use changes

will continue within the project action area that will be more detrimental than beneficial to habitat for the Federally listed species considered in this biological opinion. The Service does not have specific information regarding future non-federal actions within the project action area. However, increased agriculture, urbanization, and human development is reasonably likely to result in increased loss of habitat and a reduction in available food resources to support these species.

## **Conclusion**

### *San Joaquin kit fox*

Even with the implementation of the proposed Conservation Measures, the Service still believes that there is a likelihood of take of San Joaquin kit fox from the proposed project. However, after reviewing the current status of the San Joaquin kit fox, the environmental baseline for the action area, the effects of the proposed project, and the cumulative effects, it is the Service's biological opinion that the CHST-FB Project, as proposed, is not likely to jeopardize the continued existence of this listed species. Based on the proposed project design and all of the conservation measures, the amount of incidental take anticipated is small relative to the rangewide condition of the species. The project, as proposed, is not likely to restrict or preclude movement among San Joaquin kit fox populations. The protection of habitats within the permittee-responsible mitigation sites as identified in the 2012 Draft CMP will minimize the effect on the San Joaquin kit fox from incidental take resulting from permanent habitat loss. Permanent protection of these lands through conservation easements will provide beneficial effects for this species and contribute to its survival and recovery.

### *Tipton kangaroo rat*

Even with the implementation of the proposed Conservation Measures, the Service still believes that there is a likelihood of take of Tipton kangaroo rat from the proposed project. However, after reviewing the current status of the Tipton kangaroo rat, the environmental baseline for the action area, the effects of the proposed project, and the cumulative effects, it is the Service's biological opinion that the CHST-FB Project, as proposed, is not likely to jeopardize the continued existence of this listed species. Based on the proposed project design and all of the conservation measures, the amount of incidental take anticipated is small relative to the rangewide condition of the species. The protection of habitats within the permittee-responsible mitigation sites as identified in the 2012 Draft CMP will minimize the effect on the Tipton kangaroo rat from incidental take resulting from permanent habitat loss. Permanent protection of these lands through conservation easements will provide beneficial effects for this species and contribute to its survival and recovery.

### *Central California tiger salamander*

Even with the implementation of the proposed Conservation Measures, the Service still believes that there is a likelihood of take of central California tiger salamander from the proposed project. However, after reviewing the current status of the central California tiger salamander, the

environmental baseline for the action area, the effects of the proposed project, and the cumulative effects, it is the Service's biological opinion that the CHST-FB Project, as proposed, is not likely to jeopardize the continued existence of this listed species. Based on the proposed project design and all of the conservation measures, the amount of incidental take anticipated is small relative to the rangewide condition of the species. The protection of habitats within the permittee-responsible mitigation sites as identified in the 2012 Draft CMP will minimize the effect on the central California tiger salamander from incidental take resulting from permanent habitat loss. Permanent protection of these lands through conservation easements will provide beneficial effects for this species and contribute to its survival and recovery.

*Blunt-nosed leopard lizard*

Even with the implementation of the proposed Conservation Measures, the Service still believes that there is a likelihood of take of blunt-nosed leopard lizard from the proposed project. However, after reviewing the current status of the blunt-nosed leopard lizard, the environmental baseline for the action area, the effects of the proposed project, and the cumulative effects, it is the Service's biological opinion that the CHST-FB Project, as proposed, is not likely to jeopardize the continued existence of this listed species. Based on the proposed project design and all of the conservation measures, the amount of incidental take anticipated is small relative to the rangewide condition of the species. The protection of habitats within the permittee-responsible mitigation sites as identified in the 2012 Draft CMP will minimize the effect on the blunt-nosed leopard lizard from incidental take resulting from permanent habitat loss. Permanent protection of these lands through conservation easements will provide beneficial effects for this species and contribute to its survival and recovery.

*Vernal pool fairy shrimp, vernal pool tadpole shrimp,*

Even with the implementation of the proposed Conservation Measures, the Service still believes that there is a likelihood of take of the vernal pool fairy shrimp and the vernal pool tadpole shrimp from the proposed project. However, after reviewing the current status of the vernal pool fairy shrimp and the vernal pool tadpole shrimp, the environmental baseline for the action area, the effects of the proposed project, and the cumulative effects, it is the Service's biological opinion that the CHST-FB Project, as proposed, is not likely to jeopardize the continued existence of this listed species. Based on the proposed project design and all of the conservation measures, the amount of incidental take anticipated is small relative to the rangewide condition of the species. The protection of habitats within the permittee-responsible mitigation sites as identified in the 2012 Draft CMP will minimize the effect on the vernal pool fairy shrimp and the vernal pool tadpole shrimp from incidental take resulting from permanent habitat loss. Permanent protection of these lands through conservation easements will provide beneficial effects for this species and contribute to its survival and recovery.

*Valley elderberry longhorn beetle*

Even with the implementation of the proposed Conservation Measures, the Service still believes that there is a likelihood of take of the valley elderberry longhorn beetle from the proposed project. However, after reviewing the current status of the valley elderberry longhorn beetle, the environmental baseline for the action area, the effects of the proposed project, and the cumulative effects, it is the Service's biological opinion that the CHST-FB Project, as proposed, is not likely to jeopardize the continued existence of this listed species. Based on the proposed project design and all of the conservation measures, the amount of incidental take anticipated is small relative to the rangewide condition of the species. The protection of habitats within the permittee-responsible mitigation sites as identified in the 2012 Draft CMP will minimize the effect on the valley elderberry longhorn beetle from incidental take resulting from permanent habitat loss. Permanent protection of these lands through conservation easements will provide beneficial effects for this species and contribute to its survival and recovery.

*California jewelflower*

Even with the implementation of the proposed Conservation Measures, the Service still believes that there is a likelihood of adverse effects to the California jewelflower from the proposed project. However, after reviewing the current status of the California jewelflower, the environmental baseline for the action area, the effects of the proposed project, and the cumulative effects, it is the Service's biological opinion that the CHST-FB Project, as proposed, is not likely to jeopardize the continued existence of this listed species. Based on the proposed project design and all of the conservation measures, the amount of adverse effects anticipated will be minimal. The protection of habitats within the permittee-responsible mitigation sites as identified in the 2012 Draft CMP will minimize the effect on the California jewelflower from adverse effects resulting from permanent habitat loss. Permanent protection of these lands through conservation easements will provide beneficial effects for this species and contribute to its survival and recovery.

*Hoover's spurge*

Even with the implementation of the proposed Conservation Measures, the Service still believes that there is a likelihood of adverse effects to the Hoover's spurge from the proposed project. However, after reviewing the current status of the Hoover's spurge, the environmental baseline for the action area, the effects of the proposed project, and the cumulative effects, it is the Service's biological opinion that the CHST-FB Project, as proposed, is not likely to jeopardize the continued existence of this listed species. Based on the proposed project design and all of the conservation measures, the amount of adverse effects anticipated will be minimal. The protection of habitats within the permittee-responsible mitigation sites as identified in the 2012 Draft CMP will minimize the effect on the Hoover's spurge from adverse effects resulting from permanent habitat loss. Permanent protection of these lands through conservation easements will provide beneficial effects for this species and contribute to its survival and recovery.

*Kern mallow*

Even with the implementation of the proposed Conservation Measures, the Service still believes that there is a likelihood of adverse effects to the Kern mallow from the proposed project. However, after reviewing the current status of the Kern mallow, the environmental baseline for the action area, the effects of the proposed project, and the cumulative effects, it is the Service's biological opinion that the CHST-FB Project, as proposed, is not likely to jeopardize the continued existence of this listed species. Based on the proposed project design and all of the conservation measures, the amount of adverse effects anticipated will be minimal. The protection of habitats within the permittee-responsible mitigation sites as identified in the 2012 Draft CMP will minimize the effect on the Kern mallow from adverse effects resulting from permanent habitat loss. Permanent protection of these lands through conservation easements will provide beneficial effects for this species and contribute to its survival and recovery.

*San Joaquin woolly-threads*

Even with the implementation of the proposed Conservation Measures, the Service still believes that there is a likelihood of adverse effects to the San Joaquin woolly-threads from the proposed project. However, after reviewing the current status of the San Joaquin woolly-threads, the environmental baseline for the action area, the effects of the proposed project, and the cumulative effects, it is the Service's biological opinion that the CHST-FB Project, as proposed, is not likely to jeopardize the continued existence of this listed species. Based on the proposed project design and all of the conservation measures, the amount of adverse effects anticipated will be minimal. The protection of habitats within the permittee-responsible mitigation sites as identified in the 2012 Draft CMP will minimize the effect on the San Joaquin woolly-threads from adverse effects resulting from permanent habitat loss. Permanent protection of these lands through conservation easements will provide beneficial effects for this species and contribute to its survival and recovery.

**INCIDENTAL TAKE STATEMENT**

Section 9(a)(1) of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened fish and wildlife species without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by impairing behavioral patterns including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with this Incidental Take Statement.



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

Sections 7(b)(4) and 7(o)(2) of the Act generally do not apply to listed plant species. However, limited protection of listed plants from take is provided to the extent that the Act prohibits the removal and reduction to possession of Federally listed endangered plants or the malicious damage of such plants on areas under Federal jurisdiction, or the destruction of endangered plants on non-Federal areas in violation of State law or regulation or in the course of any violation of a State criminal trespass law. The California jewelflower is listed as endangered under the California Endangered Species Act (CESA) (California Fish and Game Code, section 2080 et seq.). The Hoover's spurge, the Kern mallow, and the San Joaquin woolly-threads are not currently listed under the CESA. The CESA prohibits the unauthorized take of State-listed threatened or endangered species. The Native Plant Protection Act (Division 2, Chapter 10, section 1908) prohibits the unauthorized take of State-listed threatened or endangered plant species. The CESA requires State agencies to consult with California Department of Fish and Game on activities that may affect a State-listed species and mitigate for any adverse impacts to the species or its habitat. Pursuant to CESA, it is unlawful to import or export, take, possess, purchase, or sell any species or part or product of any species listed as endangered or threatened. The State may authorize permits for scientific, educational, or management purposes, and to allow take that is incidental to otherwise lawful activities.

### **Amount or Extent of Take**

#### *San Joaquin kit fox*

It is not possible to quantify the number of individual San Joaquin kit foxes that will be taken as a result of the proposed project because this species is relatively sparsely distributed and have large home ranges, and we believe that the number of individuals foxes impacted will be relatively small. Therefore, the amount of habitat for this species that will be impacted as a result of the CHST-FB Project will be used as a surrogate for quantifying take. The Service anticipates that all San Joaquin kit foxes that may be in the section of the action area undergoing construction at any given time will be harassed by project activities. In addition, the Service anticipates that up to 4,700 acres of suitable habitat will be directly impacted and permanently lost as a result of the CHST-FB Project resulting in harm to the species by significantly impairing essential behaviors, including breeding foraging, and denning. Upon implementation of the

Reasonable and Prudent Measures, these levels of incidental take associated with the CHST-FB Project in the form of harm and harassment of the San Joaquin kit fox caused by habitat loss and construction activities will become exempt from the prohibitions described under section 9 of the Act.

*Tipton kangaroo rat*

It is not possible to quantify the number of individual Tipton kangaroo rats that will be impacted as a result of the CHST-FB the proposed project because the number of individuals within the project action area is unknown. The anticipated loss of individuals of this species also may be difficult to quantify due to seasonal fluctuations in their numbers, random environmental events, changes in their habitat, or additional environmental disturbances. Therefore, the amount of habitat for this species that will be impacted as a result of the CHST-FB Project will be used as a surrogate for quantifying take. The Service anticipates that 454 acres of suitable habitat for the Tipton kangaroo rat will be permanently lost as a result of the CHST-FB Project. Upon implementation of the Reasonable and Prudent Measures, these levels of incidental take associated with the CHST-FB Project in the form of harm, harassment, capture, injury, and death of the Tipton kangaroo rat caused by habitat loss and construction activities will become exempt from the prohibitions described under section 9 of the Act.

*Central California tiger salamander*

It is not possible to quantify the number of individual central California tiger salamanders that will be impacted as a result of the CHST-FB the proposed project because the number of individuals within the project action area is unknown. The anticipated loss of individuals of this species also may be difficult to quantify due to seasonal fluctuations in their numbers, random environmental events, changes in their habitat, or additional environmental disturbances. Therefore, the amount of habitat for this species that will be impacted as a result of the CHST-FB Project will be used as a surrogate for quantifying take. The Service anticipates that 5.5 acres of upland habitat for the central California tiger salamander will be permanently lost as a result of the CHST-FB Project. Upon implementation of the Reasonable and Prudent Measures, these levels of incidental take associated with the CHST-FB Project in the form of harm, harassment, capture, injury, and death of the central California tiger salamander caused by habitat loss and construction activities will become exempt from the prohibitions described under section 9 of the Act.

*Blunt-nosed leopard lizard*

It is not possible to quantify the number of individual blunt-nosed leopard lizards that will be impacted as a result of the CHST-FB the proposed project because the number of individuals within the project action area is unknown. The anticipated loss of individuals of this species also may be difficult to quantify due to seasonal fluctuations in their numbers, random environmental events, changes in their habitat, or additional environmental disturbances. Therefore, the amount of habitat for this species that will be impacted as a result of the CHST-FB Project will be used as a surrogate for quantifying take. The Service anticipates that 98 acres of suitable habitat for

the blunt-nosed leopard lizard will be permanently lost as a result of the CHST-FB Project. Upon implementation of the Reasonable and Prudent Measures, these levels of incidental take associated with the CHST-FB Project in the form of harm, harassment, capture, injury, and death of the blunt-nosed leopard lizard caused by habitat loss and construction activities will become exempt from the prohibitions described under section 9 of the Act.

*Vernal pool fairy shrimp and vernal pool tadpole shrimp*

It is not possible to quantify the number of individual vernal pool fairy shrimp and vernal pool tadpole shrimp that will be taken as a result of the proposed project. The anticipated loss of individuals of this species also may be difficult to quantify due to seasonal fluctuations in their numbers, random environmental events, changes in water regime at their vernal pool habitat, or additional environmental disturbances. Therefore, the quantity of acres of habitat for this species impacted by the project will be used as a surrogate for quantifying take. The Service anticipates that 29.77 acres of vernal pool habitat suitable for vernal pool fairy shrimp and 0.004 acre of vernal pool habitat suitable for vernal pool tadpole shrimp will be permanently lost as a result of the CHST-FB Project. Upon implementation of the Reasonable and Prudent Measures, these levels of incidental take associated with the CHST-FB Project of the vernal pool fairy shrimp and vernal pool tadpole shrimp caused by habitat loss and construction activities will become exempt from the prohibitions described under section 9 of the Act.

*Valley elderberry longhorn beetle*

It is not possible to quantify the number of individual Valley elderberry longhorn beetles will be taken as a result of the proposed project. The anticipated loss of individuals of this species also may be difficult to quantify due to seasonal fluctuations in their numbers, random environmental events, changes in their habitat, or additional environmental disturbances. Therefore, the amount of acres of habitat for this species that will be impacted will be used as a surrogate for quantifying take. The Service anticipates that up to 36 elderberry shrubs for the Valley elderberry longhorn beetle will be permanently lost as a result of the CHST-FB Project. Upon implementation of the Reasonable and Prudent Measures, these levels of incidental take associated with the CHST-FB Project in the form of harm and death of the Valley elderberry longhorn beetle caused by habitat loss and construction activities will become exempt from the prohibitions described under section 9 of the Act.

**Effect of the Take**

The Service has determined this level of anticipated take is not likely to result in jeopardy to the San Joaquin kit fox, the Tipton kangaroo rat, the central California tiger salamander, the blunt-nosed leopard lizard, the vernal pool fairy shrimp, the vernal pool tadpole shrimp, and the valley elderberry longhorn beetle.

### **Reasonable and Prudent Measure**

The Service has determined that the following reasonable and prudent measure is necessary and appropriate to minimize the effects of the CHST-FB Project on the San Joaquin kit fox, the Fresno kangaroo rat, the Tipton kangaroo rat, the central California tiger salamander, the blunt-nosed leopard lizard, the vernal pool fairy shrimp, the vernal pool tadpole shrimp, and the valley elderberry longhorn beetle:

All of the conservation measures as proposed by the FRA and the Authority in the biological assessment, and restated in the project description section of this biological opinion, must be fully implemented and adhered to.

### **Terms and Conditions**

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

1. The FRA shall ensure that the Authority and all of its contractors fully implement and adhere to the proposed conservation measures. All terms and conditions that apply to contractor activities shall be conditioned in contracts for the work.
2. In order to monitor whether the amount or extent of incidental take anticipated from implementation of the project is approached or exceeded, the FRA shall adhere to the following reporting requirements. Should this anticipated amount or extent of incidental take be exceeded, the FRA must immediately reinstate formal consultation as per 50 CFR 402.16.
  - a. For those components of the action that will result in habitat degradation or modification whereby incidental take in the form of harm is anticipated, the FRA shall provide monthly updates to the Service with a precise accounting of the total acreage when the following habitats are impacted: (1) habitat for the San Joaquin kit fox (Table 5) (2) habitat for the Tipton kangaroo rat (Table 4); (3) upland habitat for the California tiger salamander (Table 4); (4) habitat for the blunt-nosed leopard lizard (Table 4); (5) vernal pool habitat for vernal pool species (Table 4); and (6) actual number of elderberry shrubs and stems for the valley elderberry longhorn beetle (Table 4). Updates shall also include any information about changes in project implementation that result in habitat disturbance not described in the *Description of the Proposed Action* and not analyzed in this biological opinion.
  - b. For those components of the action that may result in direct encounters between listed species and project workers and their equipment whereby incidental take in the form of harassment, harm, injury, or death is anticipated, the FRA shall immediately contact the Service's SFWO at (916) 414-6600, to report the encounter. If an encounter occurs after normal working hours, the FRA shall contact the SFWO at the earliest possible opportunity the next working day. When injured or killed individuals of the listed

species are found, the FRA shall follow the steps outlined in the *Salvage and Disposition of Individuals* section.

- c. A post-construction report detailing compliance with the project design criteria and proposed conservation measures described under the *Description of the Proposed Action* section of this biological opinion shall be provided to the Service within 30 calendar days of completion of the project. The report shall include: (1) dates of project groundbreaking and completion; (2) pertinent information concerning the success of the project in meeting compensation and other conservation measures; (3) an explanation of failure to meet such measures, if any; (4) known project effects listed species, if any; (5) observed incidences of injury to or mortality of any listed species, if any; and, (6) any other pertinent information.
3. The FRA will submit a final Compensatory Mitigation Plan to the Service prior to initiation of construction of the CHST-FB Project. In addition, prior to commencement of construction for any phase, the FRA will provide a phase specific final mitigation plan that implements mitigation consistent with the CMP, and identifies long term management measures, appropriate conservation instruments, appropriate financial assurances (e.g., proof of credit purchase from Service-approved conservation banks) to the Service for each phase of construction. The Authority will also submit all proposed conservation easements or similar instruments, management plans, and financial assurances to the Service for review and approval prior to initiation of construction activities.

### **Salvage and Disposition of Individuals**

In the case of an injured and/or dead federally listed wildlife species, the Service shall be notified of events within one day and the animal shall only be handled by a Service-approved biologist. Injured federally listed wildlife species shall be cared for by a licensed veterinarian or other qualified person. In the case of a dead federally listed wildlife species, the animal shall be preserved, as appropriate, and shall be bagged and labeled (i.e. species type; who found or reported the incident; when the report was made; when and where the incident occurred; and if possible, cause of death). Carcasses shall be held in a secure location, such as a freezer or cooler, until instructions are received from the Service regarding the disposition of the specimen or until the Service, or another appropriate agency or qualified person, takes custody of the specimen. The FRA must report to the Service within one calendar day any information about take or suspected take of federally-listed species not exempted in this opinion. Notification must include the date, time, and location of the incident or of the finding of a dead or injured animal. The Service contacts are Daniel Russell, Deputy Assistant Field Supervisor, Endangered Species Program, Sacramento, at (916) 414-6600 and the Service's Law Enforcement Division at (916) 414-6660.

## CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities that can be implemented to further the purposes of the Act, such as preservation of endangered species habitat, implementation of recovery actions, or development of information and data bases.

1. The Service recommends the FRA develop and implement the appropriate restoration measures in areas designated in the *Valley Elderberry Longhorn Beetle Recovery Plan* (Service 1984), *Recovery plan for upland species of the San Joaquin Valley, California* (Service 1998), and the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (Service 2005c).
2. The FRA and Authority should incorporate “environmentally friendly” erosion and stabilization techniques whenever possible in this project, such as use of biodegradable materials constructed from natural fibers (e.g. coconut fiber).
3. Sightings of any listed or sensitive animal species should be reported to the CNDDDB of the CDFW. A copy of the reporting form and a topographic map clearly marked with the location the animals were observed also should be provided to the Service.

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

## REINITIATION--CLOSING STATEMENT

This concludes formal consultation on the CHST-FB Project. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action.

If you have any questions, please contact Florence Gardipee, Fish and Wildlife Biologist, or Daniel Russell, Deputy Assistant Field Supervisor, of this office at (916) 414-6600, or by email (Flo\_Gardipee@fws.gov).

Sincerely,

A handwritten signature in black ink, appearing to read "Jan C. Knight". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Jan C. Knight  
Acting Field Supervisor

cc:

Mark McLoughlin, Sacramento, California High Speed Rail Authority  
Julie Vance, California Department of Fish and Game, Bakersfield, California  
Enrique Manzanilla, Environmental Protection Agency, San Francisco, California  
Jane M. Hicks, U.S. Army Corps of Engineers, San Francisco, California

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**Personal communications**

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\_\_\_\_\_ 2013. Associate Director and Research Ecologist Endangered Species Recovery Program, California State University-Stanislaus, Bakersfield, California. Telephone conversations and email correspondence with Florence Gardipee, U.S. Fish and Wildlife Service, Sacramento, California, regarding suitability of agricultural lands for use by San Joaquin kit fox populations in Fresno, Kings, Tulare and Kern Counties, and issues related to wildlife crossing structures for this species.

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## United States Department of the Interior



### FISH AND WILDLIFE SERVICE

Sacramento Fish and Wildlife Office  
2800 Cottage Way, Room W-2605  
Sacramento, California 95825-1846

In Reply Refer To:  
08ESMF00-2012-F-0247

APR - 1 2014

David Valenstein  
Chief, Environmental and Systems Planning Division  
U.S. Department of Transportation  
Federal Railroad Administration  
1200 New Jersey Avenue, SE  
Washington, D.C. 20590

Subject: Biological Opinion on the California High-Speed Train System: Fresno to Bakersfield Section Project, Fresno, Tulare, Kings, and Kern Counties

Dear Mr. Valenstein:

This is in response to the Department of Transportation, Federal Railroad Administration (FRA), and the California High-Speed Rail Authority (Authority), the FRA's designated non-federal representative, September 18, 2013, request for administrative edits to the *Biological Opinion on the California High-Speed Train System: Fresno to Bakersfield Section Project, Fresno, Tulare, Kings, and Kern Counties*, dated February 28, 2013 (2013 FB-BO), and the October 8, 2013, letter requesting reinitiation of formal consultation with the U.S. Fish and Wildlife Service (Service) on the CHST-FB Project. The FRA determined that the proposed CHST-FB Project may affect, but is not likely to adversely affect the Fresno kangaroo rat, and requested the Service's concurrence with their determination. This document represents the Service's biological opinion on the effects of the action on the Federally listed as endangered San Joaquin kit fox (*Vulpes macrotis mutica*), Fresno kangaroo rat (*Dipodomys nitratooides exilis*), Tipton kangaroo rat (*Dipodomys nitratooides nitratooides*), blunt-nosed leopard lizard (*Gambelia sila*), the vernal pool tadpole shrimp (*Lepidurus packardii*), the California jewelflower (*Caulanthus californicus*), the Kern mallow (*Eremalche kernensis*), the San Joaquin woolly threads (*Monolopia congdonii*); and Federally listed as threatened central California Distinct Population Segment of the California tiger salamander (*Ambystoma californiense*) (central California tiger salamander), vernal pool fairy shrimp and its critical habitat (*Branchinecta lynchi*), valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), Hoover's spurge (*Chamaesyce hooveri*), in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) (Act). Critical habitat for the vernal pool fairy shrimp has been designated and occurs within the project action area, including the Fagundes Compensatory Mitigation Site

(FCMS). Critical habitat for the central California tiger salamander and the vernal pool tadpole shrimp has been designated and occurs only within the FCMS portion of the project action area. Critical habitat for the Fresno kangaroo rat, the valley elderberry longhorn beetle, and the Hoover's spurge has been designated but does not occur within the proposed CHST-FB Project action area. Critical habitat has not been designated for the San Joaquin kit fox, the Tipton kangaroo rat, the blunt-nosed leopard lizard, the California jewelflower, the Kern mallow, and the San Joaquin woolly threads.

This document represents the Service's biological opinion on the CHST-FB Project, and supersedes the February 2013 FB-BO. .

The Service has determined that the proposed FCMS component of the CHST-FB Project is not likely to adversely affect the vernal pool fairy shrimp and the vernal pool tadpole shrimp because the project, as proposed, will not result in harm to the cysts of these species. .

The Service has determined that the CHST-FB Project may affect but is not likely to adversely affect the designated critical habitat for the central California tiger salamander. This determination is based on the on the following:

1. We do not anticipate adverse effects from the CHST-FB Project to the Primary Constituent Elements (PCEs) within the portion of designated critical habitat that occurs within the FCMS.
2. The effects from habitat restoration activities proposed at the FCMS are expected to be temporary and occur over a short duration (less than 3 months).

The Service has determined that the CHST-FB Project, as proposed, may affect but is not likely to adversely affect the designated critical habitat for the vernal pool fairy shrimp. This determination is based on the on the following:

1. The portion of designated critical habitat for this species that occurs within the project action area is located outside of the project footprint and the 250-foot area on both sides of the CHST-FB alignment project footprint, where permanent effects to the hydrology of vernal pool habitat could occur. Therefore, we do not anticipate adverse effects to the PCEs of the designated critical habitat.
2. We do not anticipate adverse effects from the CHST-FB Project to the PCEs within the portion of designated critical habitat that occurs within the FCMS.
3. The effects from habitat restoration activities proposed at the FCMS are expected to be temporary and occur over a short duration (less than 3 months).

The Service has determined that the CHST-FB Project, as proposed, may affect but is not likely to adversely affect the designated critical habitat for the vernal pool tadpole shrimp. This determination is based on the on the following:

1. We do not anticipate adverse effects from the CHST-FB Project to the PCEs within the portion of designated critical habitat that occurs within the FCMS.
2. The effects from habitat restoration activities proposed in the CHST-FB Project are expected to be temporary and occur over a short duration (less than 3 months).

The Service agrees with the FRA's and the Authority's determination that the CHST-FB Project, as proposed, may affect, but is not likely to adversely affect the Fresno kangaroo rat. This biological opinion serves as our written concurrence with this finding. This determination is based on the on the following:

1. Existing populations of the Fresno kangaroo rat have not been identified within this portion of its historic range.
2. Potential habitat for this species is located outside of the recovery zones identified in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (Service 1998).
3. The FRA and the Authority has proposed conservation measures to avoid take of the Fresno kangaroo rat.

This biological opinion is based on: (1) *California High-Speed Train: Fresno to Bakersfield, Potential Wetlands and Waters of the U.S.*, dated February 8, 2010; (2) *Fresno to Bakersfield Preliminary Jurisdictional Waters and Wetlands Delineation Report, Volumes 1, 2, 3, and 4*, dated June 2011; (3) *Fresno to Bakersfield Preliminary Jurisdictional Waters and Wetlands Delineation Report, Volumes 1, 2, 3, and 4*, dated June 2011; (4) *Draft Fresno Bakersfield Section Biological Resources*, July 2011; (5) *Draft Fresno Bakersfield Section Biological Resources and Wetlands Technical Report*, July 2012; (6) *Draft Fresno to Bakersfield Draft EIR/EIS, Volumes I, II, and III*, dated August 2011; (7) *Draft Fresno to Bakersfield Section Compensatory Mitigation Plan*, dated September 2011; (8) *Draft Fresno to Bakersfield Section Compensatory Mitigation Plan*, dated September 2011; (9) *Draft Fresno to Bakersfield Section Compensatory Mitigation Plan*, dated August 2012; (10) *Draft Fresno to Bakersfield Biological Assessment*, dated September 2011; (11) *Draft Fresno to Bakersfield Biological Assessment*, dated June 2012; (12) *Fresno to Bakersfield Supplemental Preliminary Jurisdictional Waters and Wetlands Delineation Report, Volumes 1, 2, 3, and 4*, dated July 2012; (13) *Revised Draft Fresno to Bakersfield Draft EIR/EIS, Volumes I, II, and III*, dated July 2012; (9) *Fresno to Bakersfield Revised Draft EIR/Supplemental Draft EIS, Executive Summary*, dated July 2012; (14) *Assessment of the Use of Agricultural Lands by San Joaquin Kit Foxes* memo, dated February 7, 2013; (15) GIS data files; (16) *Assessment of Adequacy of Proposed Crossing Structures for San Joaquin Kit Foxes in the Biological Assessment for the Fresno-Bakersfield Segment of the California High-Speed Train* memo, dated February 9, 2013; (17) *Administrative Edits Memo*, dated September 18, 2013; (18) *Fresno to Bakersfield Supplemental Biological Assessment*, dated October 2013; (19) *Merced to Fresno Section – Inoculum Collection Methods for the HST PPI Wetland Restoration at Lazy K Ranch*, dated December 13, 2013; and (20) other information available to the Service.

### Consultation History

September 2009 to July 2012	The Service provided technical assistance to the FRA and the Authority through participation in meetings, electronic mail correspondence, letters, review of draft documents, and providing comments and guidance.
July 6, 2012	The Service received the biological assessment and request for formal consultation for the CHST-FB Project from the FRA.
July, 17, 2012	The Service participated in a meeting with URS/HMM/Arup Joint Venture (URS) biologists at the Sacramento Fish and Wildlife Office.
July 19, 2012	The Service requested review of a draft project description proposed for inclusion in the biological opinion for the CHST-FB Project and requested for further information via electronic mail.
September 26, 2012	The Service requested information and submitted an <i>Information Checklist</i> template to the FRA and the Authority and URS via electronic mail.
September 27, 2012	The Service received information requested on September 26, 2012 and a completed <i>Information Checklist</i> for the CHST-FB Project from the FRA and the Authority and URS via electronic mail.
September 28, 2012	The Service requested the current Draft Compensatory Mitigation Plan and GIS files for the CHST-FB Project via electronic mail.
October 1, 2012	The Service received the Draft Compensatory Mitigation Plan and prospectuses for proposed properties for the CHST-FB Project via electronic mail.
October 16, 2012	The Service requested review and consideration of consistency for conservation measures that will be implemented for species that occur among multiple sections of the California High-Speed Train Project via electronic mail.
November 8 to 9, 2012	The Service participated in a site visit with the FRA and the Authority, California Department of Fish and Wildlife (CDFW), and URS.
November 14, 2012	The Service requested supplemental information, including a review of the project description submitted to the FRA and the Authority and URS on July 19, 2012 via electronic mail.

- December 3, 2012 The Service notified the FRA and the Authority, CDFW, and URS via electronic mail that Kern mallow may be present in Tulare County based on new information, and requested revised estimates of habitat loss for plant species that will be affected by the CHST-FB Project.
- December 10, 2012 The Service received updated prospectuses for proposed properties for the CHST-FB Project via electronic mail.
- December 14, 2012 The Service attended a meeting with the FRA and the Authority, CDFW, URS, AECOM, and Dr. Brian Cypher, to discuss planning for a report to be drafted by Dr. Brian Cypher regarding the status of San Joaquin kit fox throughout its range.
- January 3, 2013 The Service provided a summary of pending information action items necessary for completing the biological opinion to the FRA and the Authority via electronic mail.
- January 15, 2013 The Service received supplemental information regarding botanical resources from the FRA and the Authority via electronic mail.
- January 17, 2013 The Service received an electronic mail memo drafted by Dr. Brian Cypher to the Authority regarding his review of proposed locations of dedicated wildlife crossings for the San Joaquin kit fox, and a revised project description from the FRA and the Authority via electronic mail.
- January 28, 2013 The Service participated in a meeting with the FRA and the Authority at the Sacramento Field Office.
- January 29, 2013 The Service received the requested GIS files from URS, and submitted revisions and comments to FRA and the Authority regarding the proposed conservation measures via electronic mail.
- January 30, 2013 The FRA and the Authority submitted the 2010 memos from Dr. Brian Cypher to the Service via electronic mail.
- February 5, 2013 The Service participated in a meeting with the FRA and the Authority at their office to discuss revisions to proposed conservation measures.
- February 8, 2013 The Service received revised conservation measures from the FRA and the Authority via electronic mail.

- February 11, 2013                    The Service received the Assessment of the Use of Agricultural Lands by San Joaquin kit foxes memo, dated February 7, 2013, from Dr. Brian Cypher to the FRA and the Authority via electronic mail.
- February 13, 2013                    The Service received the *Assessment of Adequacy of Proposed Crossing Structures for San Joaquin Kit Foxes in the Biological Assessment for the Fresno-Bakersfield Segment of the California High-Speed Train* memo, dated February 9, 2013, from Dr. Brian Cypher to the FRA and the Authority via electronic mail. The Service corresponded with Authority and URS regarding estimates of the project action area via electronic mail.
- February 15, 2013                    The Service received requested information regarding plant surveys conducted in 2010 from the FRA and the Authority via electronic mail. The Service requested further information regarding wildlife crossing opportunities for the San Joaquin kit fox from Dr. Brian Cypher
- February 15, 2013 to February, 20, 2013                    The Service participated in email correspondence regarding wildlife crossings with Dr. Brian Cypher and the FRA and the Authority.
- February 22, 2013                    The Service received proposed revisions to the conservation measures from the FRA and the Authority via electronic mail.
- February 25, 2013                    The Service received additional proposed revisions to the conservation measures from the Authority via electronic mail.
- September 18, 2013                    The Service received a request from the FRA and Authority for administrative edits to the 2013 FB-BO.
- October 8, 2013                    The Service received the supplemental biological assessment and request for reinitiation of formal consultation for the CHST-FB Project from the FRA and the Authority.
- October 30, 2013                    The service participated in a meeting with the FRA and the Authority and URS to discuss the proposed administrative edits and request for reinitiation of formal consultation.
- December 4, 2013                    The Service participated in a conference call with the FRA and the Authority and URS to discuss the proposed administrative edits and request for reinitiation of formal consultation.

- December 18, 2013            The Service participated in a meeting with the FRA and the Authority and URS to discuss the proposed administrative edits and request for reinitiation of formal consultation.
- January 6, 2014            The Service participated in a conference call with the FRA and the Authority and URS to discuss the proposed administrative edits and request for reinitiation of formal consultation.
- January 28, 2014           The Service participated in a conference call with the FRA and the Authority and URS to discuss the proposed administrative edits and request for reinitiation of formal consultation.
- January 30, 2014           The Service received requested GIS files from the Authority and URS.
- February 3, 2014           The Service received supplemental information requested during conference calls from the Authority and URS.
- July 2012 to March 2014    The Service participated in weekly conference calls with the FRA and the Authority, CDFW, and URS.

## **PROJECT DESCRIPTION**

### **Description of the Proposed Action**

The proposed project includes the construction, operation, and maintenance of an approximately 117-mile long rail line to support an intercity High-Speed Train (HST) from Fresno to Bakersfield in the Central Valley of California. The Fresno to Bakersfield section is one of nine sections of the overall HST system. The HST system will be a state-of-the-art electrically powered, high-speed, steel-wheel-on-steel-rail system. Trains will be capable of operating at speeds of up to 220 miles per hour on a fully grade-separated, dedicated track alignment. The entire rail alignment will be fenced or walled in order to control access for safety and security.

Several potential alignments have been identified in the Revised Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement (Fresno Bakersfield RDEIR/SDEIS) for the proposed project. These alternatives include varying siting for not only rail alignments, but also other project infrastructure, including passenger stations, power delivery structures, maintenance-of-way facilities, operations control centers, and a Heavy Maintenance Facility (HMF). Since an alternative has not been selected to date, this biological opinion includes a project description and effects analysis for all alternative alignments, and assesses effects to federally-listed species based on a range of impacts from minimum to maximum (expressed in acreages). Regardless of the final alignment selected, project impacts will be similar geographically as well as in general nature and magnitude.



The project footprint extends to the physical limits of the construction activities associated with the proposed action. The project footprint includes all areas that will be permanently or temporarily affected by the proposed action. The footprint consists of the limits of cut and fill plus all access roads and areas required for operating, storing, and refueling construction equipment.

Parcels within the project footprint that the Authority was granted permission to enter were initially surveyed by biologists in 2010, with follow up surveys in 2011 and 2012. The purpose of the surveys was to determine which habitat types were present and identify potential project effects to federally-listed species. In accordance with the *Central Valley Biological Resource and Wetland Survey Plan* (FRA and Authority 2009 and 2011) physical botanical and wildlife habitat assessment surveys and jurisdictional wetland delineation were conducted within the project footprint. The surveys were done 60 to 120 feet in width depending on if tracks in the area are to be at-grade or elevated and within a 250-foot buffer around the project footprint. To evaluate project effects to wide ranging wildlife and wildlife movement corridors, aerial photographic interpretation and windshield surveys were conducted within a 1000-foot buffer around the project footprint.

In accordance with Service or California Department of Fish and Wildlife species-specific protocols, the study area was extended laterally from the project footprint up to 1.24 miles. Depending on target species, the extended study area identifies species-specific habitats based on aerial photographic interpretation, documented occurrences of the species, and field observations of federally listed species and their habitats.

Approximately 38 percent of the proposed project alignment has been surveyed to date. In areas that were not accessible, biologists conducted, to the extent possible, visual surveys of habitat types. Within unsurveyed areas, aerial photography was used to assess habitat types which were used to calculate the anticipated range of effects to federally-listed species habitat. The entire project alignment will be surveyed prior to construction to determine the effects of the project on federally-listed species, as described in further detail in the Conservation Measures section of this biological opinion.

Although it was difficult to determine the total number of elderberry shrubs (*Sambucus* spp.) that may be affected by the proposed action, the FRA and the Authority estimated that no more than three times the number of shrubs detected in areas surveyed in 2010 (12 shrubs) will likely be encountered within the project action area.

The proposed project is described as the Burlington Northern Santa Fe Railway (BNSF) Alternative Alignment, and consists of a single alignment for the entire length of the rail line, with 10 smaller alternative alignments. These alternatives include two west of Hanford alternatives, each with two variations, at-grade and below-grade; one alternative alignment within the city of Corcoran; three separate alternative alignments around the cities Corcoran, Allensworth, and Wasco; and three alternatives within urban Bakersfield.

The FRA and the Authority may begin construction activities at any point along the initial operating segment-first construction (IOS-first construction) of the statewide HST alignment. The IOS-first construction is approximately 130 miles long and mostly overlaps with the Fresno to Bakersfield section. A 25-mile portion of the IOS-first construction is in the Merced to Fresno Section. Currently, the IOS-first construction is divided into four separate construction packages. Ground disturbance may occur concurrently within any of the construction packages and in more than one location at a time. A description of general project components, project alignment, and construction methods are included below. Additional project details are located in the biological assessment.

## **General Project Elements**

### *Trainsets*

The HST system will be designed to accommodate a typical train 9 to 11 feet in width with a total length of 660 feet and consisting of eight cars. A typical train consisting of two trainsets will seat up to 1,000 passengers and be approximately 1,320 feet long. Trains will operate up to 220 miles per hour.

### *Rail Line*

The proposed project will consist of a fully dedicated rail line, constructed from continuous welded steel rail. The rail line will be in a double-track formation, with one track in each direction. In some areas, such as near regional passenger stations, at least four tracks will be constructed to allow trains to pass one another. The following four general rail line profiles will be constructed: 1) At-grade tracks will be constructed at existing ground levels; 2) elevated tracks will be placed on retained fill; 3) aerial tracks will be placed on bridge structures; and 4) below-grade tracks will be constructed within retained cuts. The general rail profiles are discussed in further detail below.

1. At-grade rail line will be fixed to concrete cross ties that will be bedded in either crushed rock or a concrete slab. The top of the rail will be constructed at a minimum 4.5 feet above the 100-year floodplain. The height of the at-grade profile will vary based on topography and necessary clearance for culverts and other water conveyance structures. Drainage will be accomplished by constructing a 3-foot-wide drainage swale on either side of the rail line, which will be intercepted at regular intervals by culverts. Additional paired 30-inch-wide culverts will be used to prevent ponding along the alignment. Ducts will be constructed alongside the tracks to convey low voltage power cables and fiber optic lines to power trackside signaling and serve communications systems. Duct covers will serve as safety walkways for detrainning passengers in the case of emergencies. An 8-foot high security fence will be installed on the outer edge of the HST right-of-way. The overall width of the right-of-way will be approximately 120 feet where the rail line is at grade. The proposed project will include between 79 and 91 miles of at-grade rail line.

2. Rail line elevated on retained fill will be used when necessary to narrow the right-of-way within a constrained corridor. Retaining walls will be built above existing ground level and backfilled.
3. Aerial tracks will be used in urban areas where extensive road networks need to be maintained. Aerial tracks will have a minimum clearance of approximately 16.5 feet over roadways and 24 feet over railroads. Pier supports will be approximately 10 feet in diameter at ground level. This type of rail line may also be used to cross riparian areas and other water features. The proposed project will include 22-33 miles of elevated and aerial rail line combined.
4. Below-grade tracks will be used when the rail alignment crosses under existing rail tracks, roads, or highways that are at-grade. This rail type will be used only for short distances in highly constrained situations. Retaining walls will typically be needed to protect adjacent properties. Below-grade crossings will also be used for roadways when it is preferable for them to go below the rail track. The proposed project will include up to 3 miles of below-grade tracks.

### *Road Crossings*

To maintain local traffic and agricultural access while maintaining grade separation with the HST tracks, the proposed project will include between 172 and 197 road crossings, depending on the selected alignment. Most road crossings will be constructed as overpasses, and each structure will have a footprint ranging 0.62 acre to 137.42 acres, with a median of approximately 24.5 acres.

### *Wildlife Crossings*

To maintain permeability and connectivity for wildlife along the rail line where it is at-grade, a variety of wildlife crossings will be constructed. Wildlife crossings will typically consist of modified culverts, and will be approximately 73 feet long, 10 feet wide, and 3 feet high. To accommodate variations in topography, the height of the at-grade profile may require wildlife crossing structures be depressed up to 1.5 feet below-grade. These crossings will yield a calculated "openness factor" (OF) (Bremner-Harrison et al. 2007) of 0.41, which is a calculation of the function of height, width, and crossing distance. At locations where storm water swales parallel the embankment, or localized flooding may occur, the approach to wildlife crossing structures will be designed to avoid ponding within the structures.

Additional wildlife crossing structure designs may include circular or elliptical pipe culverts, and longer culverts with crossing distances of up to 100 feet. These culverts will be at least 3 feet high, depressed no more than 1.5 feet below-grade, and meet or exceed a minimum 0.41 openness factor.

Additional wildlife crossing opportunities will be available along elevated portions of the alignment, at bridges over riparian corridors, road crossings, and drainage structures (i.e. large

culverts). Dedicated wildlife crossings will be located approximately every 0.3 miles along the rail line between Cross Creek in Kings County and Poso Creek in Kern County. This section of the alignment is located adjacent to the Allensworth Ecological Reserve and the Pixley National Wildlife Refuge which are important areas for wildlife dispersal, particularly the San Joaquin kit fox. Dedicated wildlife crossings will be located on both the north and south sides of major river and creek crossings. There will be between 73 and 98 dedicated wildlife crossings constructed, depending on which rail alignment alternatives are selected. A detailed description of wildlife crossing structures and their proposed locations are included in the biological assessment.

### *Stations*

Stations will be sited and designed to allow for connection to local transit, airports, and highways. All stations will include the following elements:

1. Station buildings of 40,000 to 100,000 square feet that are two to three stories high and contain passenger boarding platforms, ticketing, waiting areas, passenger amenities, employee areas, and baggage and freight areas.
2. Parking facilities from 1.5 to 9 acres in Fresno and Bakersfield and 3.5 to 17.25 acres at the potential Kings/Tulare Regional Station.
3. Waiting areas and queuing space for taxis and buses.
4. Pedestrian connections.

The proposed project will include the construction of up to three train stations, one each in Fresno and Bakersfield, and a potential third Kings/Tulare Regional Station (Regional station) located either east or west of Hanford. One location is being considered for the Fresno station, three potential locations for the Regional station, and three locations are being considered for the Bakersfield station. Station locations will be based according to which rail alignments are selected. The stations will range in size from 18.5 to 20.5 acres for the Fresno Station, 25 to 48 acres for the Regional Station, and 19 to 24 acres for the Bakersfield station. Details of each Station alternative are discussed below.

### **Fresno Station**

The location for the Fresno station is:

1. The Fresno Station-Mariposa Alternative: This station will be located in downtown Fresno, less than 0.5 mile east of State Route (SR) 99 along the BNSF Alternative. This station will be centered on Mariposa Street and bordered by Fresno Street to the north, Tulare Street on the south, H Street on the east, and G Street on the west, and occupy approximately 20.5 acres.

### **Kings/Tulare Regional Station**

The three potential locations for the Regional station include:

1. The Regional Station-East Alternative: This station will be located east of SR 43 and north of the San Joaquin Valley Railroad on the BNSF Alternative, and occupy approximately 27 acres.
2. The Regional Station-West Alternative: This station will be located east of 13<sup>th</sup> Avenue and north of the San Joaquin Valley Railroad on the Hanford West Bypass 1 and 2 Alternatives, and occupy approximately 48 acres.
3. The Regional Station-West Alternative Below-Grade: This station will be in the same location and similar to the Regional Station West Alternative, except that the platform will be located below-grade. This proposed station will occupy approximately 48 acres.

### **Bakersfield Station**

The three potential locations for the Bakersfield station include:

1. The Bakersfield Station-North Alternative: This station will be located in downtown Bakersfield, at the corner of Truxtun Avenue and Union Avenue, east of an existing Amtrak station and corresponds with the BNSF Alternative Alignment, and occupy approximately 19 acres.
2. The Bakersfield Station-South Alternative: This station will be situated in the same general area as the Bakersfield-North Alternative, but will be located south of the BNSF right-of-way. This station will occupy approximately 20 acres.
3. The Bakersfield Station-Hybrid Alternative: This station will be located in the same general area as the Bakersfield-North and Bakersfield-South Alternatives, at the corner of Truxtun Avenue and Union Avenue, and occupy approximately 24 acres.

### *Electrical System*

The components of the electrical system include the following:

The overhead contact system (OCS), which is the wiring above the track that electrifies the train. OCS poles will be spaced approximately every 200 feet along straight portions of rail and every 70 feet in tight-turn areas.

1. Traction power substations, which provide power to the OCS, will be located approximately every 30 miles and will occupy 0.73 acres each within a 2-acre parcel. Five substations are planned. Each station will include a 20 foot-wide access road from the nearest street access, and a protective perimeter fence will be installed.

2. Switching stations will be located approximately every 15 miles between traction power substations, and will occupy 0.22 acre each. Five switching stations are planned. Switching stations allow adjacent power sections to maintain power in the event of an outage.
3. Paralleling stations will be located approximately every five miles between the traction power substations and switching stations, and serve to stabilize current flow. Seventeen stations are planned and each will occupy 0.18 acre.

Additional elements of the electrical system will include backup and emergency power sources, which will consist of generators or batteries located at passenger stations. Also, signaling and train control huts will be located within the rail line right-of-way.

#### *Heavy Maintenance Facility*

One HMF will be constructed between the cities of Merced and Bakersfield in order to support the start-up and maintenance of the trainsets and overall system operation. The HMF will occupy at least 154 acres, and it is not known at this time if it will be located within the footprint of the proposed project or within the Merced to Fresno HST section. Five potential HMF sites are being considered within the Fresno Bakersfield section. The HMF will operate 24 hours a day, 7 days a week, with up to 1,500 employees working at a given time. An Operations Control Center will be co-located with the HMF.

#### *Maintenance-of-Way Facility*

A Maintenance-of-Way (MOW) facility will be constructed within the footprint of the proposed project. The MOW will be used for housing equipment and vehicles necessary for accessing the rail alignment and right-of-way for repairs and upgrades. If the HMF is constructed as part of the proposed project, the MOW will be co-located adjacent to the HMF. If the HMF is not constructed in the proposed project, the MOW will be located within the project footprint. The MOW will occupy approximately 26 acres.

#### **Project Alignment**

The BNSF Alternative Alignment will extend from Fresno to Bakersfield and will be sited adjacent to the existing BNSF right-of-way to the extent feasible. Several minor deviations from the existing BNSF right-of-way are necessary to accommodate engineering constraints for high-speed trains. The BNSF Alternative Alignment will not follow the BNSF right-of-way within the city of Fresno; rather, the BNSF Alternative will run east of and adjacent to the Union Pacific Railroad (UPRR) right-of-way. The alignment will also veer from the BNSF right-of-way near the cities of Laton and Hanford, and rejoin the BNSF right-of-way near the city of Corcoran. The alignment will generally follow the BNSF corridor through Bakersfield to the project terminus at Oswell Street.

*Fresno County*

The BNSF Alternative Alignment will begin at the north end of the Fresno station tracks adjacent to the western side of the UPRR right-of-way in the vicinity of Amador Street. The alignment will be below grade for approximately 140 yards as it crosses the Fresno Bee railroad spur. The alignment will return to grade and continue southeast through Fresno on the western side of the UPRR until reaching East Jensen Avenue. A temporary rerouting of existing railroad tracks (known as a shoofly track in railroad parlance) will be required between Fresno Street and SR 41. The temporary track from the shoofly will be removed after the new track is installed and service is restored to the existing track. An intrusion protection barrier approximately 1 mile in length will be required within the project footprint from approximately Stanislaus Street to Ventura Avenue due to the proximity of the UPRR and HST rights-of-way. An intrusion barrier is a safety wall erected between two rail lines to prevent a derailed train from entering the adjacent rail line. The alignment will again be below grade in a shallow trench as it travels underneath East Jensen Avenue, then curve to the south and be elevated over Golden State Boulevard and SR 99. The elevated structure will span just over 1 mile and will reach a maximum height of approximately 55 feet. The alignment will return to grade and join the BNSF corridor on its western side at East Malaga Avenue south of Fresno. The BNSF Alternative will continue through Fresno County along the BNSF right-of-way in an area composed mostly of agricultural land.

Approximately 24 miles of track will be located in Fresno County. Nearly all of the alignment, roughly 22 of the 24 miles, will be at-grade. The HST alignment will be elevated where it crosses from the western side to the eastern side of the BNSF tracks near East Conejo Avenue. The elevated structure will span approximately 1 mile and will reach a maximum height of approximately 42 feet as it crosses over the BNSF tracks. A total of approximately 5.5 miles of BNSF tracks will be realigned from approximately East Sumner Avenue to East Huntsman Avenue and approximately East Rose Avenue to East Kamm Avenue to accommodate the HST alignment. Another 0.5 miles of BNSF tracks will be realigned in the vicinity of South Peach Avenue. The alignment will be at-grade with bridges where it crosses Cole Slough and the Kings River into Kings County. These bridges will clear the Cole Slough and Kings River levees by approximately 3 feet. Dedicated wildlife crossing structures will be placed between 100 and 500 feet to the north and south of Cole Slough and the Kings River. There will be approximately 2 to 4 wildlife crossing structures in Fresno County, depending on the rail alignment alternative selected.

*Kings County*

Approximately 28 miles of the BNSF Alternative will be in Kings County. The rail line will pass east of the city of Hanford, parallel to and approximately 0.5 mile east of SR 43 (Avenue 8). South of Hanford in the vicinity of Idaho Avenue, the BNSF Alternative will curve to the west and then south toward the BNSF right-of-way. The alignment was refined in this area to minimize impacts to aquatic features located north of Corcoran and east of the BNSF tracks. The alignment will rejoin the BNSF right-of-way on its eastern side just north of Corcoran and travel through the eastern edge of the city of Corcoran. The majority of this part of the alignment will

pass through agricultural land except where it travels through the city of Corcoran. The alignment in Corcoran encompasses a number of land uses, including residential, commercial, and industrial. A total of approximately 8 miles of track within Kings County will be elevated. The first elevated portion will be located just east of the city of Hanford, and will span a length of 2.5 miles, beginning just south of Fargo Avenue and ending just north of Hanford Armona Road. This portion of the alignment will pass over the San Joaquin Valley Railroad and SR 198. The structure will reach a height of approximately 50 feet aboveground. The potential Kings/Tulare Regional Station will be located along this structure near the SR 43 and SR 198 interchange.

The alignment will continue at-grade south of Hanford Armona Road for approximately 10 miles, and then ascend onto an elevated structure over Cross Creek and the BNSF right-of-way. The structure will span a length of approximately 2.5 miles, beginning north of Cross Creek and returning to grade north of Nevada Avenue. The elevated structure will reach a maximum height above ground of 40 feet. The alignment will then continue at-grade and require an intrusion protection barrier within the project footprint from approximately Nevada Avenue to approximately North Avenue. The barrier will be approximately 2 miles in length. At Patterson Avenue, the alignment will again ascend onto an elevated structure over Brokaw Avenue, Whitley Avenue, a BNSF Railway spur, and agricultural facilities at the southern end of the city of Corcoran. The elevated structure will span approximately 1.7 miles. The alignment will be constructed on a retained embankment as it crosses into Tulare County, from north of 4<sup>th</sup> Avenue to Avenue 136. Approximately 0.3 miles of BNSF tracks will be realigned at Oregon Avenue, south of Corcoran.

Dedicated wildlife crossing structures will be provided from approximately Cross Creek south to the Tulare County line in at-grade portions of the railroad embankment at intervals of approximately 0.3 miles. The BNSF Alternative will also include dedicated wildlife crossing structures placed between 100 and 500 feet to the north and south of each of the following river/creek crossings: Dutch John Cut (Slough), Kings River, and Cross Creek. There will be approximately 10 to 18 wildlife crossing structures in Kings County, depending on the rail alignment alternative selected.

#### *Kings County: Proposed HST Alignment over State Route 43*

The portion of the HST System alignment that is shifting across SR 43 passes through the Cross Creek grassland region on an at-grade alignment. At-grade portions of the track bed will be built on compacted dirt embankments. The top of the rail will be constructed at a minimum of 4.5 feet above the 100-year floodplain or higher when transitioning to an elevated structure. The height of the at-grade profile may vary to accommodate slight changes in topography, provide clearance for storm water culverts and structures in order to allow water flow, and potential wildlife movement. A drainage system may be designed to include a 3-foot-wide drainage swale located on either side of the rail line, intercepted at regular intervals by culverts and open-structures to carry runoff to existing natural drainage or appropriate municipal drainage systems. Drainage may also include paired 30-inch-wide culverts under the embankment, spaced as frequently as necessary to prevent ponding and allow drainage in the Cross Creek grassland region north of



Corcoran (Figure 1, below), the HST tracks were previously proposed to be located between the existing BNSF Railway tracks and the California Department of Transportation (Caltrans) SR 43 right-of-way. The Caltrans right-of-way in this area varies from 142 feet to 192 feet wide and is intended to allow Caltrans to widen SR 43 to 4 lanes in the future. The FRA and Authority have decided to relocate the HST tracks to the east of the existing Caltrans SR 43 right-of-way. This alignment will require a strip of land east of the existing SR 43 roadway near Cross Creek with a maximum width of 205-feet to construct the HST System and to relocate an existing berm into lacustrine habitat (Figure 2, below: illustration showing the shift in the alignment from the west of SR 43 to the east).

An existing berm that is approximately 12 feet high and 36 feet wide is located adjacent to the SR 43 right-of-way; this berm will be shifted and reconstructed to the east of the HST System. The relocated berm will function and perform similarly as the existing berm by continuing to store agricultural water from excess water releases. Similar to the existing structure, the relocated berm will be a barrier to hydrological connectivity outside of the lacustrine habitat. Reconstruction of the existing berm will include reusing suitable material from the existing berm, supplemented by borrow material as necessary. Typical construction equipment such as front-end loaders, scrapers, and dump trucks, will be used to reconstruct a berm with similar geometry and structural functions as the existing berm, to the east of its current location. All work will be conducted in accordance with relevant general and species-specific conservation measures.

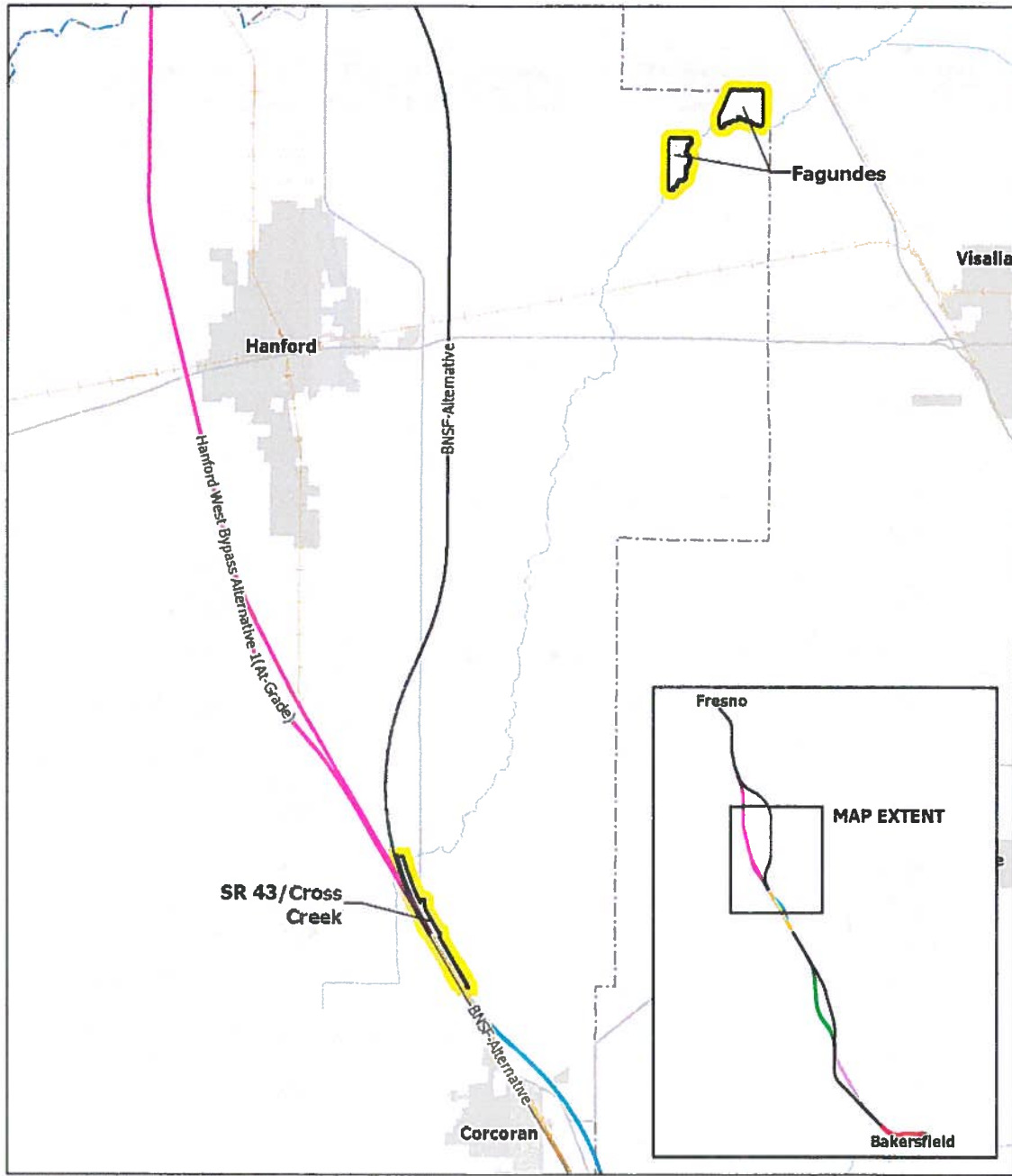
Potentially suitable aquatic habitat within the range of the central California tiger salamander in the SR 43/Cross Creek area consists of man-made ponds mapped as lacustrine habitat. This lacustrine habitat is used for agricultural water storage and is filled with excess water releases pumped in from Cross Creek. The fill and drainage of this feature is done when water is available or when water is needed for irrigation purposes. Due to the artificial and managed hydrology of this area, this site's lacustrine habitat likely provides limited, low-quality breeding habitat, if any, for the central California tiger salamander.

Construction work window restrictions for wetlands and other waters of the U.S. will be implemented to reduce direct and indirect effects of construction activities on federally listed species within those habitats. In the event that construction work window restrictions cannot be conducted, dewatering, water diversions, or additional best management parties (BMPs) will be employed as determined through agency consultation.

### *Tulare County*

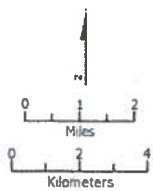
The BNSF Alternative will cross approximately 22 miles of Tulare County. The alignment will travel through the county adjacent to the western side of the BNSF right-of-way. The majority of the alignment will be at-grade, with only a combined total of 4 miles elevated where the

Figure 1. Fresno to Bakersfield project footprint.



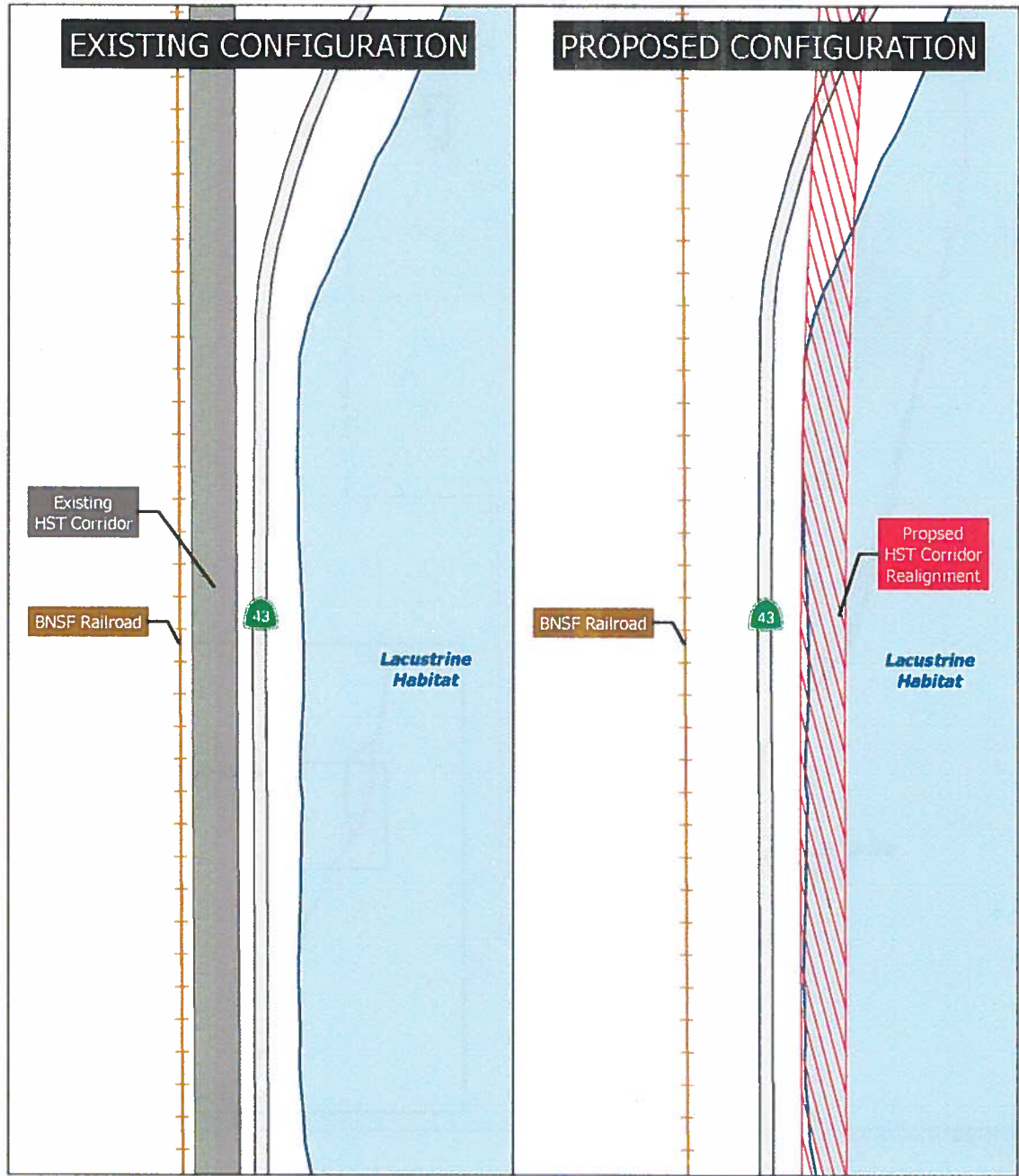
PRELIMINARY DRAFT/SUBJECT TO CHANGE - HST ALIGNMENT IS NOT DETERMINED  
 Date source: URS, 2013

October 7, 2013



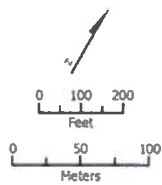
- |                               |                      |                      |
|-------------------------------|----------------------|----------------------|
| <b>Alternative alignments</b> | Corcoran Bypass      | Existing rail line   |
| BNSF Alternative              | Allensworth Bypass   | Stream               |
| Hanford West Bypass           | Wasco-Shafter Bypass | County boundary      |
| Alternatives 1 & 2            | Bakersfield South    | Community/Urban area |
| Corcoran Elevated             | Bakersfield Hybrid   |                      |

**Figure 2. CHST-FB corridor realignment: Shift in the alignment from the west of SR 43 to the east.**



PRELIMINARY DRAFT/SUBJECT TO CHANGE - HST ALIGNMENT IS NOT DETERMINED  
Source: URS, 2013.

October 7, 2013



-  Existing HST corridor
-  Existing BNSF railroad
-  Proposed HST corridor realignment
-  Lacustrine habitat

alignment crosses the Tule River, and then both Deer Creek and the Stoil railroad spur from the BNSF Railway. The elevated structure will reach a height of approximately 50 feet. This alignment will cross over Lakeland Canal.

Dedicated wildlife crossing structures will be provided throughout at-grade portions of the railroad embankment at intervals of approximately 0.3 miles. The BNSF Alternative will also include dedicated wildlife crossing structures placed between 100 and 500 feet to the north and south of each of the following river/creek crossings: Tule River and Deer Creek. There will be approximately 68 to 72 wildlife crossing structures in Tulare County, depending on the rail alignment alternative selected.

### *Kern County*

The Kern County portion of the BNSF Alternative is approximately 44 miles long and will pass through the cities of Wasco and Shafter on its way to Bakersfield. The alignment will closely follow the western side of the BNSF corridor until just south of Wasco, where it will cross over to the eastern side of the BNSF tracks. Approximately 4 miles of BNSF tracks will be realigned in the vicinity of 4<sup>th</sup> Street, from 8<sup>th</sup> Street to Poso Avenue, and from Jackson Avenue to Merced Avenue to accommodate the HST alignment. The alignment will continue on the eastern side of the BNSF right-of-way through Shafter and then cross over once more to the western side of the BNSF right-of-way. Approximately 8 miles of Santa Fe Way will be shifted west of the proposed alignment to accommodate the HST right-of-way, from north of Riverside Street to south of Renfro Road. Approximately 1.5 miles of the BNSF's Lone Star Rail Spur will be realigned from Riverside Street to south of Burbank Street. The alignment will generally follow the BNSF corridor through Bakersfield to the project terminus at Oswell Street. Approximately 2.5 miles of BNSF tracks will be realigned in Bakersfield from Jomani Drive to Glenn Street and from Oak Street to C Street to accommodate the alignment. Within this portion of the alignment, approximately 27 miles will be at-grade, and the remainder of the alignment will be elevated. Specifically, three elevated sections will occur along this section of the BNSF Alternative in the cities of Wasco, Shafter, and Bakersfield. The alignment will be at-grade with a bridge where it crosses Poso Creek.

The first elevated structure will begin at 1st Street, pass through Wasco for about 3 miles and return to grade north of Kimberlina Road. This structure will reach a height of approximately 45 feet to the top of the rail. From approximately Kimberlina Road, the alignment will continue at-grade for approximately 5 miles to just north of Shafter Avenue where it will again ascend onto an elevated structure.

The second elevated structure will run through Shafter for a distance of about 3.5 miles, between Shafter Avenue and Cherry Avenue. This structure will pass over a BNSF Railway yard within the city, and reach a maximum height of approximately 45 feet to the top of the rail. After returning to grade just south of Cherry Avenue, the alignment will travel approximately 10 miles to Country Breeze Place where it will ascend onto another elevated structure through Bakersfield.

The third elevated structure will run from Country Breeze Place through the Bakersfield Station to the terminus of the BNSF Alternative at Oswell Street. The elevated structure through Bakersfield will pass over the transportation corridor improvement projects, SR 99, the Kern River, and a BNSF Railway yard. The structure will range in height from 50 to 90 feet to the top of the rail. The highest elevations in the city of Bakersfield will be reached between Rosedale Highway and SR 99. From SR 99 to the terminus of the BNSF Alternative, the structure will range in height from 50 to 70 feet to the top of the rail.

Dedicated wildlife crossing structures will be provided in at-grade portions of the railroad embankment at intervals of approximately 0.3 miles. The BNSF Alternative will also include dedicated wildlife crossing structures placed between 100 and 500 feet to the north and south of the Poso Creek crossing. There will be approximately 12 to 16 wildlife crossing structures in Kern County, depending on the rail alignment alternative selected. Dedicated wildlife crossing structures will not be installed between 100 and 500 feet to the north and south of the Kern River, because the BNSF Alternative will be elevated.

### **Alternative Alignments and Bypasses**

In addition to the BNSF Alternative, the FRA and the Authority are considering seven other alternative alignments for portions of the Fresno to Bakersfield Section. The FRA and the Authority developed these alternatives to avoid environmental, land use, or community impacts identified for portions of the BNSF Alternative.

#### *Hanford West Bypass 1 Alternative*

The Hanford West Bypass 1 Alternative Alignment will parallel the BNSF Alternative from East Kamm Avenue to approximately East Elkhorn Avenue in Fresno County. At East Conejo Avenue where the BNSF Alternative crosses to the eastern side of the BNSF tracks to pass the city of Hanford to the east, the Hanford West Bypass 1 Alternative continues south on the western side of the BNSF tracks. The Hanford West Bypass 1 will diverge from the BNSF corridor just south of East Elkhorn Avenue and ascend onto an elevated structure just south of East Harlan Avenue, cross over the Kings River complex and Murphy Slough, and passing the community of Laton to the west. The elevated structure will be approximately 0.8 miles in length and reach a maximum height of approximately 40 feet to the top of the rail. The Hanford West Bypass 1 Alternative will return to grade just north of Dover Avenue. The alignment will continue at-grade, curve gently to the east, and travel between the community of Armona to the west and the city of Hanford to the east. The Hanford West Bypass 1 Alternative rejoins the BNSF corridor on its western side at about Lansing Avenue. The alignment will then ascend onto another elevated structure, and travel over Cross Creek and the special aquatic features that exist north of the city of Corcoran. The elevated structure will span approximately 3 miles and reach a maximum height of approximately 20 feet to the top of the rail. This alignment will return to grade just north of Nevada Avenue and will connect to the BNSF Alternative traveling through Corcoran at-grade, on the western side of the BNSF corridor. The total length of the Hanford West Bypass 1 Alternative will be approximately 28 miles.

The Hanford West Bypass 1 Alternative includes a design option where the alignment will be below-grade between Grangeville Boulevard and Houston Avenue. The alignment will travel below-grade in an open cut with side slopes as it transitions to a retained-cut profile, approximately 40 feet below ground level. As the alignment transitions back to grade just north of Houston Avenue, the open cut profile will be used once more. The alignment will cross SR 198 and several local roads. South Peach Avenue, East Clarkson Avenue, East Barrett Avenue, Elder Avenue, and South Tenth Avenue will be closed at the HST right-of-way, while the other roads will be realigned and/or grade-separated from the HST with overcrossings or undercrossings. Grade separations at Grangeville Boulevard, 13th Avenue, and West Lacy Boulevard will be determined based on the alignment design option selected (at-grade or below-grade).

The potential Kings/Tulare Regional Station–West Alternative will be sited along this alignment east of 13<sup>th</sup> Avenue, between Lacey Boulevard and the San Joaquin Valley Railroad spur. This potential station includes at-grade and below-grade design options as well.

#### *Hanford West Bypass 2 Alternative*

The Hanford West Bypass 2 Alternative Alignment will be the same as the Hanford West Bypass 1 Alternative from East Kamm Avenue to just north of Jackson Avenue, but at this point the Hanford West Bypass 2 Alternative will curve away to the east from the Hanford West Bypass 1 alignment. The Hanford West Bypass 2 Alternative will then travel over Kent Avenue, the BNSF right-of-way, and Kansas Avenue on an elevated structure approximately 1.5 miles in length. The structure will reach a maximum height of 55 feet to the top of the rail before returning to grade north of Lansing Avenue and continuing along the BNSF corridor. Similar to the Hanford West Bypass 1 Alternative, the Hanford West Bypass 2 Alternative will travel over Cross Creek and the special aquatic features north of Corcoran and return to grade north of Nevada Avenue; however, the Hanford West Bypass 2 Alternative will be on the eastern side of the BNSF tracks to connect to either the Corcoran Elevated Alternative or the Corcoran Bypass Alternative. Like the Hanford West Bypass 1 Alternative, the Hanford West Bypass 2 Alternative will have a total length of approximately 28 miles.

The Hanford West Bypass 2 Alternative includes the same below-grade design option as the Hanford West Bypass 1 Alternative between Grangeville Boulevard and Houston Avenue as well as both at-grade and below-grade options at the potential Kings/Tulare Regional Station–West Alternative. Similar to the Hanford West Bypass 1 Alternative, the Hanford West Bypass 2 Alternative will cross SR 198 and several local roads. Road closures will be the same as those for the Hanford West Bypass 1 Alternative, and roadway modifications at Grangeville Boulevard, 13th Avenue, and West Lacey Boulevard will depend on the alignment design option selected.

#### *Corcoran Elevated Alternative*

The Corcoran Elevated Alternative Alignment will be the same as the corresponding section of the BNSF Alternative from approximately Nevada Avenue south of Hanford to Avenue 136,

except that it will pass through the city of Corcoran on the eastern side of the BNSF right-of-way on an aerial structure. The aerial structure begins at Niles Avenue and returns to grade south of 4th Avenue. It will reach a maximum height of approximately 51 feet to the top of the rail. The total length of the Corcoran Elevated Alternative will be approximately 10 miles. An intrusion protection barrier will be required in the at-grade portion of the alignment from north of Nevada Avenue to just north of Niles Avenue due to the proximity of the BNSF and HST rights-of-way. This barrier will be approximately 2 miles in length. Approximately 0.2 miles of BNSF tracks will be realigned at Patterson Avenue.

Dedicated wildlife crossing structures will be provided from approximately Cross Creek south to Avenue 136 in at-grade portions of the railroad embankment at intervals of approximately 0.3 mile. Dedicated wildlife crossing structures will also be placed between 100 and 500 feet to the north and south of each of the Cross Creek and Tule River crossings. This alternative alignment will cross SR 43 and pass over several local roads on an elevated aerial structure. Santa Fe Avenue will be closed at the HST right-of-way.

#### *Corcoran Bypass Alternative*

The Corcoran Bypass Alternative Alignment will diverge from the BNSF Alternative at Nevada Avenue and swing east of Corcoran, rejoining the BNSF Railway route at Avenue 136. The total length of the Corcoran Bypass will be approximately 10 miles. An intrusion protection barrier will be required in the vicinity of Nevada Avenue due to the proximity of BNSF and HST rights-of-way. Similar to the corresponding section of the BNSF Alternative, the majority of the Corcoran Bypass Alternative will be at-grade. However, one elevated structure will carry the HST over SR 43, the BNSF tracks, and the Tule River. The structure will reach a maximum height of approximately 45 feet to the top of the rail.

Dedicated wildlife crossing structures will be provided from approximately Cross Creek south to Avenue 136 in the at-grade portions of the railroad embankment at intervals of approximately 0.3 mile. Dedicated wildlife crossing structures will also be placed between 100 and 500 feet to the north and south of each of the Cross Creek and Tule River crossings.

This alternative alignment will cross SR 43, Whitley Avenue/SR 137, and several local roads. SR 43, Waukena Avenue, and Whitley Avenue will be grade-separated from the HST with an overcrossing or undercrossing; other roads, including Niles Avenue, Orange Avenue, and Avenue 152, will be closed at the HST right-of-way.

#### *Allensworth Bypass Alternative*

The Allensworth Bypass Alternative Alignment will pass west of the BNSF Alternative to avoid the Allensworth ER and the Colonel Allensworth State Historic Park. The total length of the Allensworth Bypass Alternative Alignment will be approximately 21 miles; the alternative will begin at Avenue 84 and rejoin the BNSF Alternative at Elmo Highway. The Allensworth Bypass



Alternative will be constructed on an elevated structure only where the alignment crosses Deer Creek and the Stoil railroad spur. The majority of the alignment will pass through Tulare County at-grade.

Dedicated wildlife crossing structures will be provided from approximately Avenue 84 to Poso Creek at intervals of approximately 0.3 mile. Dedicated wildlife crossing structures will also be placed between 100 and 500 feet to the north and south of both the Deer Creek and the Poso Creek crossings.

The Allensworth Bypass will cross several roads, including County Road J22, Avenue 24, Garces Highway, Woollomes Avenue, Magnolia Avenue, Pond Road, and Elmo Highway. Avenue 24, Woollomes Avenue, and Elmo Highway will be closed at the HST right-of-way, and the other roads will be realigned and/or grade-separated from the HST with overcrossings.

#### *Wasco-Shafter Bypass Alternative*

The Wasco-Shafter Bypass Alternative Alignment will diverge from the BNSF Alternative between Taussig Avenue and Zachary Avenue, cross over to the eastern side of the BNSF tracks and bypassing Wasco and Shafter to the east. The Wasco-Shafter Bypass Alternative will be at-grade except where it travels over 7th Standard Road and the BNSF tracks to rejoin the BNSF Alternative. This aerial structure will reach a maximum height of 75 feet to the top of the rail. Approximately 4 miles of Santa Fe Way will be shifted to the west of the proposed alignment from approximately Galpin Street to south of Renfro Road to accommodate the HST right-of-way. The total length of the alternative alignment will be 21 miles.

The Wasco-Shafter Bypass will cross SR 43, SR 46, East Lerdo Highway and several local roads. Some roads, such as SR 46, Kimberlina Road, Shafter Avenue, Beech Avenue, Cherry Avenue, and Kratzmeyer Road will be grade-separated from the HST with overcrossings/undercrossings; other roads will be closed at the HST right-of-way.

#### *Bakersfield South Alternative*

From the Rosedale Highway (SR 58) in Bakersfield, the Bakersfield South Alternative alignment parallels the BNSF Alternative at varying distances to the north. At Chester Avenue, the Bakersfield South Alternative curves south and parallels California Avenue. As with the BNSF Alternative, the Bakersfield South Alternative will begin at-grade and become elevated starting at Country Breeze Place through Bakersfield to its terminus at Oswell Street. The elevated section will range in height from 50 to 90 feet to the top of the rail. The realignment of the BNSF tracks from Jomani Drive to Glenn Street in Bakersfield will be required, as it is for the BNSF Alternative. Dedicated wildlife crossing structures will not be installed between 100 and 500 feet to the north and south of the Kern River, because the Bakersfield South Alternative will be elevated.



The Bakersfield South Alternative will be approximately 12 miles and will cross the same roads as the corresponding portion of the BNSF Alternative. This alternative includes the Bakersfield Station–South Alternative.

### *Bakersfield Hybrid Alternative*

From Rosedale Highway (SR 58) in Bakersfield, the Bakersfield Hybrid Alternative follows the Bakersfield South Alternative as it parallels the BNSF Alternative at varying distances to the north. At approximately A Street, the Bakersfield Hybrid Alternative diverges from the Bakersfield South Alternative, crosses over Chester Avenue and the BNSF right-of-way in a southeasterly direction, and then curves back to the northeast to parallel the BNSF tracks toward Kern Junction. After crossing Truxtun Avenue, the alignment curves to the southeast to parallel the UPRR tracks and Edison Highway to its terminus at Oswell Street. As with the BNSF and Bakersfield South alternatives, the Bakersfield Hybrid Alternative will begin at-grade and become elevated starting at Country Breeze Place through Bakersfield to Oswell Street. The elevated section will range in height from 30 to 90 feet to the top of the rail. The realignment of the BNSF tracks from Jomani Drive to Glenn Street in Bakersfield will be required, as it is for both the BNSF and the Bakersfield South alternatives. Dedicated wildlife crossing structures will not be installed between 100 and 500 feet to the north and south of the Kern River, because the Bakersfield Hybrid Alternative will be elevated.

The Bakersfield Hybrid Alternative will be approximately 12 miles long and will cross many of the same roads as the BNSF and Bakersfield South alternatives. This alternative includes the Bakersfield Station–Hybrid Alternative.

## **Construction Methods**

### *Pre-Construction Activities*

During final design, the FRA and the Authority and its contractor will conduct a number of pre-construction activities to determine how best to stage and manage the actual construction. These activities will include the following:

1. Conducting geotechnical investigations which will focus on defining precise geology, groundwater, seismic, and environmental conditions along the alignment. The results of this work will guide final design and construction methods for foundations, underground structures, tunnels, stations, grade crossings, aerial structures, systems, and substations.
2. Identifying staging areas and precasting yards which will be needed for the casting, storage, and preparation of precast concrete segments, temporary spoil storage, workshops, and the temporary storage of delivered construction materials. Field offices and/or temporary jobsite trailers will also be set up at the staging areas.
3. Initiating site preparation and demolition, such as clearing, grubbing, and grading, followed by the mobilization of equipment and materials. Demolition will require strict

controls to ensure that adjacent buildings or infrastructure are not damaged or otherwise affected by the demolition efforts.

Relocating utilities, where the contractor will work with the utility companies to relocate or protect in place such high-risk utilities as overhead tension wires, pressurized transmission mains, oil lines, fiber optics, and communications prior to construction.

4. Implementing temporary, long-term, and permanent road closures to re-route or detour traffic away from construction activities. Handrails, fences, and walkways will be provided for the safety of pedestrians and bicyclists.
5. Siting the temporary batch plants that will be required to produce the Portland cement concrete or asphaltic concrete needed for roads, bridges, elevated structures, retaining walls, and other large structures. These plants generally consist of silos containing fly ash, lime, and cement; heated tanks of liquid asphalt; sand and gravel material storage areas; mixing equipment; aboveground storage tanks; and designated areas for sand gravel truck unloading, concrete truck loading, and concrete truck washout. The contractor will be responsible for implementing procedures for reducing air emissions, mitigating noise impacts, and reducing the discharge of potential pollutants into storage drains or watercourses from the use of equipment, materials, and waste products.
6. Conducting other studies and investigations, as needed, such as local business surveys to identify business usage, delivery, shipping patterns, and critical times of the day or year for business activities. This information will help develop construction requirements and worksite traffic control plans, and will identify potential alternative routes, cultural resource investigations, and historic property surveys.

### **Major Construction Activities**

Four major types of construction activities (earthwork; construction of bridges, aerial structures, and road crossings; construction of railroad systems; and construction of stations) are briefly described below.

#### *Earthwork*

Earth support is an important factor in constructing the deep excavations that will be encountered on several alignment sections. It is anticipated that the following excavation support systems may be used along the route. The three general excavation support categories are described below.

1. **Open Cut Slope:** Open cut slope is used in areas where sufficient room is available to open-cut the area and slope the sides back to meet the adjacent existing ground. The slopes are designed similar to any cut slope (i.e., the natural repose angle of adjacent ground material and global stability are taken into account).

2. **Temporary:** Temporary excavation support structures are designed and installed to support vertical or near vertical excavation faces in areas where room to open-cut does not exist. These structures do not contribute to the final load carrying capacity of the trench structure and they are either abandoned in place or dismantled as the excavation is being backfilled. Generally, a temporary excavation support structure consists of soldier piles and lagging, sheet pile walls, slurry walls, secant piles, or tangent piles.
3. **Permanent:** Permanent structures are designed and installed to support vertical or near vertical excavation faces in areas where room to open-cut does not exist. These structures form part of the permanent final structure. Generally permanent structures consist of slurry walls, secant piles, or tangent pile walls.

### *Construction of Bridge, Aerial Structure and Road Crossing*

Each bridge or aerial structure will contain two tracks (one in each direction). There will be four tracks (two for local trains that stop at the station and two for express trains that pass through) at the elevated station alternatives in Fresno and Bakersfield (the potential Kings/Tulare Regional Station will at-grade or below grade). Station tracks will be 6,000 feet long with the station at the center. Of the four tracks passing through the station, the two express tracks (for trains that do not stop at the station) will be separated from those that stop at the station and platforms. In constructing the station tracks, more than one dual track aerial structure may be necessary. Similar to existing high-speed rail systems around the world, it is anticipated that the bridges and aerial structures will be designed and built as single box segmental girder. Where needed, other structural types will be considered and used, including steel girders, steel truss, and cable-supported structures. Basic construction elements of bridges, aerial structures, and road crossings are listed below:

1. **Foundations:** A typical aerial structure foundation pile cap is supported by an average of 4 large diameter bored piles with diameters ranging from 5 to 9 feet. The depth of the piles depends on geotechnical site conditions. Pile construction can be achieved by using rotary drilling rigs, and either bentonite slurry or temporary casings may be used to stabilize pile shaft excavation. The estimated pile production rate is 4 days per pile installation. Additional pile installation methods available to the contractor include bored piles, rotary drilling cast-in-place piles, driven piles, and a combination of pile jetting and driving. On completing the piles, pile caps can be constructed using conventional methods. For pile caps constructed near existing structures (e.g., the railway, bridges, underground drainage culverts), temporary sheet piling can be used to minimize disturbances to adjacent structures. It is anticipated that sheet piling installation and extraction is achieved using hydraulic sheet piling machines.
2. **Substructure:** Aerial structures with pier heights ranging from 20 to 90 feet may be constructed using conventional jump form and scaffolding methods. A self-climbing formwork system may be used to construct piers and portal beams over 90 feet high. The self-climbing formwork system is equipped with a winched lifting device, which is raised up along the column by hydraulic means with a structural frame mounted on top of the

previous pour. In general, a 3-day cycle for each 12-foot pour height can be achieved. The final size and spacing of the piers depends on the type of superstructure and spans they are supporting.

3. Superstructure: It will be necessary to consider the loadings, stresses, and deflections encountered during the various intermediate construction stages, including changes in static scheme, sequence of tendon installation, maturity of concrete at loading, and load effects from erection equipment. As a result, the final design will depend on the contractor's means and methods of construction and can include several different methods, such as a span-by-span, incrementally launched, progressive cantilever, and balanced cantilever.

### *Construction of Railroad Systems*

The railroad systems are to include trackwork, traction electrification, signaling, and communications. After completion of earthwork and structures, trackwork is the first rail system to be constructed, and it must be in place to start traction electrification and railroad signaling installation.

Trackwork construction generally requires the welding of transportable lengths of steel running onto longer lengths (approximately 0.25 mile), which are placed in position on crossties or track slabs and field-welded into continuous lengths. Both tie and ballast as well as slab track construction will be used. Tie and ballast construction, which will be used for at-grade and minor structures, typically uses cross ties and ballasts that are distributed along the trackbed by truck or tractor. In sensitive areas, such as where the HST is parallel to or near streams, rivers, or wetlands, and in areas of limited accessibility, this operation may be accomplished by using the established right-of-way with material delivery via the constructed rail line. For major civil structures, slab track construction will be used. Slab track construction is a non-ballasted track form employing precast track supports.

The traction electrification equipment to be installed will include traction power substations and the OCS. Traction power substations are typically fabricated and tested in a factory, then delivered by tractor-trailer to a prepared site adjacent to the alignment. It is assumed that substations are to be sited every 30 miles along the alignment. The OCS will be assembled in place over each track and will include poles, brackets, insulators, conductors, and other hardware.

The signaling equipment to be installed includes wayside cabinets and bungalows, wayside signals (at interlocking), switch machines, insulated joints, impedance bounds, and connecting cables. The equipment will support automatic train protection, automatic train control, and positive train control to control train separation, routing at interlocking, and speed.

### *Construction of Stations*

The typical construction sequence will be:

1. **Demolition and Site Preparation:** The contractor will be required to construct detour roadways, new station entrances, construction fences and barriers, and other elements required because the existing facilities on the worksite are taken out of service. The contractor will be required to perform street improvement work, site clearing and earthwork, drainage work, and utility relocations. Substations and maintenance facilities are assumed to be newly constructed structures. For platform improvements or additional platform construction, the contractor may be required to realign existing track.
2. **Structural Shell and Mechanical/Electrical Rough-Ins:** For these activities, the contractor will construct foundations and erect the structural frame for the new station, enclose the new building, and/or construct new platforms and connect the structure to site utilities. The contractor will also rough-in electrical and mechanical systems and install specialty items such as elevators, escalators, and ticketing equipment.
3. **Finishes and Tenant Improvements:** The contractor will install electrical and mechanical equipment, communications and security equipment, finishes, and signage. The contractor may also install other tenant improvements, if requested.

### **Construction Materials and Equipment**

The materials required for construction will include steel rails, building materials for the maintenance facilities, control buildings, and power supply facilities; concrete; reinforcing steel; ballast; cement; aggregates; specialized train system components; fuel; and water. The materials will be delivered and stored at the project site for use.

Fill material will be excavated from local borrow sites and hauled by truck to the rail alignment. Railroad ballast will be drawn from existing, permitted quarries in various locations, from the Bay Area to Southern California. Ballast will be delivered by a combination of rail and trucks. All materials will be suitable for construction purposes and free from toxic pollutants in toxic amounts in accordance with Section 307 of the Clean Water Act.

Various types of construction equipment will be used in the different phases of the project. The types of equipment associated with the different construction phases are listed in Appendix A of the biological assessment.

### **Construction Staging**

To the extent practical, construction staging will utilize the same areas that will ultimately be occupied by permanent HST facilities. For example, staging areas will be placed at the future locations of the HST maintenance yards in Fresno and Bakersfield. Five additional staging areas will be set up at various points along the HST right-of-way. These staging areas will be spaced roughly evenly between Fresno and Bakersfield, and will be chosen for their easy access to the local road network and highways. All proposed construction staging areas are contained within the limits of the project footprint.

## Construction Schedule

Project construction will generally occur in 8-hour shifts between 7 a.m. and 7 p.m., 6 days per week. Occasionally, double shifts may also be required and will be subject to local regulations regarding construction hours. The proposed CHST-FB Project construction schedule is detailed below (Table 1).

**Table 1. Proposed construction schedule for the CHST-FB Project.**

Phase	Tasks	Duration
Right-of-Way Acquisition	Per Assembly Bill 3034, proceed with right-of-way acquisitions once State Legislature appropriates funds in annual budget	TBD
Survey and Preconstruction	Locate utilities, establish right-of-way and project control points and centerlines, and establish or relocate survey monuments	TBD
Mobilization	Mobilize safety devices and special construction equipment	April 2014–July 2014
Site Preparation	Relocate utilities; clear/grub right-of-way; establish detours and haul routes; prepare construction equipment yards, stockpile materials, and establish precast concrete segment casting yard	July 2014–October 2014
Earth Moving	Prepare excavations and earth support structures	November 2014–November 2016
Construction of Road Crossings	Prepare surface street modifications and grade separations	November 2014–November 2016
Construction of Aerial Structures	Construct aerial structures and bridge foundations, substructures, and superstructures	November 2014–January 2017
Track Laying	Lay tracks, including backfilling operations and drainage facilities	November 2016–August 2017
Systems	Prepare train control systems; paralleling, switching, and traction power systems; overhead contact system; communication system; signaling equipment	June 2017–May 2019
Demobilization	Demobilize, including site cleanup	October 2016–April 2017
HMF Phase 1 <sup>a</sup>	Assemble test track and prepare storage	May 2017–November 2018
Maintenance-of-Way Facility	Potentially co-located with HMF <sup>a</sup>	May 2017–November 2018
HMF Phase 2 <sup>a</sup>	Assemble test track	May 2017–November 2018
HMF Phase 3 <sup>a</sup>	Assemble HMF	June 2018–November 2018
HST Stations	Prepare/conduct demolition, site preparation, foundations, structural frame, electrical and mechanical systems, finishes	Fresno: June 2017–April 2020 Kings/Tulare Regional: TBD <sup>b</sup> Bakersfield: June 2018–April 2021

Notes:

<sup>a</sup> HMF would be sited in either the Merced to Fresno Section or the Fresno to Bakersfield Section.

<sup>b</sup> Right-of-way would be acquired for the Kings/Tulare Regional Station once it is decided that it will be constructed; however, the station itself

HMF = heavy maintenance facility

HST = high-speed train

TBD = to be determined

## **Operations and Maintenance**

This section describes the train schedule, lighting, and maintenance and inspection activities.

### *Train Service*

Three categories of trains will be operated: express, limited-stop, and all-stop trains. Express trains will run between major stations (e.g., San Francisco, Los Angeles, San Diego). An express train could make the trip between San Francisco and Los Angeles in 2 hours and 40 minutes.

Limited-stop trains will skip selected stops along the route to provide faster service between stations. All-stop trains will focus on regional service.

### *Lighting*

In general, the right-of-way will not be lighted except at stations and associated maintenance and electrical facilities. Station lighting will be designed to provide safety for arriving and departing passengers within urban areas. Maintenance and electrical facilities will have permanent lighting for both interior and exterior areas, as needed to support operations, including those operations that require lighting 24 hours per day. Typically, exterior lights will be mounted on tall masts, towers, or poles and illuminate the area with sodium- or mercury-vapor light. The lights will be angled toward the ground to limit reflectance on the surrounding community.

### *Maintenance and Inspection Activities*

During operation of the HST system, programmed inspection and maintenance will be performed to verify that the project components are functioning as required. The FRA and the Authority will regularly perform maintenance along the track and railroad right-of-way as well as the power systems, train control, signaling, communications, and other vital systems required for the safe operation of the HST system. Maintenance for the HST will include the following activities:

1. Inspection and repair of the rail line, the power supply system, structures (including dedicated wildlife crossings), signaling/control components, stations and the maintenance facilities.
2. Drain cleaning, vegetation control, and litter removal along the right-of-way, aerial structures, and bridge sections.
3. Long-term maintenance may include intermittent activities, such as replacing short lengths of rail or ballast. A maintenance-of-way program will be instituted to schedule inspection and maintenance activities.

**FCMS: Project Description**

The FCMS has been proposed as one of the locations that will be used as part of the Compensatory Mitigation Plan that has been developed to offset impacts to natural habitats that have the potential to support Federally-listed species. The FCMS includes opportunities for vernal pool and seasonal wetland (wetland) preservation; grassland (upland) preservation; vernal pool establishment, rehabilitation, enhancement, and restoration; and riparian rehabilitation and enhancement. Planned activities will consist of restoration enhancement, establishment, preservation, and long-term management of wetlands and native vegetation communities to approximate the historical landscape based on the existing conditions of onsite vernal pools and those on nearby reference sites.

*Land Grading and Contouring*

Excavation will occur in up to 10 acres proposed for vernal pool restoration/ enhancement. Grading may also be necessary in the immediate uplands adjacent to restored vernal pools in order to establish appropriate topography. Up to 10 acres of vernal pool depressions will be restored/enhanced throughout the 405-acre site (currently an annual grassland upland habitat) to mimic the existing vernal pools of the FCMS. Restoration/enhancement of vernal pools will result in up to 10 acres of conversion of upland habitat to vernal pool/wetland habitat. Excavation depths will vary for each pool and will be determined by pool size, shape, slope, and position. Pools will be constructed to include outlet features that will limit ponding depth to better mimic the natural pools in the design reference site and to establish hydrological interconnectivity between new pools and the existing vernal pools and seasonal wetlands/drainages (seasonal wetlands) within the FCMS. Excavation to restore vernal pools will thus result in 10 acres of permanent impacts to uplands. Minor grading and contouring will occur in uplands adjacent to restored pools to establish appropriate topography. Assuming a 50 foot buffer is used around each pool, an additional 40 acres of uplands will be graded to establish topography; these impacts will be temporary and the acreage will remain as upland habitat. The restored vernal pools will be seeded through inoculum collected from existing vernal pools and seasonal wetlands and by natural vectors such as hydrologic connectivity, birds, other wildlife species, and cattle.

Minor and temporary ground disturbance will occur in order to collect inoculum (cysts for invertebrates and seeds for native plant taxa) from existing pools proposed for preservation. As described below, inoculum will be collected from 10 percent of the surface area of the donor pools (up to 0.76-acre) to a depth of no more than one inch. Temporary disturbance may also occur within the remaining area of the project site (up to 395 acres) in order to bring vehicles into the site for grading or transport personnel to the project.

The FRA and the Authority also propose to conduct riparian restoration and enhancement along the existing Cross Creek riparian corridor. Restoration of riparian cover will involve planting the appropriate riparian species (based on the species currently growing in the area), irrigating during plant establishment, and installing riparian exclusion fencing or fencing around plantings to protect them from cattle grazing for the first year after planting. Native riparian cover will be



reestablished by obtaining canes from donor trees (e.g., willow, cottonwood, valley oak, other native riparian trees, associated native shrubs) either onsite or within the Cross Creek watershed (maximum of 10 canes per tree), a suitable ancillary collection site, or sourced from local nurseries with native species in containers.

Restoration activities proposed at the FCMS will include the following project elements and site developments (generally in chronological order):

1. Construction schedules and practices (Vernal Pool Establishment and Riparian Rehabilitation/Enhancement Areas).
2. Land grading and contouring (Vernal Pool Establishment Area).
3. Inoculum collection (Wetland Preservation Area).
4. Vernal pool inoculation and erosion control (Vernal Pool Establishment Area).
5. Riparian planting and associated erosion control measures along Cross Creek (Riparian Rehabilitation/Enhancement Area).
6. Long-term management of the FCMS will include monitoring and maintenance consistent with the terms of one or more conservation easements placed on the site and a long-term management plan developed for the site.

Wetland restoration work will be performed during late summer and early fall, when natural vernal pools on the site are dry (approximately June 1 to October 15); restoration work will be supervised and monitored by a qualified biologist. Application of inoculum will occur either during construction activities or during the final phase of construction of the Vernal Pool Establishment Area before the wet season.

It is anticipated that all ground-disturbing activities for wetland restoration will be conducted using the following heavy equipment:

- Backhoe
- Grader
- Small dozer
- Paddle-wheel scraper
- Dump truck (two)
- Water truck
- Landscape tractor

Riparian rehabilitation and enhancement will be the before the winter rainy season begins. The riparian restoration activities will be limited to the use of hand tools, an auger mounted on a small tractor, and personal and light-duty trucks (to transport and plant riparian trees and shrubs).

The area will be mowed or grazed but not scraped or otherwise cleared at the start of the planting activities. Irrigation is expected to be required immediately after planting and for two or three seasons after planting. As an alternative or supplement to the proposed temporary irrigation system, a water truck may be used to transport onsite well water, as required, during the dry season from late spring through late fall. All work will occur outside the ordinary high-water mark and be limited to those areas along the river channel corridor where planting is deemed to have the greatest opportunity for success and will provide the greatest benefit.

During restoration activities on each site, equipment will be staged and stored within a designated area of approximately 100 feet by 100 feet outside of the Vernal Pool Establishment Area, Wetland Preservation Area, and Riparian Rehabilitation/Enhancement Area. Staging for each site will only occur on upland locations within each site after compliance with applicable general and species-specific conservation measures. Effects associated with staging are expected to be minimal and temporary.

Land grading and contouring will occur only within the Vernal Pool Establishment Area, where vernal pools will be restored. Vernal pool slopes will be constructed to mimic side slopes of natural vernal pools from a suitable design reference site, which will be selected from a location or (locations) within the Wetland Preservation Area or offsite locations, if appropriate. Example vernal pool slopes could range from approximately 2 percent to 6 percent, with a targeted mean average of approximately 3 percent, unless otherwise determined through further analyses (e.g., LIDAR analysis; remote sensing technology that measures distance by illuminating a target with a laser and analyzing the reflected light).

Excavation depths will vary for each vernal pool and be determined by vernal pool size, shape, slope, and position in the landscape and within the constituent vernal pool complex. Vernal pools will be restored to include outlet features (topographic not structural) that will limit ponding depth to better mimic the natural conditions in the design reference site. Vernal pool depths will generally range from 5 to 15 inches.

The following vernal pool construction process will be implemented:

1. A construction area will be identified (area will consist of individual pools or vernal pool complexes), and the topsoil will be scraped down 3 to 4 inches and stockpiled in an adjacent upland area.
2. Individual pools/complexes will be further excavated and contoured according to the design plan, with grades 3 inches below the final design grade.
3. Excavated (secondary) soils will be distributed around the vernal pool margins and contoured to mimic natural mima mound topography.
4. The junction between vernal pool boundaries and upland areas will be graded and contoured to ensure a smooth, natural wetland-upland transition.

5. Stockpiled topsoil will be redistributed across the construction site, including vernal pools and mounds, to provide a good substrate for plant establishment and growth.
6. No soil will be disposed of offsite. Exposed soil will be reseeded with naturalized plant seed (i.e., seeds appropriate to the site) to minimize erosion and invasive plant establishment.
7. Inoculum will be collected from natural vernal pools at the Wetland Preservation Site and distributed within the Vernal Pool Establishment Area.
8. Final finish grading will be performed for an overall natural, smooth contour for the restored vernal pools and mounds. Sufficient soil will be left above the hardpan for proper propagation potential for vernal pool plants (minimum of 2 inches).

Development of the Vernal Pool Establishment Area will require the temporary establishment of a storage and laydown area (i.e., the Staging Area). The Staging Area may include fuel and lubricant storage areas, which will be located at least 100 feet from water sources and sensitive areas. The Staging Area will be restored to pre-project conditions on completion of the vernal pool restoration.

*Inoculum Collection, Inoculation, and Erosion Control (Vernal Pool Restoration Area, Wetland Preservation Area)*

Minor and temporary ground disturbance will occur in order to collect inoculum (cysts for invertebrates and seeds for native plant taxa) from existing pools proposed for preservation. As described below, inoculum will be collected from 10 percent of the surface area of the donor pools (up to 0.76-acre) to a depth of no more than one inch. Temporary disturbance may also occur within the remaining area of the project site (up to 395 acres) in order to bring vehicles into the site for grading or transport personnel to the project.

When designing vernal pool creation, it is essential to balance the competing concerns of minimizing disturbance to existing donor pools and ensuring that sufficient inoculum is used to ensure success of both invertebrate and floristic species. If insufficient inoculum is used, scarified soil in the created pools may be colonized by invasive plant taxa that flourish in disturbed land cover. Removal of inoculum will be made by hand tools or by using small, light machinery (Bobcat 753, mower vacuum, shop vacuum, for example). All selections of light machinery will be approved by the Service prior to collection. Soil will be removed along transects so as not to remove all of the inocula soil from one specific area of the vernal pool. If possible, inoculum will be translocated the same day that it is collected. If storage is required, the inoculum will be kept dry and stored in a location where it will not be dispersed by the wind.

The FRA and the Authority propose to disturb no more than 10 percent of the existing pools, and collect inoculum no deeper than one inch. Where surface topography has small undulations, scraping to a depth of an inch may result in slightly less volume than predicted because of voids within the graded area. Assuming that the entire collection area yields the predicted volume,

removal of 0.76-acre of inoculum to a depth of one inch will yield 102.2 cubic yards (cy) allowing application of 10.22 cy per acre, a volume that will result in application of inoculum slightly less than one inch deep over the 10 acres proposed for creation. The Authority estimates that this is the minimum volume necessary to ensure success of vernal pool flora and fauna and to avoid colonization of disturbed surfaces by invasive taxa.

Restored vernal pools will be inoculated with a mix of soil, seeds, and organic material collected from natural vernal pools in the Wetland Preservation Area. The Wetland Preservation Area historically supported vernal pool fairy shrimp and vernal pool tadpole shrimp.

Suitable inoculum collection sites will generally be identified from pools or complexes within the Wetland Preservation Area that are deeper, with a high density of vernal pool indicator species, and where target species (vernal pool fairy shrimp, vernal pool tadpole shrimp) have been reported in the past.

Inoculum collected from vernal pools with documented vernal pool fairy shrimp will be stockpiled separately and placed in shallow, restored vernal pools that provide the preferred habitat for that species. Inoculum collected from vernal pools with documented vernal pool tadpole shrimp will also be stockpiled separately and placed into deeper, restored vernal pools that provide the preferred habitat for that species. All collected inoculum will be pooled to capture a range of genotypes and genetic diversity that are currently represented for each species within the Vernal Pool Preservation Area for translocation to the Vernal Pool Restoration Area.

The inoculum collected from these vernal pools will likely include aquatic invertebrate cysts and plant seeds. The inoculum will be collected in accordance with Service-approved methods to minimize disturbance. Inoculum will be collected manually or by using a small, rubber-tired tractor to minimize disturbance to the pool site. A Service-approved biological monitor will be present to directly supervise this activity at all times and ensure that there are no unanticipated impacts on natural vernal pools or upland habitats. The Service-approved biological monitor will specifically identify travel routes that avoid vernal pools and direct the tractor operator along these routes.

A maximum of 10 percent of the 7.6-acre donor vernal pool area will be used for topsoil (inoculum) collection. Topsoil will be collected from no greater than 1- inch in depth, which will provide ~102 cubic yards (CY) of inoculum, in order to minimize disturbance to the vernal pools. This will result in approximately 11.7 CY of topsoil per acre for the 10 acres of mitigation pools that will be seeded. Once inoculum is collected from a vernal pool, any scraped areas will be smoothed out in accordance with Service-approved methods that will minimize disturbance.

Silt fencing may be temporarily established as required or needed along the portions of the perimeter of the Vernal Pool Establishment Area where swales provide the potential for sediment runoff into Cross Creek. The silt fencing will consist of standard woven black fabric attached to wooden stakes and buried approximately 6 inches in the ground. If needed, straw wattles will be placed adjacent to the silt fencing or along swales to capture sediments. These materials will be

removed after one or two rainy seasons, depending on the extent of re-establishment of vegetation on the site.

*Riparian Restoration (Riparian Rehabilitation/Enhancement Area)*

Riparian habitat restoration will occur on 5.6 acres of riparian and 14.7 acres of riverine habitat within the Riparian Rehabilitation/Enhancement Area along Cross Creek. These activities will be accomplished by obtaining canes from donor trees (e.g., willow, cottonwood, valley oak, other native riparian trees, and associated native shrubs) either onsite or within the Cross Creek watershed (maximum of 10 canes per tree), a suitable ancillary collection site, or from a local, native plant nurseries. Nursery container plants will be used to supplement if needed. Collection will occur between November and February. Increasing the riparian habitat along Cross Creek will enhance the wildlife value of the habitat adjacent to the river and surrounding areas by providing shade, shelter, nesting sites, and foraging habitat. A planting plan will be submitted to the Service for review and approval prior to implementation.

Water required to support initial planting growth will be obtained from existing wells, relying on existing water rights. Establishment of plantings will require 3 years of supplemental watering, after which it is expected that plantings will have reached the water table. Holes for planting will be augured to maximum depth of 5 feet. A temporary irrigation system using aboveground plastic pipes to supply drip irrigation to the riparian plantings will also be installed and connected to the well(s). The temporary irrigation system installation will be monitored by a Service-approved biologist to ensure no impacts on sensitive resources occur. If necessary, the Service-approved biologist will have the authority to stop work to ensure that impacts on sensitive resources are avoided. Installation of the system will be done by hand using a utility truck to transport pipe to the restoration area. The temporary irrigation system will be removed when riparian plantings are sufficiently established and irrigation is no longer needed; maintenance of the system will occur as necessary with the system removed within two to three seasons after the first planting season.

*Implementation and Mitigation Responsibilities*

The FRA and the Authority will ensure that the FCMS has appropriate mitigation and monitoring plans in place. All plans will incorporate the principles of adaptive management, requiring the mitigation contractor and long-term manager to accommodate changing conditions, and incorporate new data, technologies, or better methods.

The FRA and the Authority will submit a final Fagundes Compensatory Mitigation Plan for review and approval by the Service that includes a site-specific mitigation work plan, maintenance plan, performance standards/success criteria, contingency planning, performance monitoring requirements, and a long-term management plan. These components have been developed early in the conceptual mitigation planning process (for the Draft Compensatory Mitigation Plan).

### *Long-Term Management*

Areas within the FCMS will be protected with one or more conservation easements and managed in accordance with a long-term management plan (LTMP) adopted by the FRA and the Authority or the landholding entity. The LTMP, along with the conservation easement(s), will serve as the guiding documents for the maintenance, management, and monitoring of the FCMS. The FRA and the Authority will submit the LTMP for the FCMS to the Service for review and approval prior to implementation. The LTMP, along with the conservation easement(s), will serve as the guiding documents for the maintenance, management, and monitoring of the FCMS.

The purpose of the LTMP is to ensure the FCMS is managed, monitored, and maintained in a manner that conserves and sustains the native and sensitive resources that occur on the site. The LTMP will establish objectives, tasks, and priorities to monitor, manage, maintain, and report relevant habitat, land cover, and listed species on the site.

### **Conservation measures**

The project proponent proposes to avoid or minimize effects to listed species and their respective habitats through the following conservation measures. Of these, applicable conservation measures that will be implemented at the FCMS will be described in the final Compensatory Mitigation Plan for that component of the project.

### **General Conservation Measures**

- 1. Qualified Project Biologists and Biological Monitors:** At least 15 days prior to the onset of activities, the FRA and the Authority will submit the name(s) and resumes of biologists and other qualified staff (e.g. biological monitors) who will conduct activities specified in the following measures. No project ground-disturbance activities will begin until proponents have received written approval from the Service that the biologists are approved to conduct the work, which approval shall be provided in 15 (calendar) days except under unusual or extraordinary cases. Qualified restoration ecologists, landscape architects, and special-status species experts may also be contracted, after Service approval, for assistance with implementation of proposed conservation measures.
- 2. Regulatory Agency Access:** The contractor will allow access by the Service or other resource agency staff to the construction site. Due to safety concerns, all visitors will check in with the resident engineer prior to accessing the construction site.
- 3. Prepare and Implement a Worker Environmental Awareness Program:** Construction contractor personnel who work onsite will attend a Worker Environmental Awareness Program (WEAP) training session. The environmental training will cover general and specific biological and legal information on federally listed species and their respective habitats. The training sessions will be given prior to the initiation of construction activities and repeated, as needed. Upon completion of the WEAP training, construction crews will sign a form stating that they attended the training and understand and will comply with the information presented. Updates and synopsis of the training

will be provided 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. A fact sheet prepared by the Service-approved project biologist conveying this information will be prepared for distribution to the construction crews. Maintenance crews will be required to attend a contractor education and environmental training class annually.

4. **Prepare and Implement a Restoration and Revegetation Plan:** During final design, the Service-approved project biologist will prepare a restoration and revegetation plan (RRP) for upland communities. The RRP will be submitted to the Service for review and approval. This will be a complement for site restoration in addition to the temporary effects for riparian plant communities and for jurisdictional waters. The RRP will address impacts to habitat subject to temporary ground disturbances, such as de-compaction or regrading. The Service-approved project biologist will approve the seed mix for revegetation. During construction activities, the contractor will implement the RRP in temporarily disturbed areas. The Service-approved project biologist will prepare and submit compliance reports to document implementation of this measure to the Service.
5. **Prepare and Implement a Biological Resources Management Plan:** Prior to construction activities, the Service-approved project biologist will prepare the Biological Resources Management Plan (BRMP) and assemble the biological resources conservation and mitigation measures.
6. **Prepare and Implement a Weed Control Plan:** Prior to construction activities, the contractor will prepare and implement a Weed Control Plan (WCP) to minimize or avoid the spread of weeds during construction activities. The contractor will implement the guidelines in the WCP during the project period and require that maintenance crews follow the guidelines in the WCP during the project period. The FRA and the Authority or its designee will appoint the responsible party for implementing the WCP during the operations period. The WCP will include the following:
  - a. Schedule for conducting noxious weed surveys to be conducted in coordination with the BRMP.
  - b. Success criteria for noxious and invasive weed control as established by a qualified biologist.
  - c. Based on monitoring results, additional or revised measures may be needed to ensure the introduction and spread of noxious weeds is not promoted by the construction of the HST.
  - d. Provisions to ensure that the development of the WCP will be coordinated with development of the RRP so that measures to reduce the spread and establishment

of noxious weeds and incorporates percent cover of noxious weeds into revegetation performance standards may be incorporated in the RRP.

7. **Pre-Construction Surveys.** The Service-approved project biologist will conduct preconstruction surveys for all properties not previously surveyed due to lack of access. All survey data will be provided to the Service prior to the initiation of ground disturbing activities. These surveys will determine the amount of direct and indirect effects to each species. Compensatory mitigation is proposed based on actual acres of direct effects and associated required compensatory mitigation.
8. **Biological Monitoring during Construction Activities.** The Service-approved project biologist will direct the work of Service-approved biological monitors who will be present onsite during key construction activities, including during ground disturbance activities and for all construction activities conducted within or adjacent to identified Environmentally Sensitive Areas (ESAs), wildlife exclusion fence zones (WEF), or non-disturbance zones to oversee permit compliance and monitoring efforts. The Service-approved biological monitor(s), as hired by the Design/Build Contractor, will advise the contractor on methods that may minimize or avoid impacts on federally-listed species.
9. **“Take” Notification and Reporting.** The Service and the California Department of Fish and Wildlife (CDFW) will be notified within 24 hours, via telephone and email, after discovery of a project-related accidental death or injury to a federally or state-listed species during project-related activities. The BRMP will determine all Service-approved individuals responsible for take notification and reporting. .
10. **Environmentally Sensitive Areas, Wildlife Exclusion Fencing and Non-Disturbance Zones.** Fencing will be used to establish non-disturbance exclusion zones to restrict construction equipment and personnel from ESAs or restrict federally-listed wildlife species from entering the construction areas. The non-disturbance zones will be determined through consultation and permitting with the various natural resources regulatory agencies.

Two types of fencing, high visibility ESA fence and WEF, will be used for these purposes. ESA fencing will be identified and depicted on the project plans and delineated in the field by the Service-approved project biologist or Service-approved biological monitor (s). The contractor will ensure that all ESA areas are off-limits to construction personnel and equipment.

11. **Monofilament Restrictions.** During construction activities, the Service-approved biological monitor(s) will verify that the Contractor is not using plastic mono-filament netting (erosion-control matting) or similar material in erosion control materials. Non mono-filament substitutes including coconut coir matting, tackified hydroseeding compounds, rice straw wattles (e.g., Earthsaver wattles: biodegradable, photodegradable,



burlap), reusable erosion, sediment, and wildlife control systems that may be approved by the regulatory agencies (e.g., ERTEC Environmental Systems products) may be used.

12. **Avoidance of Entrapment.** At the end of each work day, all excavated, steep-walled holes or trenches that are more than 8 inches deep will be covered at the close of each day with plywood or similar materials or provided a minimum of one escape ramp per 10 feet of trenching constructed of fill earth. Before such holes or trenches are filled, they will be thoroughly inspected for trapped wildlife by the Service-approved biological monitor(s). All culverts or similar enclosed structures with a diameter of 4 inches or greater that are stored at a construction site will be inspected for wildlife before the pipe is subsequently used or moved.
13. **Artificial Dens Along the Wildlife Exclusion Fencing and Dedicated Wildlife Crossing Structures.** To mitigate the temporary impacts of ESA and WEF fencing on federally-listed species and their movement/migration corridors during construction, artificial dens will be installed along the outer perimeter of the ESA and WEF fencing. Artificial dens will also be installed at dedicated wildlife crossing structures to prevent predation by larger predators at wildlife undercrossings and to provide escape cover for wildlife, particularly the San Joaquin kit.
14. **Equipment Staging Areas.** Construction staging areas for storage of equipment and materials will be set up in areas that will ultimately be occupied by permanent HST facilities, such as the station sites or the HMF site. Additional staging areas may be sited based on the contractor's needs, access to local road networks, and highway access.

Prior to construction activities, the contractor under the supervision of the Service-approved project biologist, will locate staging areas for construction equipment that are outside of areas of sensitive biological resources, including habitat for federally listed species, habitats of concern, and wildlife movement corridors, to the maximum extent possible. The Service-approved project biologist will prepare a memorandum documenting compliance with this measure.
15. **Construction Utility Requirements and Waste Disposal.** Contractors will temporarily store excavated materials produced by construction activities in designated areas at or near the construction site. Wherever possible, they will return excavated soil to its original location to be used as backfill and will dispose of waste materials associated with construction in local landfills permitted to take those types of materials. Material unsuitable for reuse will be hauled offsite to a permitted location in conformance with the Act.
16. **Cleaning Of Construction Equipment.** During construction, all equipment will be washed to remove mud and plant materials to avoid introduction of invasive species when working in areas that could support federally-listed species.

17. **Dewatering and Water Diversion.** If construction occurs where open or flowing water is present, a strategy approved by the resource agencies (e.g., Service, U.S. Army Corps of Engineers (Corps), State Water Resources Control Board (SWRCB) and CDFW) will be used to dewater or divert water from the work area.
18. **Construction Site Speed Limits.** To minimize dust levels and the potential for construction equipment to strike federally listed species, the Service-approved project biologist will restrict project vehicle traffic within the project footprint to established roads, construction areas, and other designated areas during ground-disturbing activities. The Service-approved project biologist will establish vehicle traffic in locations disturbed by previous activities to prevent further adverse effects, require observance of a 15-mph speed limit for construction areas with potential special-status species habitat, clearly flag and mark access routes, and prohibit off-road traffic.
19. **Work Stoppage.** During construction activities, the Service-approved project biologist or Service-approved biological monitors shall have stop work authority to protect any federally listed wildlife species within the project footprint. This work stoppage will be coordinated with the FRA and the Authority or its designee. The contractor will suspend ground-disturbing activities in the immediate construction area where the potential construction activity could result in “take” of listed species; work may continue in other areas. The contractor will continue the suspension until the individual leaves voluntarily, is relocated to an approved release area using Service- and/or DFW-approved handling techniques and relocation methods, or as required by the Service and the CDFW.
20. **Post-Construction Compliance Reports.** A post-construction compliance report, consistent with Service protocols and in compliance with the Act, will be submitted to the Service upon completion of each construction package, construction phase, permitting phase, or other portion of the HST section as defined by FRA and the Authority-contractor design/build contracts. The BRMP will determine the individual responsible for post-construction compliance reporting.
21. **Restoration of Temporarily Disturbed Areas.** Temporarily disturbed biological communities or habitats that could support federally-listed species or wetlands and other waters of the U.S. will be restored to pre-project conditions
22. **Compensatory Mitigation.** Habitat compensation for impacts to federally-listed species may include the creation, restoration, enhancement, and/or preservation of habitat. Habitat compensation may be accomplished by: 1) purchasing “credits” from a Service-approved conservation bank with a service area covering the impact area; 2) by acquiring appropriate properties in fee-title; or 3) by establishing a conservation easement over a property. If options 2 or 3 are selected, an endowment fund or comparable funding instrument will be established in order to manage the property for the benefit of federally-listed species in perpetuity. Success criteria will be developed with the Service if compensatory mitigation is done through the creation, restoration or enhancement of

suitable habitats. Additionally, a long-term management plan will be developed for the property. This plan will identify the monitoring, maintenance, management, and reporting requirements for the compensation site. All proposed habitat compensation sites, bank purchases, long-term management plans, conservation easements, and endowments will be submitted to the Service for review and approval before the plans are finalized and implemented. The proposed habitat compensation ratios for each species are discussed in the Species Specific Conservation Measures section below.

### *San Joaquin kit fox*

1. The FRA and the Authority will follow the Service's *Standard Measures for Protection of the San Joaquin Kit Fox Prior to or During Ground Disturbance* (Kit Fox Guidance) (Service 2011a). Minimization measures included in that document are summarized below.
  - a. Prior to the start of construction activities, the Service-approved project biologist will conduct pre-construction surveys in accordance with the *San Joaquin Kit Fox Survey Protocol for the Northern Range* (Service 1999c). Pre-construction surveys for the kit fox will be conducted between May 1 and September 30 within the project in suitable habitat areas (alkali desert scrub, annual grassland, pasture, and barren) to identify known or potential San Joaquin kit fox dens. Pre-construction surveys will be conducted by a Service-approved project biologist within 30 days prior to the start of construction or ground disturbing activities and will be phased with project build-out. Reports for each survey will be submitted to the Service and the CDFW within 30 days of completion.
  - b. Disturbance to all kit fox dens will be avoided to the maximum extent possible.
  - c. During the breeding season (December 1 through July 31), all construction activities will be prohibited within the following limits:
    - i. Non-natal den exclusion zone of 100 feet surrounding occupied/non-occupied non-natal dens.
    - ii. Natal den exclusion zone of 200 feet for surrounding occupied/non-occupied natal dens.
  - d. All construction activities near any occupied dens will cease one-half hour after sunset and will not begin earlier than one-half hour before sunrise, when feasible.
  - e. A minimum of 5 days of den-monitoring is required to allow animals to vacate, during which time passive harassment measures (i.e., partially blocking den entrances with soil) may be pursued to encourage movement out of the den.

- f. After a non-natal den is determined to be unoccupied, it may be excavated under the direction of a Service-approved biological monitor at any time of year.
  - g. Vacant natal dens may be excavated only between August 15 and November 1 and after pups have vacated the den. If a kit fox is observed at the den during this period and construction activities within the non-disturbance exclusion zone of active San Joaquin kit fox burrows cannot be avoided, a Service-approved project biologist may initiate passive harassment measures in accordance with the Service's Kit Fox Guidance. Prior to passive harassment efforts, the project biologist will contact the Service and CDFW for approval.
  - h. If construction activities within the non-disturbance exclusion zone of active San Joaquin kit fox burrows cannot be avoided during the breeding and pupping season, the Service-approved project biologist will implement measures in accordance with the *Standardized Recommendations for Protection of the San Joaquin kit fox Prior to or During Ground Disturbance* following approval from the Service (Service 2011a). Destruction of any known natal or pupping den will not occur without approval from the Service. A minimum of five days of den-monitoring is required to allow animals to relocate, during which time passive harassment measures (i.e., partially blocking den entrances with soil) may be pursued to encourage relocation. After a non-natal den is determined to be unoccupied, it may be excavated under the direction of a Service-approved project biologist following Service approval.
  - i. All construction pipes, culverts, or similar structures with a diameter of 4 inches or greater that are stored at a construction site for one or more overnight periods will be thoroughly inspected for kit foxes before the pipe is subsequently buried, capped, or otherwise used or moved in any way. If a kit fox is discovered inside a pipe, that section of pipe will not be moved until the Service has been contacted for guidance. If necessary, and under the direct supervision of the Service-approved biological monitor, the pipe may be moved once to remove it from the path of construction activity, until the fox has escaped.
2. If a San Joaquin kit fox is detected within the project footprint during construction, a Service-approved biologist, in accordance with agency guidance, will request approval from the Service and CDFW to capture and relocate the kit fox.
  3. The FRA and the Authority, in collaboration with the Service and CDFW, will develop and implement a monitoring program for use of the dedicated wildlife crossings by San Joaquin kit fox. The final monitoring plan will be reviewed and approved by the Service prior to implementation. The goal of the monitoring program will be to collect data on use of dedicated wildlife crossings by the San Joaquin kit fox, and other wildlife species. The data will also be used to determine the efficacy of the wildlife crossing in facilitating movement of San Joaquin kit fox under the HST and inform future wildlife crossing design alternatives that could be installed in other segments. The monitoring plan will be

implemented for five years and may be continued by mutual agreement between the FRA and the Authority, the Service, and the CDFW.

4. A Summary of the proposed habitat compensation, per conservation measures # 22, for the kit fox is provided below in Table 2.

**Table 2. Proposed San Joaquin kit fox habitat compensation ratios.**

San Joaquin kit fox Area	Habitat	Mitigation Ratio
Southwestern Tulare County Satellite Areas	Natural	3:1
	Developed	0.5:1
Metropolitan Bakersfield Satellite Area	Natural	3:1
	Developed	0.1:1
Recovery Plan-Linkage	Natural	3:1
	Developed	0.5:1
Other Areas (outside of Recovery Areas)	Natural	2:1
	Developed	0.1:1
Note:		
Natural includes: alkali desert scrub, annual grasslands, pasture, barren, and valley oak woodland habitats.		
Developed includes: agricultural lands (croplands, dryland grain fields, irrigated grain fields, irrigated row crops, orchards, hayfields, and vineyards) and urban areas.		

### *Fresno Kangaroo rat*

1. **Implement Avoidance Measures for Fresno Kangaroo Rat.** Prior to the start of ground-disturbing activities, the Service-approved project biologist will conduct a habitat assessment on the identified parcels within the project footprint that may support the Fresno kangaroo rat to determine presence of kangaroo rat burrows or their sign.
2. If no burrows or signs of kangaroo rats are detected and kangaroo rats are confirmed to be absent from the project footprint, the following actions will be implemented:
  - a. The Service-approved project biologist will install, maintain, and monitor exclusion fencing along the perimeter of the project footprint to ensure that no take of Fresno kangaroo rat or destruction of their potential habitat outside of the project footprint occurs.
  - b. The Contractor will trim and clear vegetation to the ground by hand, using hand-operated equipment, or grazing animals (sheep, goats) to discourage small-mammal presence in the project footprint. The cleared vegetation will remain undisturbed by project construction equipment for 14 days to allow other small-

mammal species to passively relocate through the one-way exit/escape points along the wildlife exclusion fencing.

3. In the unlikely event that kangaroo rat individuals, their burrows, or signs of them are found within the project footprint during the habitat assessment, the Service and CDFW will be notified immediately and the FRA will reinitiate consultation to identify appropriate conservation measures to be implemented for this species.

#### *Tipton Kangaroo rat*

1. Prior to construction, a habitat assessment will be conducted in potentially suitable habitat (alkali desert scrub, annual grassland, pasture, barren) within the project footprint by the Service-approved project biologist to determine presence of kangaroo rat burrows or sign. The habitat assessment surveys will be conducted within 2 years, and no more than 14 days prior to the start of construction or ground disturbing activities, and may be phased with project build-out. If no burrows or sign of kangaroo rats are detected, no further measures will be required. Protocol-level surveys for the Tipton kangaroo rats will be conducted by Service-approved biologists with a valid 10(a)(1)(a) permit, in potentially suitable habitat areas where any burrows or sign are observed. The Service and the CDFW will be immediately notified if any Tipton kangaroo rats are discovered. A report for each protocol level survey for Tipton kangaroo rats will be submitted to the Service and the CDFW within 30 days of completion of the survey.
2. In areas where kangaroo rat burrows or sign are present, non-disturbance exclusion zones will be established at least 14 days prior to construction or ground disturbing activities. The fencing will be installed under the supervision of the Service-approved project biologist along the project footprint in potentially suitable habitat (alkali desert scrub, pasture, and annual grassland, barren). Fencing will be composed of a combination of both ESA fencing and WEF with one way exit/escape points.
3. The following additional measures may be implemented after the exclusion fencing is installed:
  - a. In areas where kangaroo rat burrows or sign are present, vegetation will be trimmed and cleared to the ground by hand, hand operated equipment, or grazing animals (sheep, goats) to discourage Tipton kangaroo rat presence in the project footprint. The cleared vegetation will remain undisturbed by project construction equipment for 14 days to allow the species to passively relocate through the one way exit/escape points along the wildlife exclusion fencing, OR;
  - b. A small mammal trapping and relocation plan in general accordance with the survey protocols in the California Valley Solar Ranch Project: Plan for Relocation of Giant Kangaroo Rats (*Dipodomys ingens*) (H.T. Harvey & Associates, 2011) will be prepared for Service review and approval and will incorporate agency recommended species specific measures as applicable. The

small mammal trapping surveys will occur within the project footprint in potentially suitable habitat (alkali desert scrub, pasture, annual grassland, and barren) that contain kangaroo rat burrows or sign. Trapping, with Service approval, will be conducted prior to construction and phased with project build-out; trapping will be limited to the dry, summer months on evenings when the nightly low temperature is forecast to exceed 50 °F. Small mammal trapping and relocation will be performed by a Service-approved biologist(s) with a valid 10(a)(1)(a) permit.

4. Impacts to suitable habitat for the Tipton kangaroo rat will be compensated for, per conservation measure # 22, at a 3:1 ratio through the purchase of Service-approved bank credits or through preservation of occupied habitat in perpetuity.

#### *Central California tiger salamander*

1. Prior to construction activities, the Service-approved project biologist will conduct a pre-construction survey of potential breeding and suitable upland habitat in the Cross Creek grassland region to determine the presence or absence of central California tiger salamanders within the project footprint. Surveys will be conducted no more than 30 days before the start of ground-disturbing activities and will be phased with project build-out. If any central California tiger salamanders are found, the Service-approved project biologist will immediately notify the Service.
2. The measures listed below will be implemented in the Cross Creek grassland region to avoid and minimize potential adverse effects to this species:
  - a. The Service-approved project biologist will work in coordination with the Service to install, maintain, and monitor exclusion fencing along the perimeter of the project footprint to ensure that no take of central California tiger salamander or destruction of their potential habitat outside of the project footprint occurs.
  - b. The Service-approved project biologist will install exclusion barriers (e.g. silt fences) to exclude central California tiger salamanders from construction areas. Exclusion fencing will be maintained by the contractor throughout the central California tiger salamander's entire active period (November to April) or until all construction activities are completed, whichever occurs first. Exclusion fencing must be trenched into the soil at least four inches in depth, with the soil compacted against both sides of the fence for its entire length to prevent central California tiger salamanders from passing under the fence. Barriers must be inspected by the Service-approved project biologist at least twice weekly on non-consecutive days outside of the breeding season. Barriers will be inspected daily following any rain event, and during months when juvenile central California tiger salamanders are most likely emigrating from their breeding ponds in search of burrows in surrounding upland habitat. Barriers will be installed by the contractor

with turn-arounds at any access openings needed in the fencing, to redirect central California tiger salamanders away from openings.

3. Non-disturbance exclusion zones will be established, maintained, and monitored by the Service-approved biological monitor(s) to ensure that take of central California tiger salamanders or destruction their potential habitat does not occur outside of the project footprint; fencing will be composed of a combination of high-visibility ESA fence and/or WEF.
4. Impacts to suitable upland habitat for the central California tiger salamander will be compensated for, per conservation measure # 22, at a 3:1 ratio through the purchase of Service-approved bank credits or through preservation of occupied habitat in perpetuity.

*Blunt-nosed leopard lizard*

1. Protocol-level surveys will be conducted by a Service-approved project biologist(s) in all suitable habitats (alkali desert scrub, annual grassland, barren, valley foothill riparian) within the project alignment one year prior to the start of construction following the California Department of Fish and Wildlife's *Approved Survey Methodology for the Blunt-Nosed Leopard Lizard* (CDFG 2004).
2. The Service-approved biological monitor(s) will conduct visual preconstruction surveys within the project footprint in areas of potential blunt-nosed leopard lizard habitat no more than 30 days prior to ground disturbing activities associated with each construction phase. The Service-approved biological monitor(s) will conduct daily surveys prior to construction activities to ensure blunt-nosed leopard lizards are not within the project footprint. Reports for each survey will be submitted to the Service and the CDFW within 30 days of completion.
3. During the active season (April 15 through October 15), in areas where blunt-nosed leopard lizards or blunt-nosed leopard lizard signs are present, the following measures will be implemented:
  - a. Following the preconstruction survey for blunt-nosed leopard lizard within the project footprint, if active burrows or egg clutch sites are identified within the project footprint, the Service-approved Project Biologist will establish, maintain, and monitor 50-foot buffers around active burrows and egg clutch sites. The 50-foot buffers will be established around the active burrow and clutch sites in a manner that allows for a connection between the burrow site and the suitable natural habitat adjacent to the footprint so that blunt-nosed leopard lizard may leave the project footprint after the young have hatched. Project activities within the 50-foot buffers, including vegetation clearing and grubbing (as described below), will be prohibited until the eggs have hatched and blunt-nosed leopard lizard have been allowed to leave the project footprint, as determined by the Project Biologist.



- b. Following the preconstruction survey for blunt-nosed leopard lizard within the project footprint, if no active burrows or egg clutch sites are identified within the project footprint, the Service-approved Project Biologist will conduct vegetation clearing and grubbing activities with hand tools. Cleared vegetation will be cut to 4 inches above the ground level, and all trimmings will be removed from the project footprint. The vegetation-free work area will be allowed to sit undisturbed for a minimum of 72 hours to allow blunt-nosed leopard lizards to passively relocate from the site. A follow-up preconstruction survey will be conducted in the vegetation-free work area to look for blunt-nosed leopard lizards or their sign. Any blunt-nosed leopard lizards observed during the follow-up survey will be allowed to leave the work site on their own accord. Immediately after the follow-up preconstruction survey of the vegetation-free work area, the project footprint will be delineated with high-visibility ESA fence and “a non-gaping, non-climbing barrier using a rigid and non-climbable material” wildlife exclusion fence. The vegetation-free work area within the wildlife exclusion fence will be maintained and monitored daily by the Project Biologist.
    - c. The Contractor will conduct ground-disturbing activities when air temperatures are between 75 and 95 degrees Fahrenheit. The temperature range corresponds to the period when this species is moving around and can avoid danger.
4. During the non-active season (October 16 through April 14), suitable blunt-nosed leopard lizard burrows identified during protocol-level and preconstruction surveys will be avoided by the Contractor. A 50-foot no-work buffer will be established around burrows to prevent impacts until the active season, when blunt-nosed leopard lizards will be able to leave the vegetation-free work area on their own accord. The no-work buffer will be established by routing the high-visibility ESA fence and wildlife exclusion fence around the suitable burrow sites in a manner that allows for a connection between the burrow site and the suitable natural habitat adjacent to the footprint so that blunt-nosed leopard lizard can leave the project footprint during the active season. If construction activities are required during this period, the appropriate measures will be established through consultation with the USFWS and CDFW.
5. If blunt-nosed leopard lizards are observed at any time during protocol-level surveys, preconstruction surveys, or the construction period, USFWS and CDFW will be contacted. Appropriate measures to avoid take of the species will be established through consultation with the USFWS and CDFW.
6. Non-disturbance exclusion zones will be established along the project footprint in potentially suitable areas (alkali desert scrub, annual grassland, barren, valley foothill riparian); fencing will be composed of a combination of both ESA high-visibility ESA fencing and wildlife exclusion fencing.

7. Non-disturbance exclusion zones will be maintained and monitored by the Service-approved biological monitor(s) to avoid the possibility for take of lizards, their burrows/nests, or the species' habitat outside of the project footprint.
8. Impacts to suitable upland habitat for the lizard will be compensated for at a 3:1 ratio through the purchase of Service-approved bank credits or through preservation of occupied habitat in perpetuity. Where possible, habitat preservation, per conservation measure # 22, will occur adjacent to the Pixley NWR and the Allensworth ER in order to ensure that large, contiguous blocks of blunt-nosed leopard lizard habitat are conserved.

*Vernal pool fairy shrimp and vernal pool tadpole shrimp*

To avoid and minimize potential adverse effects to the vernal pool crustaceans, the measures listed below will be implemented in the project footprint plus a 250-foot buffer where suitable habitat (e.g., vernal pools, seasonal wetlands) occurs and the species have potential to occur.

1. Non-disturbance exclusion zones will be maintained and monitored by a Service-approved biological monitor to ensure that take of vernal pool crustaceans or destruction their habitat does not occur outside of the project footprint where suitable habitat (e.g., vernal pools, seasonal wetlands) occurs and the species have potential to occur.
2. Initial construction activities in wetlands and other waters of the U.S. (e.g., vernal pools, seasonal wetlands, seasonal riverine areas, and riparian areas) will be restricted during the rainy season (October 15 to June 1). Construction may occur in these areas when there is no inundation, or the resource is dry or lacks flowing or standing water. In the event that construction work window restrictions cannot be conducted, dewatering, water diversions, or additional (BMPs) will be employed as determined through consultation with the Service, the Corps, CDFW, and the SWRCB, as applicable by regulating authority.
3. If construction activities must occur during the October 15 – June 1 period, initial ground disturbance activities will be scheduled to begin during the dry season, June 2 – October 14, to minimize the effects to vernal pool crustaceans and their habitat. If any work remains to be completed after October 15, exclusion fencing and erosion control materials will be installed to reduce sedimentation into vernal pool habitat.
4. Compensatory mitigation, per conservation measure # 22, will be provided for direct and indirect effects to vernal pool crustacean habitat. The ratios for these species will be based on whether the proposed mitigation is preservation or creation and on whether it occurs at an approved conservation bank or at a non-bank location. The compensatory mitigation ratios may range from 1.1:1 to 2:1 based on the guidance proposed in the 1996 U.S. Army Corps of Engineers, *Programmatic Formal Endangered Species Act Consultation on Issuance of 404 Permits for Projects with Relatively Small Effects on Listed Vernal Pool Crustaceans Within the Jurisdiction of the Sacramento Field Office, California* (USFWS 1996a).

*Valley elderberry longhorn beetle*

1. Protocol level presence/absence surveys for elderberry shrubs and signs of valley elderberry longhorn beetle exit holes, per the Service's *Conservation Guidelines for the Valley Elderberry Longhorn Beetle* (USFWS 1999b), will be conducted prior to construction activities within the project footprint and a surrounding 100-foot buffer.
2. If protocol-level surveys determine that elderberry shrubs occur within the project footprint plus a 100-foot buffer, then the contractor will install non-disturbance exclusion zone fences consisting of high-visibility ESA fence in compliance with the Service's 1999 *Conservation Guidelines for the Valley Elderberry Longhorn Beetle*. The Service-approved project biologist will ensure that the protective measures set-forth in the *Conservation Guidelines for the Valley Elderberry Longhorn Beetle* will be implemented within the 100-ft buffer.
3. The compensatory mitigation ratios, per conservation measure # 22, for this species may vary from 1:1 to 8:1, depending on the presence of exit holes, and may include the planting of additional associated native plants and the transplanting of directly affected elderberry shrubs during the dormancy period, as described within the *Conservation Guidelines for the Valley Elderberry Longhorn Beetle* (USFWS 1999).

*California jewelflower, Hoover's spurge, Kern mallow, and San Joaquin woolly threads*

1. The Service-approved Project Biologist will prepare a plan before the start of ground-disturbing activities to address monitoring, salvage, relocation, and propagation of federally listed plant species. The plan will include provisions that address the techniques, locations, and procedures required for the successful establishment of the plant populations. The plan will include provisions for performance that address survivability requirements, maintenance, monitoring, implementation, and the annual reporting requirements. The plan will be submitted to the Service for concurrence.
2. Protocol level, pre-construction botanical surveys for federally listed plants species will be conducted prior to any ground disturbing activities in areas where permission to enter was not available or where full protocol level botanical surveys were not conducted. Botanical surveys will be conducted in areas of suitable habitat.
3. Portions of the project footprint that support federally listed plants that will be temporarily disturbed will be restored on-site to pre-construction conditions. Prior to disturbance, pre-construction conditions will be documented detailing species composition, species richness, percent cover of key species, and photo points will be established.
4. All populations of federally listed plants species that will be directly affected will be documented. Documentation will include the density and percent cover of the species

and key habitat characteristics including soil type, associated species, hydrology, topography, and photo documentation of pre-construction conditions.

5. If a federally listed plant species is observed during protocol level, pre-construction surveys, compensatory mitigation will be provided at a 1:1 ratio based on actual acres of direct effects within the project footprint. Compensation will be accomplished by:
  - a. Identification of suitable sites to receive the listed plants.
    - i. Pixley National Wildlife Refuge, Allensworth Ecological Reserve/State Historic Park, Kern National Wildlife Refuge, Atwell Island, Alkali Sink Ecological Reserve, Semitropic Ecological Reserve, and Kern Water Bank;
    - ii. FRA and Authority proposed Permittee-Responsible Mitigation Sites;
    - iii. Or other locations approved by the Service.
  - b. Collection of seeds, plant materials, and top soil from the project footprint prior to construction impacts.

### **Analytical Framework for the Jeopardy Analysis**

In accordance with policy and regulation, the jeopardy analysis in this biological opinion relies on four components: (1) the *Status of the Species*, which evaluates the range-wide condition of the species included in this biological opinion, the factors responsible for that condition, and their survival and recovery needs of these species; (2) the *Environmental Baseline*, which evaluates the condition of these species in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the species; (3) the *Effects of the Action*, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the species; and (4) the *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on the species.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of species current status, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the species in the wild. The jeopardy analysis in this biological opinion places an emphasis on consideration of the range-wide survival and recovery needs of the species and the role of the action area in the survival and recovery of the species as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

**Action Area**

The action area is defined in 50 CFR § 402.02, as “all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action.” For the purposes of the effects assessment, the action area includes the CHST-FB alignment footprint, lands surrounding it, and the 405-acre FCMS.

Several potential alignments have been identified in the Revised Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement for the proposed project. These alternatives include varying siting for not only rail alignments, but also other project infrastructure, including passenger stations, power delivery structures, maintenance-of-way facilities, operations control centers, and a HMF. Since an alternative has not been selected to date, this biological opinion includes a project description and effects analysis for all alternative alignments, and assesses effects to federally-listed species based on a range of impacts from minimum to maximum (expressed in acreages). Regardless of the final alignment selected, project impacts will be similar geographically as well as in general nature and magnitude.

The project footprint extends to the physical limits of the construction activities associated with the proposed action. The project footprint includes all areas that will be permanently or temporarily affected by the proposed action. The footprint consists of the limits of cut and fill plus all access roads and areas required for operating, storing, and refueling construction equipment. The estimated project footprint for the CHST-FB Project alignment is expected to be no greater than approximately 7,189 acres.

The estimated length of the Fresno to Bakersfield alignment will extend up to 117 miles. The area affected by disturbance from noise and vibrations, dust, and lighting during project construction is expected to extend up to 1,000 feet from both sides of the track. Associated project structures, such as roadway improvements, overcrossings, related ancillary facilities, and other permanent project elements, are included in the estimated project action area for the CHST-FB Project. The project action area for the Fresno to Bakersfield alignment, including the project footprint and the 405-acre FCMS is estimated to be no greater than 48,856 acres, which will be considered for the purposes of this opinion.

**Status of the Species***San Joaquin kit fox*

For the most recent status of this species please refer to the 5-Year Review published in 2010 (Service 2010a).

In addition to information provided in the 5-Year Review (Service 2010a) for this species, the Service has become aware of new information regarding the status of this species provided below:

Greater than 80 percent of high quality San Joaquin kit fox habitat in the southern San Joaquin Valley is privately owned (Orman and Phillips 2011; Cypher et al. 2013). Conversion of these lands to croplands and orchards (primarily almond and pistachio) is occurring at an increasingly rapid pace, resulting in reduced availability of high quality habitat for use by San Joaquin kit foxes every year (Cyper et al. 2013).

*Tipton kangaroo rat*

For the most recent status of this species please refer to the 5-Year Review published in 2010 (Service 2010b).

*Blunt-nosed leopard lizard*

For the most recent status of this species please refer to the 5-Year Review published in 2010 (Service 2010c).

*Central California tiger salamander*

**Listing Status:** On May 23, 2003, we proposed to list the Central California Distinct Population Segment (DPS) of the central California tiger salamander as threatened (Service 2003a). At that time we also proposed reclassification of the Santa Barbara County DPS and Sonoma County DPS from endangered to threatened (Service 2003a). In the same notice we also proposed a special rule under section 4(d) of the Act to exempt take for routine ranching operations for the central California DPS and, if reclassified to threatened, for the Santa Barbara and Sonoma County DPSs (Service 2003b). On August 4, 2004, we determined that the central California DPS of the central California tiger salamander was threatened (Service 2004) and that the Santa Barbara and Sonoma County populations were threatened as well, and reclassified the central California tiger salamander as threatened throughout its range (Service 2004), removing the Santa Barbara and Sonoma County populations as separately listed DPSs (Service 2009a). In the 2004 final rule, we also finalized the special rule to exempt take for routine ranching operations for the central California tiger salamander throughout its range (Service 2004).

On August 18, 2005, as a result of litigation of the August 4, 2004, final rule on the reclassification of the central California tiger salamander DPSs (*Center for Biological Diversity et al. v. United States Fish and Wildlife Service et al.*, C 04-04324 WHA (N.D. Cal. 2005)), the District Court of Northern California sustained the portion of the 2004 rule pertaining to listing the central California tiger salamander as threatened with a special rule, but vacated the portion of the 2004 rule that re-classified the Santa Barbara and Sonoma DPSs to threatened status thereby reinstating their status as endangered. On August 31, 2011, the List of Endangered and Threatened Wildlife in part 17, subchapter B of Chapter I, title 50 of the Code of Federal Regulations (CFR) was amended to reflect the vacatures contained in the 2005 court order, classifying the Santa Barbara DPS and the Sonoma DPS of the central California tiger salamander as endangered, and the Central DPS of the central California tiger salamander as threatened with a special rule to exempt routine ranching operations from take (Service 2005a and 2011b).

**Description:** The central California tiger salamander is a large, stocky, terrestrial salamander with a broad, rounded snout. Adults may reach a total length of 8.2 inches (Petranka 1998). Tiger salamanders exhibit sexual dimorphism; males tend to be larger than females. The coloration of the central California tiger salamander is white or yellowish markings against black. As adults, central California tiger salamanders tend to have the creamy yellow to white spotting on the sides with much less on the dorsal surface of the animal, whereas other tiger salamander species have brighter yellow spotting that is heaviest on the dorsal surface. The larvae have yellowish gray bodies, broad flat heads, large feathery external gills, and broad dorsal fins extending well up their back and range in length from approximately 0.45 to 0.56 inches (1.14 to 1.42 centimeters) (Petranka 1998).

**Distribution:** Historically, the central California tiger salamander inhabited low elevation grassland and oak savanna plant communities of the Central Valley, and adjacent foothills, and the inner coast ranges in California (Jennings and Hayes 1994; Storer 1925; Shaffer *et al.* 1993). The species has been recorded from near sea level to approximately 3,900 feet (1188.7 meters) in the coast ranges and to approximately 1,600 feet (487.7 meters) in the Sierra Nevada foothills (Shaffer *et al.* 2004). Along the coast ranges, the species occurred from the Santa Rosa area of Sonoma County, south to the vicinity of Buellton in Santa Barbara County. The historic distribution in the Central Valley and surrounding foothills included northern Yolo County southward to northwestern Kern County and northern Tulare County.

The central California tiger salamander DPS occupies the Bay Area (central and southern Alameda, Santa Clara, western Stanislaus, western Merced, and the majority of San Benito counties), Central Valley (Yolo, Sacramento, Solano, eastern Contra Costa, northeastern Alameda, San Joaquin, Stanislaus, Merced, and northwestern Madera counties), southern San Joaquin Valley (portions of Madera, central Fresno, and northern Tulare and Kings Counties), and the Central Coast Range (southern Santa Cruz, Monterey, northern San Luis Obispo, and portions of western San Benito, Fresno, and Kern counties).

**Status and Natural History:** The central California tiger salamander has an obligate biphasic life cycle (Shaffer *et al.* 2004). Although the larvae salamanders develop in the vernal pools and ponds in which they were born, they are otherwise terrestrial salamanders and spend most of their postmetamorphic lives in widely dispersed underground retreats (Shaffer *et al.* 2004; Trenham *et al.* 2001). Subadult and adult central California tiger salamanders spend the dry summer and fall months of the year in the burrows of small mammals, such as California ground squirrels (*Spermophilus beecheyi*) and Botta's pocket gopher (*Thomomys bottae*) (Storer 1925; Loredó and Van Vuren 1996; Petranka 1998; Trenham 1998a). Because they spend most of their lives underground, central California tiger salamanders are rarely encountered, even in areas where they are abundant.

Central California tiger salamanders may also use landscape features such as leaf litter or desiccation cracks in the soil for upland refugia. Burrows often harbor camel crickets and other invertebrates that provide likely prey for central California tiger salamanders. Underground refugia also provide protection from the sun and wind associated with the dry California climate

that can cause excessive drying of amphibian skin. Although central California tiger salamanders are members of a family of “burrowing” salamanders, they are not known to create their own burrows. This may be due to the hardness of soils in the California ecosystems in which they are found. Tiger salamanders typically use the burrows of ground squirrels and gophers (Loredo *et al.* 1996; Trenham 1998a). However, pocket gopher burrows are most often used by Sonoma central California tiger salamanders in Sonoma County (D. Cook, pers. comm., 2001). Central California tiger salamanders depend on persistent small mammal activity to create, maintain, and sustain sufficient underground refugia. Burrows are short lived without continued small mammal activity and typically collapse within approximately 18 months (Loredo *et al.* 1996).

Upland burrows inhabited by central California tiger salamanders have often been referred to as “estivation” sites. However, “estivation” implies a state of inactivity, while most evidence suggests that central California tiger salamanders remain active in their underground dwellings. A recent study has found that central California tiger salamanders move, feed, and remain active in their burrows (Van Hattem 2004). Because central California tiger salamanders arrive at breeding ponds in good condition and are heavier when entering the pond than when leaving, researchers have long inferred that central California tiger salamanders are feeding while underground. Recent direct observations have confirmed this (Trenham 2001; van Hattem 2004). Thus, “upland habitat” is a more accurate description of the terrestrial areas used by central California tiger salamanders.

Once fall or winter rains begin, the salamanders emerge from the upland sites on rainy nights to feed and to migrate to the breeding ponds (Shaffer *et al.* 1993; Stebbins 1989, 2003). Adult salamanders mate in the breeding ponds, after which the females lay their eggs in the water (Twitty 1941; Shaffer *et al.* 1993; Petranks 1998). Historically, the central California tiger salamander utilized vernal pools, but the animals also currently breed in livestock stockpools. Females attach their eggs singly, or in rare circumstances, in groups of two to four, to twigs, grass stems, vegetation, or debris (Storer 1925; Twitty 1941). In ponds with no or limited vegetation, they may be attached to objects, such as rocks and boards on the bottom (Jennings and Hayes 1994). After breeding, adults leave the pool and return to the small mammal burrows (Loredo *et al.* 1996; Trenham 1998a), although they may continue to come out nightly for approximately the next two weeks to feed (Shaffer *et al.* 1993). In drought years, the seasonal pools may not form and the adults cannot breed (Barry and Shaffer 1994).

Central California tiger salamander larvae typically hatch within 10 to 24 days after eggs are laid (Storer 1925). The peak emergence of these metamorphs is typically between mid-June to mid-July (Loredo and Van Vuren 1996; Trenham *et al.* 2000) but in some areas as early as late February or early March. The larvae are totally aquatic. The larvae feed on zooplankton, small crustaceans, and aquatic insects for about six weeks after hatching, after which they switch to larger prey (J. Anderson 1968). Larger larvae have been known to consume the pool tadpoles of Pacific treefrogs (*Pseudacris regilla*), Western spadefoot toads (*Spea hammondi*), and California red-legged frogs (*Rana draytonii*) (J. Anderson 1968; P. Anderson 1968). Central California tiger salamander larvae are among the top aquatic predators in seasonal pool ecosystems. When not feeding, they often rest on the bottom in shallow water but are also found throughout the



water column in deeper water. Young salamanders are wary and typically escape into vegetation at the bottom of the pool when approached by potential predators (Storer 1925).

The larval stage of the central California tiger salamander usually last three to six months, as most seasonal ponds and pools dry up during the summer (Petranka 1998). Amphibian larvae must grow to a critical minimum body size before they can metamorphose (change into a different physical form) to the terrestrial stage (Wilbur and Collins 1973). Individuals collected near Stockton in the Central Valley during April varied from 1.88 to 2.32 inches in length (Storer 1925). Feaver (1971) found that larvae metamorphosed and left the breeding pools 60 to 94 days after the eggs had been laid, with larvae developing faster in smaller, more rapidly drying pools. The longer the ponding duration, the larger the larvae and metamorphosed juveniles are able to grow, and the more likely they are to survive and reproduce (Pechmann *et al.* 1989; Semlitsch *et al.* 1988; Morey 1998; Trenham 1998b). The larvae will perish if a site dries before metamorphosis is complete (P. Anderson 1968; Feaver 1971). Pechmann *et al.* (1989) found a strong positive correlation with ponding duration and total number of metamorphosing juveniles in five salamander species. In Madera County, Feaver (1971) found that only 11 of 30 pools sampled supported larval central California tiger salamanders, and 5 of these dried before metamorphosis could occur. Therefore, out of the original 30 pools, only six (20 percent) provided suitable conditions for successful reproduction that year.

Size at metamorphosis is positively correlated with stored body fat and survival of juvenile amphibians, and negatively correlated with age at first reproduction (Semlitsch *et al.* 1988; Scott 1994; Morey 1998). In the late spring or early summer, before the ponds dry completely, metamorphosed juveniles leave them and enter upland habitat. This emigration occurs in both wet and dry conditions (Loredo and Van Vuren 1996; Loredo *et al.* 1996). Unlike during their winter migration, the wet conditions that central California tiger salamanders prefer do not generally occur during the months when their breeding ponds begin to dry. As a result, juveniles may be forced to leave their ponds on rainless nights. Under these conditions, they may move only short distances to find temporary upland sites for the dry summer months, waiting until the next winter's rains to move further into suitable upland refugia. Once juvenile central California tiger salamanders leave their birth ponds for upland refugia, they typically do not return to ponds to breed for an average of 4 to 5 years. However, they remain active in the uplands, coming to the surface during rainfall events to disperse or forage (Trenham and Shaffer, 2005).

**Threats:** Documented or potential central California tiger salamanders predators include coyotes, raccoons, striped skunks, opossums, egrets, great blue herons, crows, ravens, garter snakes, bullfrogs, California red-legged frogs, mosquito fish, and crayfish.

The central California tiger salamander is imperiled throughout its range due to a variety of human activities (Service 2004). Current factors associated with declining central California tiger salamander populations include continued habitat loss and degradation due to agriculture and urbanization; hybridization with the non-native eastern salamander (Fitzpatrick and Shaffer 2004; Riley *et al.* 2003); and predation by introduced species. Central California tiger salamander populations are likely threatened by multiple factors but continued habitat fragmentation and colonization of non-native salamanders may represent the most significant

current threats. Habitat isolation and fragmentation within many watersheds have precluded dispersal between sub-populations. Other threats include predation and competition from introduced exotic species; possible commercial over-utilization; diseases; various chemical contaminants; road kill; and certain mosquito and rodent control operations. Currently, these various primary and secondary threats are largely not being offset by existing Federal, State, or local regulatory mechanisms. The central California tiger salamander is also prone to chance environmental or demographic events to which small populations are particularly vulnerable.

The Bay Area is located within the Central Coast and Livermore vernal pool regions (Keeler-Wolf *et al.* 1998). Vernal pools within the Coast Range are more sporadically distributed than vernal pools in the Central Valley (Holland 2003). This rate of loss suggests that vernal pools in these counties are disappearing faster than previously reported (Holland 2003). Most of the vernal pools in the Livermore Region in Alameda County have been destroyed or degraded by urban development, agriculture, water diversions, poor water quality, and long-term overgrazing (Keeler-Wolf *et al.* 1998). During the 1980s and 1990s, vernal pools were lost at a 1.1 percent annual rate in Alameda County (Holland 1998).

Due to the extensive losses of vernal pool complexes and their limited distribution in the Bay Area region, many central California tiger salamander breeding sites consist of artificial water bodies. Overall, 89 percent (124) of the identified water bodies are stock, farm, or berm ponds used by cattle grazing and/or as a temporary water source for small farm irrigation (CDFW 2011). This places the central California tiger salamander at great risk of hybridization with non-native tiger salamanders, especially in Santa Clara and San Benito counties. Without long-term maintenance, the longevity of artificial breeding habitats is uncertain relative to naturally occurring vernal pools that are dependent on the continuation of seasonal weather patterns (Shaffer *in litt.* 2003).

Shaffer *et al.* (1993) found that the East Bay counties of Alameda and Contra Costa supported the greatest concentrations of central California tiger salamander. Central California tiger salamander populations in the Livermore Valley are severely threatened by the ongoing conversion of grazing land to subdivisions and vineyards (Stebbins 2003). Central California tiger salamanders are under increasing pressure from habitat conversion and urbanization, development (i.e. Dublin Ranch, Fallon Village, Fallon Sports Park, Staples Ranch, and Shea Center Livermore), and infrastructure, utility and safety improvement projects (i.e. I-580 Eastbound HOV, I-580/Isabel Avenue Interchange, and I-580/Charro Avenue Interchange). The species' low recruitment and high juvenile mortality makes it particularly susceptible to habitat loss, fragmentation, urbanization, and construction related harm and mortality. Most of the central California tiger salamander natural historic habitat (vernal pool grasslands) available in this region has been lost due to urbanization and conversion to intensive agriculture (Keeler-Wolf *et al.* 1998). Central California tiger salamanders are now primarily restricted to artificial breeding ponds, such as bermed ponds or stock ponds, which are typically located at higher elevations (CDFW 2011).

*Vernal pool fairy shrimp*

For the most recent status of this species please refer to the 5-Year Review published in 2007 (Service 2007b).

*Vernal pool tadpole shrimp*

For the most recent status of this species please refer to the 5-Year Review published in 2007 (Service 2007c).

*Valley elderberry longhorn beetle*

For the most recent status of this species please refer to the 5-Year Review published in 2006 (Service 2006a).

*California jewelflower*

For the most recent status of this species please refer to the 5-Year Review published in 2013 (Service 2013).

*Hoover's spurge*

For the most recent status of this species please refer to the 5-Year Review published in 2009 (Service 2009b).

*Kern mallow*

For the most recent status of this species please refer to the 5-Year Review published in 2013 (Service 2013).

*San Joaquin woolly-threads*

For the most recent status of this species please refer to the 5-Year Review published in 2010 (Service 2010d).

**Environmental Baseline**

*Geography, topography, and climate*

The topography of the project area is relatively flat, with elevations in the project action area ranging from 203 to 430 feet above mean sea level. The elevation gradually decreases from approximately 300 feet from Fresno to 200 feet near Allensworth. From the vicinity of Allensworth, the elevation rises gradually to Wasco and Shafter, where it plateaus briefly (~ 350 feet) and then slightly rises into Bakersfield (~ 430 feet).

The San Joaquin Valley has an arid to semi-arid climate. Summers are generally hot and dry; the majority of the rainfall occurs during the mild winter months. Over 80 percent of annual precipitation occurs between November and April. Precipitation in the San Joaquin Valley and the eastern flanks of the interior Coast Range is limited due to the rain shadow effect of the Coast Range. Generally, annual rainfall amounts decrease from north to south across the valley floor. The mean annual precipitation records for the San Joaquin Valley range from nearly 16 inches in the north to less than 5 inches in the southern reaches of the valley (U.S. Geological Survey (USGS) 1998).

During the spring and summer, snowmelt from the Sierra Nevada provides the majority of the water for the San Joaquin Valley. Warm, moisture-laden air masses generated over the Pacific Ocean condense and cool as they are pushed upward over the Sierra Nevada, resulting in heavy precipitation on the western slopes. The resulting snow pack ranges from 20 to 80 inches as elevation increases from the lower foothills to the Sierran crest.

The northern and southern portions of the San Joaquin Valley are similar with respect to daily temperatures throughout the year. Northern and southern valley temperatures were collected at the National Climate Data Center stations in Fresno and Bakersfield. The average daily temperature in the project area (as measured in the coolest and hottest months) varies annually by about 36° degrees Fahrenheit (°F) between December (average air temperature of 46°F) and July (average air temperature of 83°F). Temperature extremes in the project action area have been recorded as high as 115°F and as low as 18°F (Western Region Climate Center 2010).

The San Joaquin Valley has a drainage area of approximately 34,100 square miles and is roughly divided into a northern San Joaquin River Basin and a southern Tulare Lake Basin. The project action area is located entirely within the Tulare Lake Basin. The Tulare Lake Basin is generally flat and used extensively for agriculture. The contributing rivers are normally diverted and dewatered before reaching the southern San Joaquin Valley floor (U.S. Department of Agriculture (USDA) 1982).

Most of the Tulare Lake Basin floor is underlain by several thousand feet of sediments, including coarse-grained, water-bearing zones. Groundwater exists under both unconfined and semi-confined conditions. Groundwater levels vary with seasonal rainfall, withdrawal, and recharge. Depth to groundwater in the valley ranges from a few inches to more than 100 feet. Recharge of the groundwater occurs through percolation of applied irrigation water and leaking water from agricultural ditches and through infiltration of stream flow.

All of the streams and rivers in the project action area have been dredged, culverted, diverted, dewatered, or channelized, or have had their active floodplains severely reduced by the construction of levees or the development of agricultural lands. Pumping of groundwater for large agricultural and urban demands has resulted in groundwater subsidence in many areas of the southern San Joaquin Valley, especially the western side and southern end.

Regular flooding is now largely controlled by dams, diversions, levees, and dredging. The previous floodplain and riparian habitat have been largely replaced by agriculture or urban

development (USDA 1982; Vileisis 1997). Evaporation of the historic Tulare, Buena Vista, and Kern lakes through water diversions and climate change has resulted in a wide area of saline-sodic soils on the southern San Joaquin Valley floor. Currently, this area continues to support the majority of wetlands in the project area.

Alterations to both surface water and groundwater in the region have resulted in a significant decline in the historical wetland area. This decline is reflected in the high proportion of drained or partially drained hydric soils mapped in the area. Most of the water is diverted into the irrigation canals that are found throughout the south San Joaquin Valley. Therefore, most of the water present in the project area is found in irrigation canals, water detention basins, precipitation-fed wetlands, and vernal pools; water is only occasionally found in river channels. The remaining wetlands are primarily unrelated to the historical floodplains or regional aquifers.

Vernal pools and seasonal wetlands within the project action area primarily occur in isolated depressions that receive water from precipitation and local surface and shallow subsurface flow or sheet flow. Water is retained in these depressions by a shallow perching layer (largely clay pans), and this water is unconnected or only partially connected to deeper groundwater layers.

#### *Land use*

There are an estimated 26,382 to 30,624 acres of agricultural lands within the project action area (Table 3). Agricultural croplands are the largest recorded habitat type within the project action area. Seven types of agricultural lands are present in the project action area: dry land grain crops, irrigated grain crops, irrigated hayfield, irrigated row and field crops, deciduous orchard, evergreen orchard, and vineyard. Agricultural lands with undetermined uses identified during surveys were generally classified as cropland. Some agricultural lands may support federally listed species such as San Joaquin lit fox, Fresno kangaroo rat, Tipton kangaroo rat, California tiger salamander, blunt-nosed leopard lizard, and some vernal pool branchiopods, and plant species.

Urban areas include municipalities, industrial, residential, and agricultural structures (e.g., feedlots and poultry farms), and adjacent dedicated areas (e.g., yards, roads, highways, parking lots, stockpiles). Fresno, Bakersfield, and multiple smaller cities in between, constitute the second greatest land use within the project action area (9,626 to 12,012 acres; Table 3). The majority of land in these urban areas is covered by impervious materials and surfaces. Native vegetation is absent or highly disturbed within urban areas, where typical vegetation consists of a variety of planted trees, such as eucalyptus (*Eucalyptus* spp.) and mulberry (*Morus* spp.), and other nonnative or ornamental vegetation.

Annual grasslands are the third most abundant habitat (2,514 to 2,960 acres; Table 3) present within the project action area, and are typically characterized by nonnative annual grass species. Dominant species include several species of brome (*Bromus* spp.), annual fescues (*Vulpia* spp.), oats (*Avena* spp.), and barleys (*Hordeum* spp.). Native species may be present but in lower densities, including goldfields (*Lasthenia* spp.), owl's clover (*Castilleja* spp.), tarweed (*Madia* spp.), pepperweed (*Lepidium* spp.), saltgrass (*Distichlis spicata*), fiddleneck (*Amsinckia* spp.),

and popcorn flower (*Plagiobothrys* spp.). On occasion, shrub species, including saltbush (*Atriplex* spp.) may occur. Most annual grasslands in the project action area have experienced some level of disturbance in the past that was associated with the various agricultural practices, such as row cropping, or grazing. Although these grasslands typically have a history of disturbance, they continue to provide suitable habitat for a number of federally listed plant and wildlife species. Annual grasslands that have experienced lower levels of disturbance more often contain vernal pool habitat.

Lacustrine habitat (576 to 704 acres; Table 3) in the project action area is limited to human-made basins used for water storage and groundwater recharge. These basins typically have earthen berms, little or no emergent vegetation, and range in size from less than 1,000 square feet to hundreds of acres. No natural, permanent lakes occur in the project action area. Some basins may be partially bordered by willows (*Salix* spp.) and other riparian vegetation and support large colonies of nesting birds, such as cormorants (*Phalacrocorax* spp.) and great white egrets. Many of the smaller basins are surrounded by fences, which limit wildlife access. Although lacustrine habitats in the project action area are human-made and controlled, they provide important habitat for many wildlife species. The larger detention basins are used by a variety of water birds, swallows, and several species of duck.

The 468 to 571 acres of pasture land in the project action area consist primarily of un-irrigated fields actively grazed by cattle and horses within private property (Table 3). Generally, these areas can be characterized by a mix of annual grasses and other herbaceous species. Pastures may provide habitat to support federally listed wildlife species. Federally listed species potentially supported by pasture habitats include the San Joaquin kit fox, Fresno kangaroo rat, Tipton kangaroo rat, and some vernal pool branchiopods, and plant species.

Approximately 304 to 563 acres of alkali desert scrub occurs within the project action area, which is dominated by shrublands with understory cover of herbs and forbs and by vernal pools (seasonally inundated or saturated areas lacking a shrub layer). Primary plant species present in these communities include saltbush, iodine bush (*Allenrolfea occidentalis*), California joint-fir (*Ephedra californica*) goldenbush (*Isocoma acradenia*), and bush seepweed (*Suaeda moquinii*).

Typical herbaceous species include alkali heath (*Frankenia salina*), goldfields, Menzie's fiddleneck (*Amsinckia menziesii*), common tarweed (*Hemizonia pungens*), and saltgrass. This habitat is concentrated in the vicinity of Allensworth in relatively undisturbed areas. Alkali desert scrub provides the best example of native habitat for federally listed species in the in the project action area, such as the San Joaquin kit fox, the Fresno kangaroo rat, the Tipton kangaroo rat, and the blunt-nosed leopard lizard. Vernal pool features within alkali desert scrub may also support the California tiger salamander, the vernal pool fairy shrimp, and the vernal pool tadpole shrimp.

Any area within the project action area with less than 2 percent total vegetation cover and less than 10 percent cover by tree or shrub species was characterized as a barren area. These areas were characterized as bare earth resulting from industrial activities (e.g., gravel extraction). Barren areas may support limited native wildlife or plant species. Approximately 331 to 485

acres were classified as barren areas within the project action area (Table 3). Brewer's blackbird (*Euphagus cyanocephalus*), killdeer, and western fence lizard may be present in barren areas. Federally listed species that may use barren habitat include San Joaquin kit fox, Fresno kangaroo rat, Tipton kangaroo rat, and blunt-nosed leopard lizard.

Riverine habitat in the project action area (~332 to 369 acres) is characterized by open water areas in canals and irrigation ditches and open water areas in the flow channel of rivers (e.g., the Kings and Kern rivers) and creeks (e.g., Tule, Cross, and Poso creeks) (Table 3). Due to extensive water diversion for agricultural purposes, riverine habitats within the project action area do not exhibit natural flow regimes and may be dry throughout a given year. Vegetation is either absent or sparse along sandy bottoms due to water-level fluctuations, vehicle disturbance, or maintenance activities in an irrigation canal or ditch. Typical vegetation, when present, is dominated by weedy species, such as mustards (*Brassicaceae*), and grasses.

Valley foothill riparian vegetation occupies about 102 to 133 acres of riparian corridors and associated floodplains or terraces of the Kings River, Cross Creek, Tule River, Poso Creek, and Kern River and along their associated sloughs and side channels within the project action area (Table 3). These riparian areas are characterized by a dominance of tall trees, including Fremont cottonwood (*Populus fremontii*), western sycamore (*Platanus racemosa*), and valley oak (*Quercus lobata*). Subcanopy trees include white alder (*Alnus rhombifolia*) and ash (*Fraxinus* spp.). Understory shrub and herbaceous species typically include California blackberry (*Rubus ursinus*), elderberry (*Sambucus* spp.), and willows. In the project action area, the transition from the riparian corridor to valley foothill riparian vegetation, such as cropland or orchard is generally abrupt, resulting in narrow bands of vegetation restricted by the bordering agricultural land. Valley foothill riparian habitat provides food, water, migration and dispersal corridors, escape, nesting, and thermal cover for an abundance of wildlife.

Over 16 to 22 acres of fresh emergent wetland is present within the project action area as small patches associated with man-made structures, including detention basins, groundwater recharge reservoirs, and irrigation and drainage ditches (Table 3). Typical species in these areas include willows, rushes, bulrushes (*Scirpus* spp.), cattails (*Typha* spp.), and docks (*Rumex* spp.). A large complex of fresh emergent wetland exists in the vicinity of Cross Creek. Otherwise, fresh emergent wetland habitats outside of the Cross Creek area are typically small vegetated areas that experience year-round ponding from irrigation water or, less frequently, seasonally during winter rain events.

Approximately 8.35 acres of Valley oak woodland occurs along the floodplain of the Kings River and associated sloughs and side channels of the Hanford West Bypass 1 and 2 Alternatives (Table 3). This habitat is characterized by well-spaced stands of mature valley oak (*Quercus lobata*) with little or no sub-canopy and a well-developed herbaceous layer. Dominant herbaceous species include brome, annual fescues, oats, and barleys. Other herbaceous plants, including soap root (*Chlorogalum pomeridianum*), filaree, miner's lettuce, prickly ox-tongue

**Table 3. Acreage of agricultural lands, urban areas, and vegetation communities within the project action area.**

Habitat Type by Vegetation Community (California Wildlife Habitat Relationship System)	Acreage <sup>a</sup>		Percent Range <sup>b</sup>
	Minimum	Maximum	
Agricultural/cropland <sup>c</sup>	26,382.12	30,624.09	63.2 - 64.9
Urban	9,626.77	12,012.08	23.7 - 24.8
Annual grassland	2,514.80	2,960.45	6.1 - 6.2
Lacustrine	576.08	703.77	1.4 - 1.5
Pasture	468.81	570.85	1.2 - 1.2
Alkali desert scrub	304.94	563.28	0.8 - 1.2
Barren	331.53	484.93	0.8 - 1
Riverine	322.37	368.74	0.8 - 0.8
Valley foothill riparian	102.24	132.84	0.3 - 0.3
Fresh emergent wetland	16.54	22.19	<0.1 - 0.1
Valley oak woodland	8.35	8.35	<0.1
Total	40,654.55	48,451.57	—

<sup>a</sup> Minimum and maximum determined acreages based on the smallest and largest amount of acreage covered by any continuous combination of alternatives.

<sup>b</sup> Percent range based on minimum and maximum values compared with sum of all minimum and maximum values. The total acres do not match the total size of the RSA because they are based on a continuous alignment as opposed to all alternatives considered.

<sup>c</sup> "Agricultural/cropland" includes dryland grain crop, deciduous orchard, evergreen orchard, irrigated grain crop, irrigated row and field crop, irrigated hayfield, vineyard, and any other undetermined cropland.

(*Picris echioides*), and spiny sow thistle (*Sonchus asper*), may be present. In the project action area, valley oak woodland may intergrade with valley foothill riparian vegetation or abruptly transition to developed areas, such as cropland or orchard. Valley oak woodland provides food, cover, nesting sites, and dispersal habitat for a wide variety of wildlife. Federally listed species potentially supported by valley oak woodland habitat include San Joaquin kit fox, Fresno kangaroo rat, Tipton kangaroo rat, and central California tiger salamander.

#### Noise environment

The following discussion regarding the baseline noise levels within the project action area is based on information acquired through noise level studies presented in the California High-Speed Train Project Revised DEIR/Supplemental DEIS, Fresno to Bakersfield Section (Authority and FRA 2012a, pp. 3.4-17 to 3.4-25). Fresno and Bakersfield are the most densely populated cities within the proposed FB alignment, with several highways, busy local roads, UPRR, and aircraft noise contributing to the noise environment. Highway 99, Highway 180, and Highway 41 are all near the proposed HST station site in Fresno. Aircraft noise from three local airports adds to the existing noise environment in the Fresno area.



The area around the proposed station in Fresno is developed primarily with commercial and industrial land uses along with some residential land uses. The noise environment in this area is dominated by traffic on the local streets, traffic on the freeways that surround the downtown area, and noise from train operations along the Union Pacific Railroad mainline. Noise levels were measured at the noise-sensitive land uses throughout the area and the measured noise levels ranged from 61 dBA along one of the quieter streets to 72 dBA near the railroad. These noise levels are typical for urban settings dominated by vehicular traffic and railroad operations. The alternative alignment will proceed southeast from the Fresno station, pass State Route SR 41 and approach the BNSF rail yard. The sensitive land uses in this area are subject to more roadway and railroad noise; the noise levels measured here range from 68 to 75 dBA. A residence located adjacent to the existing railroad line experienced a noise level of 79 dBA. This site was dominated by train noise, with a total of 44 trains passing this location in a 24-hour period. Another residence farther south located approximately 900 feet from the existing railroad experienced a noise level of 58 dBA, which was significantly quieter.

The measured ambient noise levels of agricultural lands located near train operations ranged from 64 to 77 dBA. These noise levels are to be expected in areas near freight and passenger train operations. Noise levels in rural areas with road traffic ranged from 47 to 77 dBA. The median measured noise level for agricultural lands without train operations ranged from 36 to 44 dBA, which is comparable to the inside of a house during a quiet evening. Noise levels within agricultural areas where irregular farming activities may occur ranged from 48 to 77 dBA.

Noise measurements made along the alignment through the City of Corcoran ranged from 64 to 81 dBA. These noise levels are consistent with homes adjacent to commercial and industrial sites that are exposed to highway traffic and railroad operations. Around the eastern side of Corcoran, noise levels measured at homes away from SR 43 and other major roads ranged from 48 to 61 dBA.

The noise levels measured along the Pixley Alignment ranged from 59 to 70 dBA  $L_{dn}$ . These noise levels are consistent with expectations for homes along a two-lane highway and an active rail line. In the vicinity of Allensworth, the measured noise levels for residential areas near the BNSF right-of-way ranged from 62 to 76 dBA. The noise levels measured along the BNSF Alternative through the cities of Wasco and Shafter generally ranged from 70 to 79 dBA.

The land uses within the City of Bakersfield are primarily urban with roadways, freeways, and rail lines dominating the noise environment. The noise measurements conducted near the alternative alignments and the proposed downtown Bakersfield station alternatives in this area ranged from 59 to 70 dBA, which are consistent with an urban environment.

### *Surveys*

Parcels within the project footprint that the FRA and the Authority was granted permission to enter were initially surveyed by biologists in 2010, with follow up surveys in 2011 and 2012. The purpose of the surveys was to determine which habitat types were present and identify potential project effects to federally-listed species. In accordance with the *Central Valley*

*Biological Resource and Wetland Survey Plan* (Authority and FRA 2009 and 2011) physical botanical and wildlife habitat assessment surveys and jurisdictional wetland delineation were conducted within the project footprint. The surveys were conducted within 60 to 120 feet of the HST footprint, depending on whether the track profile will be at-grade or elevated, and also within a 250-foot buffer around the project footprint where vernal pool habitat will be affected. Aerial photographic interpretation and windshield surveys were also conducted within a 1000-foot buffer around the project footprint to evaluate project effects to wide ranging wildlife and wildlife movement corridors.

In accordance with Service or California Department of Fish and Wildlife species-specific protocols, the study area was extended laterally from the project footprint up to 1.24 miles. Depending on target species, the extended study area identifies species-specific habitats based on aerial photographic interpretation, documented occurrences of the species, and field observations of federally listed species and their habitats.

Approximately 38 percent of the proposed project alignment has been surveyed to date. In areas that were not accessible, biologists conducted, to the extent possible, visual surveys of habitat types. Within unsurveyed areas, aerial photography was used to assess habitat types which were used to calculate the anticipated range of effects to federally-listed species habitat. The entire project alignment will be surveyed prior to construction to determine the effects of the project on federally-listed species, as described in further detail in the conservation measures above.

#### *San Joaquin kit fox*

The entire project action area occurs within the known geographic and historic range of the San Joaquin kit fox (Grinnell et al. 1937; Service 1998 and 2010; CNDDDB 2012). Grinnell et al. (1937) identified three subspecies of kit fox based on morphological characteristics: *Vulpes macrotis mutica*, *Vulpes macrotis arsipus*, and *Vulpes macrotis macrotis*. Grinnell et al. (1937) included Fresno, Tulare, Kings, and Kern counties within the historic range of the San Joaquin kit fox (*Vulpes macrotis mutica*). The *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998) describes three core population areas, 12 satellite populations, and 21 linkages between satellite populations, and between core and satellite populations (Service 1998 and 2010a).

There are 663 extant occurrences of San Joaquin kit fox documented within Fresno, Tulare, Kings, and Kern counties (CNDDDB 2013). The majority of these documented occurrences cluster within areas of natural habitat, such as Lokern, Carrizo Plain, Pixley National Wildlife Refuge, and Allensworth Ecological Reserve, and within and around metropolitan Bakersfield (CNDDDB 2013; Cypher pers. comm., 2013). Of these, 144 occur outside of core or satellite populations or linkages. Documented occurrences of San Joaquin kit foxes become less common in the portion of the action area north of Hanford as the alignment extends towards Fresno.

San Joaquin kit foxes are expected to occur within all areas of suitable habitat throughout the CHST-FB project action area. An estimated 5,351 acres of habitat (alkali desert scrub, annual grassland, pasture, barren, urban Bakersfield, and agricultural lands) occurs within the 7,189-acre

CHST-FB Project alignment footprint. Approximately, 1,207 of the 5,351 acres (~23 percent) occur within satellite and corridor areas. Highly suitable habitat for the San Joaquin kit fox supports denning, foraging, and breeding; in the CHST-FB project action area it is composed of annual grasslands, alkali desert scrub, pasture, and barren land cover, as mapped for this project. Approximately 755 acres of the 5,351 acres (~14 percent) of habitat is considered highly suitable for use by the San Joaquin kit (Table 4). About 23 percent (~175 acres) of the 755 acres of highly suitable habitat occurs within satellite and corridors areas. The remaining 4,596 acres of San Joaquin kit fox habitat consists of agricultural and urban habitats between Fresno and Bakersfield (Table 4).

The Fresno to Bakersfield alignment crosses two satellite populations (Southwestern Tulare County and Urban Bakersfield) and one linkage area (between the Eastern Kern Grasslands and Antelope Plain/Semitropic/Kern satellite populations). San Joaquin kit fox habitat within and around the CHST-FB alignment project action area is fragmented by highways, roads, urbanization, and high-density agricultural lands (Cypher pers. comm., 2012; Cypher et al. 2014). Highly suitable habitat, which supports breeding, denning, and foraging for the San Joaquin kit fox, is extremely fragmented within and around the CHST-FB alignment project action area, occurring as isolated patches within high-density agricultural development (Cypher et al. 2013; Cypher et al. 2014). About 18 percent of these patches are too small to individually support a single San Joaquin kit fox home range (Cypher et al 2013). However, these small patches, collectively, provide habitat for San Joaquin kit foxes that rely upon availability of multiple small patches to survive (Cypher et al. 2013).

San Joaquin kit foxes within and around the Southwestern Tulare County satellite area tend to be concentrated within these fragmented patches of high quality habitat where increased intra-and inter-specific competition for resources occurs (Cypher et al. 2014). Home ranges tend to be smaller in the satellite populations than those observed in core populations, ranging from 593.1 to 1,210 acres (Cypher et al. 2014), versus 1,063 to 1,507 acres in core populations. Within home ranges in satellite populations, the minimum area used most frequently by individual San Joaquin kit foxes ranges from 222.4 to 296.5 acres (Cypher et al. 2014). Home range overlap among San Joaquin kit foxes is extensive within areas of highly suitable habitat in satellite areas (Cypher et al. 2014), which is expected to result in increased intra-and inter-specific competition for resources. Mortality rates range from 1.5 to 3.5 times higher in satellite populations than those observed in core areas (Cypher et al. 2014). This is attributed to increased competition and predation resulting from crowding of San Joaquin kit foxes within patches of highly suitable habitat, which are relatively limited in availability (Cypher et al. 2014).

The high rate of mortality observed among satellite populations of San Joaquin kit fox may also be a function of fragmentation of highly suitable habitat, which results in increased “edge” effect, increasing exposure to greater threats due to increased accessibility for predators and humans (Cypher et al. 2014). For example, free-ranging dogs (both domestic and feral), documented as a significant source of mortality for San Joaquin kit foxes, have been observed within fragments of highly suitable habitat in satellite and core areas (Cypher et al. 2014). Exposure to other threats, such as pesticide use on agricultural lands, also increases as edge effect increases.

Demographic information for San Joaquin kit fox primarily comes from core recovery areas and is limited from satellite populations (Cypher et al., 2014); little is known outside of these areas. Because the conditions described by Cypher et al. (2014) apply to highly fragmented habitat consistent with San Joaquin kit fox habitat conditions throughout the CHST-FB alignment project footprint, we expect San Joaquin kit fox to experience similar stressors throughout the action area (i.e., increased intra-and inter-specific competition and increased mortality rates).

Genetic studies can offer insight regarding the genetic status of populations and rates of genetically effective migration among populations within a given landscape (Schwartz et al. 2007). Population genetic studies can also provide valuable information, often unattainable through other approaches, for monitoring the baseline and status of species and contribute to conservation planning (Schwartz et al. 2007). Recent genetic studies of San Joaquin kit fox sampled from Bakersfield, Carrizo Plain, Lokern, Panoche, and Camp Roberts (archived samples from this location used) revealed high levels of genetic diversity in every sampling location (allelic richness, heterozygosity, and private alleles) (Wilbert pers. comm., 2012). Three unique genetic signatures were identified: northern type predominant in Panoche Valley, a western type common in Camp Roberts, Carrizo Plain, and Lokern, and an eastern type mostly in Bakersfield (Wilbert pers. comm., 2012). San Joaquin kit fox samples collected from the Panoche Valley were also distinct in that approximately half of that population has a unique mitochondrial DNA (mtDNA) haplotype with a 16-basepair (bp) deletion (Wilbert pers. comm., 2012). Previous research showed little sequence variation in the control region of the mtDNA, which led the researchers to use the length of this fragment (determined by number of basepairs in the amplified sequence) of the mtDNA to indicate that scat samples submitted to their study were actually collected from San Joaquin kit foxes. However, the Panoche individuals detected from samples collected during 2009 to 2011 were split between the 235 and 251 bp haplotypes (Wilbert pers. comm., 2012). Only one individual outside of the Panoche Valley (in the Carrizo Plain) has been detected with this haplotype (Wilbert pers. comm., 2012).

The F-statistic ( $F_{st}$ ) is a measure of genetic differentiation that ranges along a continuum of 0 to 1, with a value of 0 indicating that populations are genetically identical and a value of 1 indicating that they are 100 percent genetically distinct from each other. The  $F_{st}$  value ( $F_{st} = 0.06$ ), and estimated number of genetically effective migrants per generation ( $N_m = 11$ ; estimated from the  $F_{st}$  value) between Bakersfield and the other two populations from their study suggests that while these populations exhibit genetic distinction from each other, moderate levels of gene flow among them do exist (Wilbert pers. comm., 2012).

This genetic distinction observed among San Joaquin kit fox sampled in Bakersfield and the other sites is also supported by previous research on the behavior and ecology of San Joaquin kit foxes in the urban habitat (Wilbert pers. comm., 2012; Cypher pers. comm., 2012 and 2013). Not only are these San Joaquin kit foxes living in an altered habitat, but they developed alternative behaviors, which have allowed them to adapt existence within the city (Wilbert pers. comm., 2012; Cypher pers. comm., 2012 and 2013).

The genetic data suggests that there is little effective current migration between the north group (Panoche) and other populations (Wilbert pers. comm., 2012). This is most likely due to the decreased population sizes, loss of intervening habitat, and loss of connecting populations

**Table 4. Range of potential habitat for the San Joaquin kit fox.**

Land Prioritization <sup>1</sup>	CWHR Vegetation Community or Wildlife Association	Impact Type	Areas of Effect (Acres) <sup>2</sup>	
			MIN	MAX
<b>Southwestern Tulare County Satellite Area</b>	<b>Natural</b>		<b>86.26</b>	<b>154.39</b>
	Annual Grassland	Direct	86.12	111.95
	Alkali Desert Scrub	Direct	0.07	37.4
	Barren	Direct	0	0
	Pasture	Direct	0.07	5.04
	Valley Oak Woodland	Direct	0	0
	<b>Agriculture</b>		<b>511.36</b>	<b>654.54</b>
	Agriculture/Crop	Direct	184.72	196.28
	Dryland Grain Crop	Direct	30.17	35.92
	Deciduous Orchard	Direct	228.81	243.09
	Evergreen Orchard	Direct	0	0
	Irrigated Grain Crop	Direct	10.69	75.75
	Irrigated Row and Field Crop	Direct	0	0
	Irrigated Hayfield	Direct	56.97	103.51
	Vineyard	Direct	0	0
	<b>Urban/BNSF</b>		<b>0</b>	<b>0</b>
	BNSF	Direct	0	0
Urban development	Direct	0	0	
<b>Metropolitan Bakersfield Satellite Area (Urban Bakersfield)</b>	<b>Natural</b>		<b>214.77</b>	<b>218.15</b>
	Annual Grassland	Direct	34.67	36.55
	Alkali Desert Scrub	Direct	10.13	11.14
	Barren	Direct	169.11	169.32
	Pasture	Direct	0.86	1.15
	Valley Oak Woodland	Direct	0	0
	<b>Agriculture</b>		<b>0</b>	<b>0</b>
	Agriculture/Crop	Direct	0	0
	Dryland Grain Crop	Direct	0	0
	Deciduous Orchard	Direct	0	0
	Evergreen Orchard	Direct	0	0
	Irrigated Grain Crop	Direct	0	0
	Irrigated Row and Field Crop	Direct	0	0
	Irrigated Hayfield	Direct	0	0
	Vineyard	Direct	0	0
	<b>Urban/BNSF</b>		<b>249.62</b>	<b>301.56</b>
	BNSF	Direct	13.5	13.67
Urban development	Direct	236.12	287.89	

Land Prioritization <sup>1</sup>	CWHR Vegetation Community or Wildlife Association	Impact Type	Areas of Effect (Acres) <sup>2</sup>	
			MIN	MAX
Linkage Area	<b>Natural</b>		<b>0</b>	<b>20.14</b>
	Annual Grassland	Direct	0	1.27
	Alkali Desert Scrub	Direct	0	0
	Barren	Direct	0	18.88
	Pasture	Direct	0	0
	Valley Oak Woodland	Direct	0	0
	<b>Agriculture</b>		<b>104.69</b>	<b>377.74</b>
	Agriculture/Crop	Direct	3.01	96.55
	Dryland Grain Crop	Direct	0	0
	Deciduous Orchard	Direct	88.81	92.49
	Evergreen Orchard	Direct	0	0
	Irrigated Grain Crop	Direct	7.9	25.8
	Irrigated Row and Field Crop	Direct	0	6.08
	Irrigated Hayfield	Direct	4.97	29.83
	Vineyard	Direct	0	126.98
	<b>Urban/BNSF</b>		<b>0</b>	<b>0</b>
	BNSF	Direct	0	0
	Urban development	Direct	0	0
Remainder Areas (Outside of Recovery Areas)	<b>Natural</b>		<b>164.34</b>	<b>361.88</b>
	Annual Grassland	Direct	111.05	183.14
	Alkali Desert Scrub	Direct	2.03	6.73
	Barren	Direct	28.58	134.24
	Pasture	Direct	22.69	37.77
	Valley Oak Woodland	Direct	0	0
	<b>Agriculture</b>		<b>1643.94</b>	<b>3262.83</b>
	Agriculture/Crop	Direct	159.49	516.12
	Dryland Grain Crop	Direct	34.85	77.8
	Deciduous Orchard	Direct	733.19	1199.27
	Evergreen Orchard	Direct	3.42	3.42
	Irrigated Grain Crop	Direct	160.47	382.44
	Irrigated Row and Field Crop	Direct	37.62	131.24
	Irrigated Hayfield	Direct	242.04	439.15
	Vineyard	Direct	272.84	513.41
	<b>Urban/BNSF</b>		<b>0</b>	<b>0</b>
	BNSF	Direct	0	0
	Urban development	Direct	0	0

1. Land Prioritization categories are based on the *Recovery Plan of the Upland Species of the San Joaquin Valley, California* (USFWS 1998) and the *San Joaquin kit fox 5-Year Review* (USFWS 2010).

2. The MIN-MAX tables presented within the Biological Assessment are not representative of any one alignment. The total acres of the table may exceed the project footprint because the sum of the maximum values is calculated across all potential project alignments.

between the north populations and the other groups sampled (Wilbert pers. comm., 2012). The remaining habitat between the western and eastern groups, although fragmented, has allowed for reduced but continued migration of individuals (Wilbert pers. comm., 2012). The highest observed rate of gene flow exists between the Bakersfield and the Lokern and Carrizo Plain populations (Wilbert pers. comm., 2012).

The number of genetically effective migrants ( $Nm = 11$ ) may appear to be small number; however, what this value represents is a relative number of genetically-effective individuals that were able to move among the Bakersfield population and the western populations (Lokern and Carrizo Plains) and successfully breed over multiple generations. According to Mills et al. (1996) a minimum of one and a maximum of 10 genetically effective migrants per generation would be an appropriate general rule of thumb for minimizing the rate of loss of genetic diversity. Therefore, the San Joaquin kit fox populations within and around the project action area currently fit well within the parameters of these recommendations.

#### *Tipton kangaroo rat*

Between 367.18 and 453.85 acres of potentially suitable habitat, such as alkali desert scrub, annual grassland, barren and pasture land, for the Tipton kangaroo rat occurs within the project action area (Table 5). According to the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998), current populations occur in various communities along the SR 99 corridor from Tipton to Pixley, and in the Allensworth Ecological Reserve (AER) and Pixley National Wildlife Refuge (PNWR), which “provides some of the best remaining habitat for Tipton kangaroo rat.” Tipton kangaroo rat was not observed during spring 2010 field surveys on properties where permission to enter was granted. Kangaroo rat sign, including active kangaroo rat-sized burrows with freshly excavated soils, fresh scat, and fresh tracks, were observed within the project action area south of the town of Allensworth. Protocol-level surveys for this species have not been conducted within the entire project action area because of limited access to properties where suitable habitat may exist. Therefore, the status of this species within the project action area is not known at this time.

Seven occurrences of Tipton kangaroo rat have been documented within the project action area (occurrence #'s 9, 21, 24, 28, 29, 32, and 36; CNDDDB 2013). A total of 41 occurrences of this species have been reported to the CNDDDB within a 10-mile distance of the proposed project footprint (CNDDDB 2013). Nine of these occurrences of Tipton kangaroo rat are documented within 1 to 2 miles of the project action area (occurrence #'s 20, 22, 23, 31, 35, 82, 83, 84, and 86; CNDDDB 2013). Two of these 9 occurrences, documented in 1929 and 1976, are considered extirpated; however, the remaining 7 occurrences are presumed extant (CNDDDB 2013). These 7 extant occurrences were reported from 1985 through 2003, and consist of observations of adults, including males and females, burrows, and breeding, wintering, and foraging sites (CNDDDB 2013). All occurrences were observed in either alkali scrub or grassland habitat.

It is reasonably likely that the Tipton kangaroo rat may be present within the project action area because suitable habitat is present and CNDDDB records indicate the presence of this species within and around the project action area.



*Central California tiger salamander*

Between 0.01 and 5.5 acres of potentially suitable upland habitat for the Central California tiger salamander occurs within the project action area (Table 5). There is no vernal pool habitat to support breeding for the Central California tiger salamander within the portion of the action area where this species is likely to occur (Table 5). Protocol-level surveys for this species have not been conducted within the entire project action area because of limited access to properties where suitable habitat may exist. Therefore, the status of this species within the project action area is not known at this time.

Four Central California tiger salamander occurrences have been reported to the CNDDDB within a 10-mile radius of the project footprint; of these, three have been reported within a 5-mile radius (CNDDDB 2013). Occurrence # 583 includes two records reported together, and is northeast of the city of Fresno. Occurrence # 612 is located south of the city of Kingsburg and west of the city of Hanford, between Cole Slough and the Kings River. These historical records (occurrence #'s 583 and 612; CNDDDB 2013) date back to the period between 1879 and 1936 and the occurrences are now considered extirpated. The third occurrence, # 522, was reported in 1999, in vernal pools associated with Cross Creek, located approximately 5 miles east of the city of Hanford (CNDDDB 2013). This occurrence consisted of California tiger salamander egg masses observed in a complex of vernal pools surrounded by nonnative annual grasslands (CNDDDB 2013). Designated critical habitat the Central California tiger salamander (Southern San Joaquin Region – Unit 5A) occurs within this same area, outside of the project action area.

It is reasonably likely that the Central California tiger salamander may be present within the project action area because suitable habitat is present and CNDDDB records indicate the presence of this species within close proximity to the project action area.

*Blunt-nosed leopard lizard*

Between 26.57 and 98.06 acres of potentially suitable habitat for the blunt-nosed leopard lizard, such as alkali desert scrub, annual grassland, barren lands, and valley foothill riparian occurs within the project action area (Table 5). Although this species was not observed during the spring 2010 field reconnaissance surveys, extensive small mammal burrows, which provide suitable refugia habitat for the blunt-nosed leopard lizard, were observed in the project action area in the vicinity of the AER. Suitable habitat for the blunt-nosed leopard lizard also occurs in the project action area between Deer Creek and Poso Creek, where suitable burrows for refugia have been observed. Protocol-level surveys for this species have not been conducted within the entire project action area because of limited access to properties where suitable habitat may exist. Therefore, the status of this species within the project action area is not known at this time.

Over 50 occurrences of the blunt-nosed leopard lizard have been reported within a 10-mile distance of the project footprint. Seven of these occurrences are located within the project action area and presumed to be extant (occurrence #'s 12, 129, 194, 203, 204, 206, and 375; CNDDDB 2013). These occurrences were reported between 1974 and 2005 in alkali desert scrub and annual grassland habitats (CDFW 2012). Blunt-nosed leopard lizards have also been reported in

the AER (CDFW 2012) and in the Deer Creek East Unit of the PNWR (Uptain et al. 1985; Service 2005b). In addition to the sightings at AER, blunt-nosed leopard lizard occurrences have been documented in the PNWR, near Poso Creek north of Wasco (Service 1998), because suitable habitat is present and CNDDDB records indicate the presence of this species within and around the project action area.

#### *Vernal pool fairy shrimp*

The proposed project falls in the San Joaquin Valley Vernal Pool Region identified in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon*. Vernal pools were documented to occur in the project action area, in the vicinity of the PNWR and AER (Service 2005b). Wetland delineation surveys identified between 2.33 and 29.77 acres of potentially suitable seasonal wetland and vernal pool habitat that could support the vernal pool fairy shrimp within the project action area (Table 5). During the spring 2010 field surveys, unidentified fairy shrimp (and seed shrimp, or common ostracods) were observed near Allensworth in vernal pools and seasonal wetlands in natural habitats dominated by alkali desert scrub and annual grassland. Protocol-level surveys for this species have not been conducted within the entire project action area because of limited access to properties where suitable habitat may exist. Therefore, the status of this species within the project action area is not known at this time.

Nine vernal pool fairy shrimp occurrences have been reported to the CNDDDB within 10 miles of the project footprint. The closest documented occurrences are located approximately 0.5 to 1 mile east of the project action area in seasonal wetlands within the PNWR and are both presumed extant (occurrence #'s 112 and 177; CNDDDB 2013). In 1993, vernal pool fairy shrimp were found in vernal pools on the Two Well Unit of PNWR (Service 2005b), which is located approximately 3 miles east of the project footprint. The *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* also describes the species as occurring in the PNWR in Tulare County, and at isolated locations in Kings County (Service 2005c).

It is reasonably likely that the blunt-nosed leopard lizard is present within the project action area. Approximately 54 square feet of vernal pool fairy shrimp designated Critical Habitat Unit 27B is within the project action area. However, that portion of the critical habitat unit does not contain the PCEs listed in the designations and is hydrologically and ecologically disconnected from the remainder of Critical Habitat Unit 27B by State Route 43 and the BNSF right-of-way.

It is reasonably likely that the vernal pool fairy shrimp may be present within the project action area because suitable habitat is present and CNDDDB records indicate the presence of this species within close proximity to the project action area.

**Table 5. Range of potential habitat within the Fresno to Bakersfield alignment of the CHST Project (excluding the FCMS) for Tipton kangaroo rat, California tiger salamander, blunt-nosed leopard lizard, vernal pool fairy shrimp, vernal pool tadpole shrimp, valley elderberry longhorn beetle, California jewelflower, Hoover's spurge, Kern mallow, and San Joaquin woolly-threads.**

Species	Habitat Type	Impact Type	Areas of Effect	
			MIN	MAX
<b>Tipton kangaroo rat</b>	Alkali desert scrub, annual grassland, barren and pasture	Direct	367.18	453.85
<b>California tiger salamander</b>	AQUATIC: Vernal pools/seasonal wetlands	Direct	18.6	18.7
	UPLAND: alkali desert scrub, annual grasslands, pasture surrounding vernal pools/seasonal	Direct	6.2	18.3
<b>Blunt-nosed leopard lizard</b>	Alkali desert scrub, annual grassland, barren and valley foothill riparian	Direct	26.57	98.06
<b>Vernal pool fairy shrimp</b>	Vernal pools / seasonal wetlands	Direct	2.33	29.77
		Indirect	14.55	103.52
<b>Vernal pool tadpole shrimp</b>	Vernal pools / seasonal wetlands (delineated within the geographic range of the species)	Direct	0.0041	0.0041
		Indirect	0.0560	0.0560
<b>Valley elderberry longhorn beetle</b>	Elderberry shrubs ( <i>Sambucus</i> spp.)	Direct and Indirect	12 shrubs	36 shrubs
<b>California jewelflower</b>	Unsurveyed alkali desert scrub, annual grassland, and pasture in Fresno County	Direct	0	15
<b>Hoover's spurge</b>	Vernal pools / seasonal wetlands in Tulare County	Direct	0	6.35
<b>Kern mallow</b>	Unsurveyed alkali desert scrub, annual grassland, and pasture in Tulare and Kern Counties	Direct	0	214.36
<b>San Joaquin woolly threads</b>	Unsurveyed alkali desert scrub, annual grassland, and pasture in Fresno, Kings, and Kern Counties	Direct	0	489.34

*Vernal pool tadpole shrimp*

Wetland delineation surveys identified 0.0041 acre of potentially suitable seasonal wetland and vernal pool habitat that could support vernal pool tadpole shrimp within the project action area (Table 5). This 0.0041 acre of vernal pool habitat falls within the southernmost extent of the

known range of this species. Portions of the project action area run parallel to the boundary of these reserves. Vernal pool tadpole shrimp were not observed during the spring 2010 field surveys. Protocol-level surveys for this species have not been conducted within the entire project action area because of limited access to properties where suitable habitat may exist. Therefore, the status of this species within the project action area is not known at this time.

Five occurrences of vernal pool tadpole shrimp have been documented in Tulare County, two occurrences in Kings County, and three occurrences in Fresno County (CNDDDB 2013). These occurrences constitute the southernmost extent of the vernal pool tadpole shrimp's known range. Three vernal pool tadpole shrimp occurrences have been reported near Cross Creek approximately 5 miles east of the city of Hanford (occurrence #'s 129, 139, and 140; CNDDDB 2013). Hundreds of vernal pool tadpole shrimp were observed in vernal pools in a nonnative grassland area west of Cross Creek within the closest occurrence (occurrence #139; CNDDDB 2013).

It is reasonably likely that the vernal pool tadpole shrimp may be present within the project action area because suitable habitat is present and CNDDDB records indicate the presence of this species within close proximity to the project action area.

*Valley elderberry longhorn beetle*

Surveys conducted in 2010 identified a limited number of elderberry shrubs that could provide habitat for the valley elderberry longhorn beetle. Based on survey results, between 12 and 36 elderberry shrubs are anticipated to occur within the project footprint (Table 5). Two elderberry shrubs were observed north of Layton, near Monmouth, outside of the riparian corridor. Ten shrubs were observed along the banks of the Kern River. Protocol-level surveys for this species have not been conducted within the entire project action area because of limited access to properties where suitable habitat may exist. Therefore, the status of this species within the project action area is not known at this time.

There are 37 occurrences of valley elderberry longhorn beetle documented in Fresno, Kings, Tulare and Kern counties, most of which are located east Highway 99. Five of these occurrences have been documented within a 10-mile distance of the project footprint. The closest reported occurrence of valley elderberry longhorn beetle is located approximately 4 miles north of Bakersfield, where many elderberry shrubs with a few exit holes were observed in a riparian area along the banks of the Kern River (occurrence # 61; CNDDDB 2013).

It is reasonably likely that the valley elderberry longhorn beetle may be present within the project action area because suitable habitat is present and CNDDDB records indicate the presence of this species within close proximity to the project action area.

*California jewelflower*

There are up to 15 acres of potentially suitable habitat for the California jewelflower within the portion of the project action area that falls within the historic range of this species (Table 5). Most of this habitat consists of alkali desert scrub, non-native and native annual grasslands,

barren lands, and pasture. Protocol-level surveys for this species have not been conducted within the entire project action area because of limited access to properties where suitable habitat may exist. Therefore, the status of this species within the project action area is not known at this time.

There are 30 occurrences of California jewelflower documented in Fresno, Kings, Tulare and Kern counties (CNDDDB 2013). Two occurrences are located within the project footprint, but are considered extirpated as a result of agricultural conversion (occurrence #'s 17 and 41; CNDDDB 2013). All other CNDDDB records of this species within 10 miles of the project action area are also confirmed as extirpated due to agricultural conversion and urban development, except for one, which is considered to be possibly extirpated (CNDDDB 2013). This occurrence is located about 3.8 miles from the project action area near Bakersfield, along Caliente Creek, at the foot of the Tehachapi Grade, in Kern County (occurrence # 39; CNDDDB 2013).

It is reasonably likely that the California jewelflower may be present within the project action area because suitable habitat is present and CNDDDB records indicate the presence of this species within and around the project action area.

#### *Hoover's spurge*

Hoover's spurge occurs within only one county, Tulare County, of the four surrounding the project action area. This population of Hoover's spurge is located outside of the project area and consists of 6 documented occurrences (CNDDDB 2013). However, Hoover's spurge may occur where suitable habitat is found within the project action area. Collectively, up to 6.5 acres of potentially suitable habitat, consisting of vernal pool and seasonal wetland habitat for Hoover's spurge within the portion of the Fresno to Bakersfield alignment that occurs in Tulare County (Table 5). Hoover's spurge was not identified during botanical surveys conducted during 2010 in areas where access was granted. However, protocol-level surveys for this species have not been conducted within the entire project action area because of limited access to other properties where suitable habitat may exist. Therefore, the status of this species within the project action area is not known at this time.

The CNDDDB contains no documented occurrences of Hoover's spurge within 10 miles of the project action area (CDFW 2012). However, historical occurrences of this species in Tulare County were recorded east of the city of Visalia (USFWS 2005b).

It is reasonably likely that the Hoover's spurge may be present within the project action area because suitable habitat is present and CNDDDB records indicate the presence of this species within close proximity to the project action area.

#### *Kern Mallow*

There are up to 214.36 acres of potentially suitable habitat for the Kern mallow within the project action area (Table 5). Most of this habitat consists of alkali desert scrub, non-native and native annual grasslands, barren lands, and pasture within Tulare and Kern counties. Protocol-level surveys for this species have not been conducted within the entire project action area because of

limited access to properties where suitable habitat may exist. Therefore, the status of this species within the project action area is not known at this time.

One historical occurrence of Kern mallow was reported it within 1 mile of the project footprint (CNDDDB 2013). This occurrence was found in a saline valley grassland community and is presumed extant, although it was last observed in 1962. Several occurrences of Kern mallow are reported from the Lokern area, between Buttonwillow and McKittrick, and are described as a single metapopulation (Service 1998). This area is approximately 30 miles west of the project action area.

During the early season botanical surveys, botanists investigated the previously known occurrences for the species; no documented Kern mallow populations were found. A population of mallow identified from the Jepson Manual as *Eremalche parryi* ssp. *kernensis*, was detected near the intersection of SR 155 and SR 43 in Kern County during the botanical surveys in May 2010. The species was recorded in a fallow field outside of the project action area (less than 500 feet away). The dominant cover in the field consisted of foxtail brome and pungent tarweed (*Hemizonia pungens*). The area appeared to have been heavily disturbed in the past.

Genetic studies of *Sidalcea* and *Eremalche* (*Malvaceae*) did not identify sufficient genetic distinction to fully resolve subspecies distinctions among *Eremalche* (Baldwin 2005; Andreasen 2005 and 2012). The species may be in the process of slowly diverging; and additional studies that include samples collected from other areas to further resolve subspecies distinctions are necessary to fully resolve subspecies distinctions (Baldwin 2005; Andreasen 2005 and 2012).

Recent morphological studies have confirmed that the only member of the genus *Eremalche* that is gynodioecious is Kern mallow. Therefore, any herbarium specimens of *Eremalche* with pistillate flowers in Tulare County should be identified as Kern mallow. Steven Hill determined in 2001 that a specimen collected near Delano in Tulare County, is indeed Kern mallow (occurrence #51, located within the project footprint; CNDDDB 2013).

Based on the information provided by the recent genetic and morphological studies of *Eremalche*, the Service currently considers any occurrences with pistillate flowers in Tulare and Kern counties to be Kern mallow until further work provides convincing evidence that suggests we should reconsider our determinations.

It is reasonably likely that the Kern mallow may be present within the project action area because suitable habitat is present and CNDDDB records indicate the presence of this species within and around the project action area.

### *San Joaquin woolly-threads*

There are up to 489.34 acres of potentially suitable habitat for the San Joaquin woolly-threads within the project action area (Table 5). Most of this habitat consists of alkali desert scrub, non-native and native annual grasslands, barren lands, and pasture within Fresno, Kings, and Kern counties. Protocol-level surveys for this species have not been conducted within the entire

project action area because of limited access to properties where suitable habitat may exist. San Joaquin woolly-threads were not observed during floristic surveys in the project action area that were conducted within Kern County in 2010. Therefore, the status of this species within the project action area is not known at this time.

There are 12 documented occurrences of San Joaquin woolly-threads within 10 miles of the project action area (CDFW 2012). Two of these occurrences are in the project action area. Nine of the 12 recorded occurrences, including the 2 occurrences that fall within the project action area, are extirpated or possibly extirpated due to agricultural and urban development (CNDDDB 2013). Occurrence # 19, located about 10 miles southeast of the terminal end of the Bakersfield North and South segments, is presumed extant although no plants were observed at the site during 1986 and 1987 surveys of the area. Two occurrences near the Kern River, approximately 6 miles to 7 miles southwest of the project action area, were confirmed in 2009 (CNDDDB 2013).

Several metapopulations of San Joaquin woolly-threads have been identified in the western San Joaquin Valley (USFWS 1998). The nearest of these occurrences to the project action area include populations near Lost Hills and Bakersfield in Kern County.

It is reasonably likely that the San Joaquin woolly-threads may be present within the project action area because suitable habitat is present and CNDDDB records indicate the presence of this species within and around the project action area.

#### **FCMS: Environmental Baseline**

The proposed 405-acre FCMS consists of two parcels along Cross Creek. These two parcels support grassland habitat with scattered vernal pool complexes. Cross Creek defines the southern boundary of Parcel A and the eastern boundary of Parcel B. The two individual parcels at the FCMS are connected by a narrow strip of land that parallels Cross Creek. This strip of land and the adjoining annual grasslands south of Cross Creek are privately owned, and the Fagundes family grazes these parcels (together with Parcels A and B of the proposed compensatory mitigation site) under a lease with the landowner. Cross Creek conveys stormwater runoff from the east in the winter and irrigation tail water during the spring and summer. The FCMS is surrounded by a combination of agricultural lands to the north and west and grasslands to the south (across Cross Creek) and immediately east. Vernal pool complexes are scattered throughout the grasslands on the FCMS.

The FCMS composes the southwestern end of a corridor of open space that is bisected by Highway 99 and surrounded by agricultural lands, primarily row crops. This corridor follows Cross Creek and is mapped as critical habitat for the central California tiger salamander, vernal pool tadpole shrimp, and vernal pool fairy shrimp. The FCMS has 365.7 acres of upland habitat for the San Joaquin kit fox and the central California tiger salamander, 19 acres of vernal pool and seasonal wetland habitat for the central California tiger salamander, vernal fairy shrimp, and the vernal pool tadpole shrimp, and 14.7 acres of restored riparian and riverine habitat (Table 6).

**Table 6. Acres of available habitat preservation and restoration within the FCMS.**

Resource Type	Acreage Available
Vernal pool habitat	7.6 acres of preservation
	8.7 acres of restoration
Seasonal wetland habitat	2.7 acres of preservation
Riverine	14.7 acres of preservation
Upland habitat	365.7 acres of preservation

*FCMS: Vegetation*

Live Oak Associates, Inc. (LOA) evaluated the mitigation potential of both parcels and described the results in a 2001 report (LOA 2001). The report identifies four vegetation communities on the two parcels: alkali grassland, northern claypan vernal pools and swales, riparian habitat, and seasonal wetland drainages. The alkali grassland habitat primarily consists of non-native annual grasses typical of the region. The northern claypan vernal pools and swales habitat type is consistent with what the 2012 *Supplemental Preliminary Jurisdictional Waters and Wetlands Delineation Report, Volumes 1, 2, 3, and 4* classified as vernal pools, swales, and seasonal wetlands. The riparian habitat is discontinuous along Cross Creek. The 2012 *Delineation Report* attributes this discontinuity in part to cattle grazing limiting recruitment of riparian vegetation. The seasonal wetland drainages occur in areas that may have once been former channels of Cross Creek.

The vernal pools on the FCMS are topographic depressions occurring within the annual grassland. The depressions are characterized by a hardpan soil layer that fills with rainwater, surface runoff, or overflow from Cross Creek and holds water during the rainy season. The depressions typically fill in December or January, and in wet years the water in the pools persists into late April or early May. In their 2001 report, LOA identified 77 vernal pools on the property in 2000. Typical plant species occurring in the pools include slender popcorn flower (*Plagiobothrys stipitatus*), dwarf wooly-heads (*Psilocarphus brevissimus* ssp. *brevissimus*), and swamp timothy (*Crypsis schoenoides*).

Currently, the portion of Cross Creek that runs through the FCMS supports very little riparian vegetation. Where riparian vegetation does occur on the property, it is degraded, consisting of scattered trees that provide little in the way of habitat value, creek shading, or nutrient enrichment.

*FCMS: Hydrology and Soils*

Cross Creek, which flows intermittently with stormwater runoff and irrigation tailwater, forms the southern border of Parcel A and the eastern border of Parcel B. Although some U.S. Geological Survey surface water monitoring stations are upstream on Cottonwood Creek (which becomes Cross Creek), these stations are over 20 miles away and are above the point where



Cottonwood Creek breaks into a more diffuse alluvial fan near the Fagundes Compensatory Mitigation Site. The flow levels in Cross Creek through the property are currently unknown and will need to be further investigated through field measurements.

The Natural Resources Conservation Service (NRCS) soil survey lists the soils within the parcels as primarily Melga silt loam, with some Remnoy very fine sandy loam and Youd fine sandy loam also occurring. These soils are derived from alluvium material and are notably characterized by a restrictive duripan layer at 10 to 20 inches. The soils are slightly saline and poorly drained (Natural Resources Conservation Service 2012).

*FCMS: Climate*

Precipitation in the area averages about 10 inches per year (1985–2012). The range of annual precipitation during this period was 4.1 inches in the driest year and 20 inches in the wettest year. Peak rainfall occurs in December through March; little precipitation occurs from June to September (Western Regional Climate Center (WRCC) 2012). Average temperatures in the area range from 37 to 55 degrees Fahrenheit in January and 65 to 97 degrees in July (period of record is 1927–2005) (WWRC 2012). Due to the general high temperatures in the area, the evapotranspiration rates are also high, approximately 0.9 inches/month in December and 8 inches/month in July (California Irrigation Management Information System 1999).

The data reviewed by the FRA and the Authority and its Regional Consultants suggests that precipitation is sufficient to support the establishment, rehabilitation, enhancement, and restoration of vernal pools on the FCMS that will meet the USACE guidelines for ponding (i.e., at least 19 days a year in 5 of 10 years). It is presumed that if depressions were created on the property to support the appropriate wetland hydrology, other vernal pool characteristics, including vegetation, soils, and wildlife will be supported.

*FCMS: San Joaquin kit fox*

Approximately 365.7 acres of highly suitable grassland habitat for the San Joaquin kit fox exists within the FCMS (Table 6). There are documented occurrences of the San Joaquin kit fox in close proximity to the FCMS (CNDDDB occurrence #'s 920, 921, 923, and 924).

It is reasonably likely that the San Joaquin kit fox is present within the FCMS because suitable habitat is present and CNDDDB records indicate the presence of this species within close proximity of the FCMS.

*FCMS: central California tiger salamander*

There are 365.7 acres of suitable upland habitat and 7.6 acres of vernal pool habitat to support the central California tiger salamander within the FCMS (Table 6). There is a documented occurrence of central California tiger salamander within 5 miles of the FCMS (CNDDDB occurrence # 612). Egg masses reported as central California tiger salamander were observed in vernal pools located within the FCMS during surveys (CNDDDB occurrence # 522) (Live Oak

Associates, Inc. 2001). Small mammal burrows are present within the upland habitat of the FCMS. However, adult central California tiger salamanders have not been observed during surveys. The FCMS is located within the reported range for this species and provides suitable aquatic and upland habitat for this species.

It is reasonably likely that the central California tiger salamander is present within the FCMS because suitable habitat is present and CNDDDB records indicate the presence of this species within the FCMS and within close proximity.

*FCMS: Vernal pool fairy shrimp*

There are 7.6 acres of suitable vernal pool habitat to support the vernal pool fairy shrimp within the FCMS (Table 6). Two observations of vernal pool fairy shrimp have been reported on the Fagundes Compensatory Mitigation Site, which document hundreds of vernal pool fairy shrimp observed during surveys (CNDDDB #'s 206 and 207).

It is reasonably likely that the vernal pool fairy shrimp is present within the FCMS because suitable habitat is present and CNDDDB records indicate the presence of this species within the FCMS.

*FCMS: Vernal pool tadpole shrimp*

There are 7.6 acres of suitable vernal pool habitat to support the vernal pool tadpole shrimp within the FCMS (Table 6). Two observations of vernal pool fairy shrimp have been reported on the Fagundes Compensatory Mitigation Site, which document hundreds of vernal pool tadpole shrimp observed during surveys (CNDDDB #'s 139 and 140).

It is reasonably likely that the vernal pool tadpole shrimp is present within the FCMS because suitable habitat is present and CNDDDB records indicate the presence of this species within the FCMS.

### **Effects of the Proposed Action**

The CHST-FB Project will result in temporary and permanent loss of habitat for the San Joaquin kit fox, the Tipton kangaroo rat, the central California tiger salamander, the blunt-nosed leopard lizard, the vernal pool fairy shrimp, the vernal pool tadpole shrimp, the valley elderberry longhorn beetle, the California jewelflower, the Hoover's spurge, the Kern mallow, and the San Joaquin woolly-threads.

*San Joaquin kit fox*

*Effects associated with construction activities*

Direct and indirect effects are reasonably likely to occur to the San Joaquin kit fox within the 48,452-acre project action area (Table 3). The Services anticipates that adverse effects to the San

Joaquin kit fox from construction activities are expected to occur within the project footprint and within 200 feet of on either side of the project footprint (11,536 acres). The maximum estimated acres (5,351) of potentially suitable habitat (alkali desert scrub, annual grassland, pasture, barren, urban Bakersfield, and agricultural lands) for the San Joaquin kit fox that may be permanently lost as a result of the CHST-FB Project will be considered in this effects analysis for the San Joaquin kit fox. However, the Service recognizes that the actual number of acres of habitat that will be lost may be lower than the estimate considered in this biological opinion, depending on the alternative selected for the CHST-FB Project.

The potentially suitable habitats occur as fragments or patches throughout the relatively narrow, linear project action area, primarily within Fresno, Tulare, Kings, and Kern Counties. Approximately 755 acres of the 5,351 acres (~ 14 percent) of suitable habitat is considered to be highly suitable for use by the San Joaquin kit fox (alkali desert scrub, annual grassland, pasture, barren lands, summed from Table 4). The remaining 4,596 acres of San Joaquin kit fox habitat consists of agricultural and urban habitats between Fresno and Bakersfield (Table 4). The 755 acres of highly suitable habitat that will be permanently lost as a result of the CHST-FB Project represents an extremely small fraction of the remaining highly suitable habitat within Fresno, Tulare, Kings, and Kern Counties (Cypher, pers. comm., 2013).

Habitat loss and alteration may occur through degradation and placement of hardscape over suitable denning or foraging habitat as a result of the CHST-FB alignment component of the project. It is reasonably likely that construction activities will result in the destruction of dens. Highly suitable habitat that supports denning and breeding is essential for persistence of San Joaquin kit fox populations (Service 2010; Cypher et al. 2013; Cypher et al. 2014). Approximately 755 acres of high quality habitat for the San Joaquin kit fox will be permanently lost as a result of the CHST-FB alignment project action area. High quality habitat is already extensively fragmented throughout the CHST-FB alignment component of the project action area. Although the total habitat loss will be spread out over the length of the alignment, the permanent loss resulting from the 100-foot wide CHST-FB alignment footprint will decrease available resources for San Joaquin kit foxes utilizing those areas.

We expect any San Joaquin kit foxes using any patch of highly suitable habitat in the project footprint to be adversely affected by the loss of this habitat wherever it occurs. The loss of highly suitable habitat, even though fragmented, will exacerbate stresses caused by currently limited habitat availability, thus resulting in harm to an unknown number of San Joaquin kit foxes throughout the project footprint. Permanent alteration and loss of highly suitable habitat that supports foraging, breeding, and denning is reasonably likely to result in harm to individual San Joaquin kit foxes through increasing already high levels of intra-specific competition among San Joaquin kit fox and interspecific competition for resources with other carnivores such as coyotes (Cypher et al. 2013; Cypher et al. 2014). Additionally, the loss of highly suitable habitat is expected to result in some kit foxes having to forage over larger areas of less-suitable habitat, thereby increasing the risk of predation from coyotes, dogs, and bobcats, as observed in other studies (White and Ralls 1993; White et al. 1995; Cypher et al. 2013). A reduction in prey is expected to result in fewer and/or smaller litters, and decreased pup survival, and reduced survival rates for juvenile and adult San Joaquin kit fox.

The proposed construction activities have the potential to expose San Joaquin kit fox to a range of adverse effects. Loud noise, lighting, and vibration caused by construction vehicles, equipment, and operation of the HST system may disrupt normal breeding, feeding, or sheltering behaviors of San Joaquin kit fox individuals. Disruption of normal behaviors, as described above, may result in a likelihood of injury or mortality of San Joaquin kit fox. Direct mortality of kit fox may occur as a result of collision with construction vehicles or equipment. Displaced individuals may be more vulnerable to predation. However, the FRA and the Authority has proposed to implement conservation measures such as minimizing the total area disturbed by project activities, enforcement of speed limits, and wildlife exclusion fencing, which will reduce the potential for mortality, injury, or harassment of the San Joaquin kit fox. Preconstruction surveys for San Joaquin kit fox will reduce the potential for injury or mortality as well. Therefore, injury or mortality from entrapment, behavioral disruption from noise and vibrations, or collision with construction equipment and vehicles is not expected to occur.

*FCMS: Construction Activities for Habitat Restoration*

Construction and inoculum collection activities associated with the proposed wetland and riparian restoration will occur within the 405-acre FCMS (Table 6). Construction equipment, such as a Bobcat 753, mower vacuum, or shop vacuum will be used to collect inoculum from donor pools within the 7.6-acre Vernal Pool Preservation Area. We expect that any San Joaquin kit foxes within 200 feet of any portion of the FCMS undergoing construction activities will be harassed. Disturbance to San Joaquin kit foxes generated by use of construction equipment and construction activities is expected to be minimal and temporary because the proposed habitat restoration will occur over a short duration (less than 3 months) during the summer months, and there is alternative habitat available for use and movement by the San Joaquin kit fox within and around the FCMS. The FRA and the Authority has proposed conservation measures, such as use of Service-approved biological monitors, enforcement of speed-limits, and daily inspections of construction areas, to avoid injury and mortality of San Joaquin kit fox. Wildlife exclusion fencing is not proposed to be erected within the FCMS during project implementation. San Joaquin kit foxes are known to den in friable disturbed soils within construction areas. Construction activities are expected to occur outside of the breeding and pupping season; therefore, Service-approved protocols for excluding San Joaquin kit foxes from dens will be implemented per proposed conservation measures for this species. The behavior of any individuals attempting to den in the FCMS construction area will be altered by any den exclusions, but injury is not expected to occur.

The FCMS will provide 365.7 acres of highly suitable habitat to support breeding, foraging, and denning for the San Joaquin kit fox, and will be protected and managed for the conservation of this species in perpetuity (Table 6).

*Effects associated with operation activities**Movement and connectivity*

According to the data provided from Wilbert and Maldonado's studies (pers. comm., 2012), the genetically defined San Joaquin kit fox populations within and around the project action area currently fit well within the parameters of recommendations of Mills et al (1996) for minimizing the rate of loss of genetic diversity. Under a metapopulation model, several genetically distinct populations with moderate migration among them is nearly an ideal situation for maintaining overall high levels of genetic diversity and minimizing adverse effects of demographic stochasticity, which is fundamental to the conservation of any species (Allendorf and Luikart 2007; Mills 2007). Maintaining these current levels of connectivity is crucial for the long-term survival and recovery of the San Joaquin kit fox.

Therefore, the FRA and the Authority has proposed construction of 73 to 98 dedicated wildlife crossings to ensure connectivity for the San Joaquin kit fox within areas identified as movement corridors and linkages to core recovery areas. Elevated portions of the alignment, bridges over riparian corridors, road overcrossings and undercrossings, and large drainage structures (e.g., large-diameter culverts 60 to 120 inches in diameter and 60 feet long) may also facilitate movement of San Joaquin kit foxes. Dedicated wildlife crossings, as proposed in the project description for the San Joaquin kit fox will be spaced at approximately 0.3-mile intervals as appropriate within the core, linkage, and satellite areas identified in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (Service 1998).

The spacing and location of dedicated wildlife crossings for the Fresno to Bakersfield Section was based on (1) existing land uses; (2) existing and proposed infrastructure not associated with the CHST-FB Project; (3) previously identified wildlife movement corridors; (4) consistency with the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (Service 1998); and (5) comments provided by Cypher (in litt. 2010, 2011, and 2013; and pers. comm., 2012 and 2013). The highest density of dedicated wildlife crossing structures is proposed for the section of the alignment between Cross Creek in Kings County and Poso Creek in Kern County. Within this region, dedicated wildlife crossing structures will be spaced at approximately 0.3-mile intervals. This area passes adjacent to the AER and the PNWR, which contain important habitat for San Joaquin kit fox, as well as several other federally listed species. Other wildlife crossing opportunities in areas where adjacent land uses are relatively conducive to wildlife movement (e.g., grazing land, grain, orchards, hay, and idle pasture) may be provided by bridges, large drainage culverts, and road crossings (60 inches in diameter and 60 feet long; OF = 0.33). For example, dedicated wildlife crossings are not proposed to be constructed within the 5 to 6-mile wide linkage area near Poso Creek that intersects with the HST; however, three of the large drainage culverts are proposed for the BNSF alternative, and a portion of the Wasco-Shafter alternative will be constructed as elevated track within this area. These proposed culvert structures and portions of elevated track may provide opportunity for movement of San Joaquin kit fox within this linkage area (Cypher, in litt, 2013; and pers. comm., 2013).

Crossing opportunities for the San Joaquin kit fox south of the Poso Creek linkage area down into urban Bakersfield will consist of up to 9 road overcrossings within this 18 to 20-mile portion of the alignment. About 27 to 40 small drainage culverts (30 inches in diameter and 60 feet long) are also proposed to be constructed within this portion of the alignment. It is unlikely that San Joaquin kit fox will use these structures for crossing under the HST because the very small OF (0.08) (Cypher in litt. 2010, 2011; Cypher, pers. comm., 2012 and 2013). However, this stretch of the alignment consists of dense agricultural development and San Joaquin kit fox have not been documented to use this area for movement (Cypher in litt. 2010, 2011; Cypher, pers. comm., 2012 and 2013).

Existing highways, roads, the BNSF rail line, urban development, and incompatible agricultural land uses may restrict movement of individuals and connectivity among existing San Joaquin kit fox populations (Service 2010; Spencer et al. 2010). Greater than 79 percent of the CHST-FB Project (~82 miles) will be installed at-grade. Portions of at-grade tracks will occur through areas that currently facilitate connectivity. Security fencing will be installed wherever the tracks are at-grade. Without the incorporation of wildlife crossing structures into the project design, the installation of long expanses of at-grade tracks with security fencing could potentially result in further loss and fragmentation of habitat and severely limit connectivity among San Joaquin kit fox habitats and populations, and preclude recolonization of currently unoccupied historic habitat. Therefore, the proposed wildlife crossings are crucial for maintaining connectivity among existing San Joaquin kit fox populations within and around the project action area.

The proposed design for the wildlife crossing is based on studies of use of highway undercrossings by San Joaquin kit fox, and other medium-sized mammals, such as the swift fox. Studies sponsored by the California Department of Transportation on highway undercrossings offered some insight into a minimum OF, as defined in the Project Description, for San Joaquin kit foxes, but the results of these studies were not conclusive (Bremner-Harrison et al. 2007). In one study, use of crossing structures under four-lane divided highways by San Joaquin kit foxes was examined at three study sites: one each along Interstate 5, SR 58, and SR 14. San Joaquin kit foxes were confirmed to be present at all three sites (Bremner-Harrison et al. 2007). A total of 45 undercrossing structures were monitored at the three separate sites. OFs ranged from 0.001 to 5.70, with most values estimated at the lower end of this range. Although San Joaquin kit foxes explored the entrances to some of these structures, no evidence was found of foxes crossing completely through any of the structures. However, evidence that San Joaquin kit foxes preferred the use of road overcrossings at all three study sites was incidentally discovered during the study.

In another study, use of crossing structures by swift foxes (*Vulpes velox*) was examined along four-lane divided highways in Colorado and South Dakota (Clevenger et al. 2010). At the Colorado site, 24 structures were monitored. Swift foxes were detected completely crossing through several 213-foot long culverts with OFs ranging from 0.12 to 0.45. At the South Dakota site, 49 structures were monitored. Swift foxes were detected completely crossing through six structures, all of which were round culvert designs with OFs ranging from 0.23 to 0.81.

Arizona Game and Fish Department (AGFD) guidelines for crossing structures recommend a minimum OF of 0.4 for medium-sized mammals, including foxes (AGFD 2006). The AGFD guidelines also recommend spacing wildlife crossings every 500 to 1,000 feet in areas designated as movement corridors for medium-sized mammals when the expanse of a road or highway will exceed at least one-half mile. An opening of at least 30-square feet (3 feet x 10 feet) was recommended for wildlife crossings that will have a length of 75 feet (AGFD 2006).

The proposed design for all wildlife-designated crossing structures for the HST is based on consultation with Dr. Brian, a species expert. His guidance is based his guidance on the findings of the swift fox study by the Clevenger et al. (2010) study and AGFG recommendations (Cypher pers. comm., 2010). The proposed structures will consist of box culverts and short-span slab bridges (constructed for tracks to cross over hydraulic features), and will be located below the HST tracks. The proposed crossing structures will provide a minimum opening that is 3 feet high, 10 feet wide, and 73 feet long (OF = 0.41). The invert or bottom of the structure opening may extend below the existing grade to accommodate variations in the topography. However, all wildlife crossings will have at least 50 percent of the vertical clearance above grade of the approaches to the opening. This will allow San Joaquin kit foxes entering the crossing to see through to the opening at the opposite end of the structure.

Other structures that will be constructed for the Fresno to Bakersfield alignment, such as road overcrossings, spans, and bridges, may provide opportunities for movement of San Joaquin kit fox. The Fresno to Bakersfield alignment will include 172 to 197 road overcrossings to accommodate existing two-lane roads that will intersect with the HST. These road overcrossings provide opportunities for a variety of terrestrial wildlife species to cross over the alignment, especially after nightfall when traffic subsides and, on roads with low traffic volume. San Joaquin kit fox have been documented to use road overcrossings to gain access across highways (Bremner-Harrison et al. 2007; Cypher in litt. 2010 and 2011, and Cypher pers. comm., 2012). Therefore, the proposed road overcrossings will provide numerous opportunities for movement of San Joaquin kit fox across the HST (Cypher in litt. 2010 and 2011, and Cypher pers. comm., 2012).

Several large bridges and elevated spans that will be constructed across rivers, creeks, and other aquatic or land features may also provide opportunities for movement of San Joaquin kit fox (Cypher in litt. 2010 and 2011, and Cypher pers. comm., 2012). About 18 to 24 bridge structures of various sizes are proposed for construction of the CHST-FB Project. In addition, approximately 22 to 33 linear miles of elevated track is proposed for the Fresno to Bakersfield alignment, which will allow for unrestricted movement of San Joaquin kit fox in those areas.

#### *Exposure to predators and infectious diseases*

The wildlife crossings may be used by other motile species such as coyotes, bobcats, feral cats and stray dogs to gain access across the HST tracks. Therefore, it may be likely that San Joaquin kit foxes may experience increased encounters with potential predators when using the proposed crossing structures. There may be potential for mortality if San Joaquin kit fox encounter predators while traveling parallel to the rail line in search of a crossing opportunity. However,

artificial escape dens will be installed within the crossing structures that will provide temporary escape. The artificial escape dens will consist of four sections of corrugated metal pipe, 20 feet long and 10 inches in diameter, will be anchored at each crossing structure. The openings of both ends of all artificial escape dens will be narrowed to a 4 to 6 inch diameter. San Joaquin kit foxes may find temporary refuge opportunities within the artificial escape dens in the event they encounter a larger predator. The FRA and the Authority has proposed to construct 73 to 98 dedicated wildlife crossings at 0.3-mile intervals, which should provide numerous opportunities for San Joaquin kit fox to gain access across the HST while minimizing the risk of encountering predators. Therefore, the potential for encounters with predators within and around wildlife crossings will be minimized through installation of the proposed wildlife crossings and artificial escape dens, and mortality from predation is not expected to occur within these structures.

The installation of the proposed wildlife crossing structures and escape dens, as described above, will also provide refuge that will allow San Joaquin kit fox to minimize or avoid contact with animals carrying transmissible infectious diseases when using the crossing structures. Increased interface between rural areas, agricultural lands and urban development may result in higher densities of wild and domestic species that benefit from human activities in these areas (Bradley and Altizer 2006). Raccoons, coyotes, skunks, red foxes, gray foxes, feral cats, and stray dogs may occur at higher densities than San Joaquin kit fox within and around the project action area where an interface between agricultural lands and urban development exists within and around the cities of Fresno and Bakersfield (Cypher et al. 2005; Smith et al. 2006; Service 2010a). These animals, especially raccoons and other small species may use the proposed crossing structures. For example, raccoons were detected at highway undercrossings in southern California more frequently than any other wild mammal species (Ng et al. 2004). Skunks, cats, and dogs were also detected using these undercrossings (Ng et al. 2004). These wild and domestic animals may carry transmissible infectious diseases, such as rabies, canine distemper virus, sarcoptic mange, and canine parvovirus (Cypher et al. 1998; Burton and Doblal 2004; Riley et al. 2004; Cummings et al. 2009). The proposed number of crossing structures and spacing intervals will provide sufficient opportunities for movement of San Joaquin kit foxes across the HST and minimize the probability of exposure to infected animals.

#### *Exposure to increased noise levels*

San Joaquin kit fox currently experience noise disturbance from highway, railroad, and road traffic. In addition to noise generated by highway and road traffic, San Joaquin kit fox that reside in metropolitan Bakersfield experience noise disturbance from a wide range of sources such as construction and human disturbance. The operation of the CHST-FB may result in additional noise disturbance that may temporarily impair behavioral patterns of this species and their prey. According to the proposed schedule for train operations, northbound and southbound trains will travel at least two to three times per hour from 6:00 a.m. to 12:00 a.m. However, noise disturbance from operation of the HST will not occur during nocturnal activities of San Joaquin kit fox in areas adjacent to the alignment from 12:00 a.m. through 6:00 a.m. (~ 6 hours).

The FRA has established noise exposure limits for all wildlife at a sound exposure level (SEL) of 100 dBA from passing trains. Construction equipment, such as bulldozers, may produce noise in



the range of 85 dBA (Burgland and Lindvall 1995). Assuming no intervening structures and maximum speeds of 220 mph, the FRA and the Authority has estimated that 100 dBA SEL will occur within 100 feet from the trackway centerline for at-grade alignments, and estimated 15 feet from the centerline for elevated sections on structures. This noise level is comparable to a helicopter operating at the same distance (Service 2006b). The FRA and the Authority has estimated that the 100 dBA SEL will be exceeded consistently throughout all alternatives for an estimated 100 feet from the trackway centerline for at-grade alignments.

All areas of the HST that are at-grade within suitable habitat are expected to experience increased noise exposure that may exceed the 100 dBA SEL threshold and potentially elicit a temporary startle, avoidance or negative behavior from San Joaquin kit fox and their prey. However, San Joaquin kit fox studied in Bakersfield, which appear to have adapted to the urban environment, have been observed denning near major roads (Bjurlin et al. 2005). Several San Joaquin kit fox were also observed using culverts and other road structures as dens in this same study (Bjurlin et al. 2005). Therefore, it is likely that San Joaquin kit fox will become quickly adapted to the increased noise disturbance generated by operation of the HST.

#### *Conservation measures for the San Joaquin kit fox*

The FRA and the Authority has proposed to mitigate for the final calculated permanent habitat loss for the San Joaquin kit fox. This will be accomplished through the acquisition of permittee-responsible mitigation sites that will be protected in perpetuity through conservation easements. These lands will be protected and managed for the conservation of the San Joaquin kit fox in perpetuity. These protected lands will provide habitat for breeding, feeding, or sheltering commensurate with or better than habitat lost as a result of the proposed project. As described in the FRA and Authority-prepared Compensatory Mitigation Plan, implementation of the mitigation proposal will preserve natural habitat for the San Joaquin kit fox within core, linkage, and satellite areas identified in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (Service 1998). The proposed permittee-responsible mitigation sites identified in the Compensatory Mitigation Plan (FRA and Authority 2012), which support potential foraging and dispersal habitat for this species, are located within these core, linkage, and satellite areas.

#### *Tipton kangaroo rat*

##### *Effects associated with construction activities*

Mortality, injury, or harassment of Tipton kangaroo rats could occur from being crushed by project related equipment or vehicles, or construction debris within the action area during construction activities. The collapse of small mammal burrows could expose individuals to predation or adverse environmental conditions. Tipton kangaroo rats could fall into trenches, pits, or other excavations, and may be directly killed or unable to escape and be subjected to desiccation, entombment, or starvation. This disturbance and displacement may increase the potential for predation, desiccation, competition for food and shelter, or strike by vehicles on roadways. However, implementation of conservation measures proposed specifically for the Tipton kangaroo rat, such as minimizing the total area disturbed by project activities, conducting pre-construction surveys, and inspecting burrows to make sure individuals are not inadvertently

crushed, providing escape ramps in trenches, and wildlife exclusion fencing will minimize mortality, injury, or harassment.

Construction of the CHST-FB Project will result in the permanent loss of between 367.18 and 453.85 acres of potential habitat for the Tipton kangaroo rat (Table 5). At the time of listing, habitat loss associated with agricultural development was identified as the main factor contributing to the decline of the Tipton kangaroo rat (Service 1988). The *Recovery Plan for Upland Species of the San Joaquin Valley, California* also cited habitat loss as the main reason for the decline for the Tipton kangaroo rat (Service 1998). In addition, the Tipton kangaroo rat is threatened by further habitat loss and fragmentation as a result of infrastructure development (Service 2010b). Between 1997 and 2010, the total of permanent loss of habitat was estimated to be about 14,824 acres (Service 2010b).

As of 2010, the total acreage of lands protected for the Tipton kangaroo rat under conservation easements was estimated to be about 40,700 acres (Service 2010b). Approximately 37 percent of these lands occur within and around the project action area. The PNWR (~ 10,300 acres), managed by the Service, has several small patches of high quality habitat (alkaline plains sparsely covered with annual grasses and saltbush) that could support Tipton kangaroo rat (Service 2010b). The AER (~ 4,936 acres), managed by the CDFW, contains high quality habitat that could support the Tipton kangaroo rat as well (Service 2010b). The CHST-FB Project may cross the AER, depending on the alternative that is finally selected, which could result in loss of habitat for this species within AER, decreased carrying capacity of habitat patches, and potentially subdivide existing populations.

In the event that Tipton kangaroo rats are discovered within the project action area during pre-construction surveys or become accidentally trapped within the project action area, the FRA and the Authority will immediately contact the Service. The FRA and the Authority has agreed to prepare and implement a Service-approved small mammal trapping and relocation plan in general accordance with the survey protocols in the *California Valley Solar Ranch Project: Plan for Relocation of Giant Kangaroo Rats*. Tipton kangaroo rats may become disorientated after translocation, which can result in drastically increased vulnerability to mortality as a result of predation and competition with cohorts for resources (Germano 2010). However, implementation of Service-approved relocation plan will minimize effects of disorientation and the risk of mortality from translocation. In addition, translocation of Tipton kangaroo rats under a Service-approved relocation plan will minimize the risk of mortality as a result of construction activities and assist in expanding existing populations into unoccupied habitat.

#### *Effects associated with operation activities*

Operation of the Fresno to Bakersfield Section may result in injury or mortality to Tipton kangaroo rats within the right-of-way. Security fencing along at-grade tracks will prohibit Tipton kangaroo rats from accessing the right-of-way and at-grade tracks or track ballast. Dedicated wildlife crossings structures specifically designated for use by this species have not been proposed for the CHST-FB Project. However, Tipton kangaroo rats may gain access across the

alignment through any dedicated wildlife crossings intended for San Joaquin kit fox, drainage culverts, or small bridges that may be coincidentally located within their habitat.

There is a high density of dedicated wildlife crossings, small drainage culverts, several bridges, and about 5 to 6 miles of elevated track proposed for the section of the FB HST alignment where this species is most likely to occur. If these structures are located in sections of the HST that intersect with populations of Tipton kangaroo rats they could potentially maintain connectivity for this species. However, the status of the Tipton kangaroo rat within the project action area is not known at this time. Therefore, it is difficult to determine whether these proposed structures will be located in areas that will facilitate movement and maintain connectivity for this species.

If crossing opportunities are inadequate, movement of Tipton kangaroo rat within the project action area may be permanently altered as a result of the construction of at-grade tracks with security fencing in areas where installation of potential crossing structures are not proposed. This may also result in the permanent subdivision of Tipton kangaroo rat populations, fragmentation of habitat, and preclude recolonization of currently unoccupied historic habitat. Loss of connectivity among Tipton kangaroo rat populations among habitats surrounding the project action area may result in increased demographic stochasticity, genetic isolation and inbreeding (Gilpin and Soulé 1986; Soule and Mills 1998; Mills 2007). Restricted movement of Tipton kangaroo rat may limit or entirely prohibit access to suitable habitat, resources, and mates on either side of the HST track.

#### *Exposure to increased noise levels*

The operation of the Fresno to Bakersfield Section may result in additional noise disturbance that may temporarily impair behavioral patterns of this species. According to the proposed schedule for train operations, northbound and southbound trains will travel at least two to three times per hour from 6:00 a.m. to 12:00 a.m. However, noise disturbance from operation of the HST will not occur during nocturnal activities of Tipton kangaroo rats in areas adjacent to the alignment from 12:00 am through 6:00 a.m. (~ 6 hours).

The FRA has established noise exposure limits for all wildlife at a sound exposure level (SEL) of 100 dBA from passing trains. Construction equipment, such as bulldozers, may produce noise in the range of 85 dBA (Burgland and Lindvall 1995). Assuming no intervening structures and maximum speeds of 220 mph, the FRA and the Authority has estimated that 100 dBA SEL will occur within 100 feet from the trackway centerline for at-grade alignments, and estimated 15 feet from the centerline for elevated sections on structures. This noise level is comparable to a helicopter operating at the same distance (Service 2006b). According to the FRA and the Authority, it is expected that the 100 dBA SEL will be exceeded consistently throughout all alternatives within 100 feet of the trackway centerline for at-grade alignments.

Non-auditory communication is important for many mammalian species. Some mammals use vibration by drumming feet, teeth or heads or stamping feet to denote territorial advertisement, agonistic interactions, co-coordinate mating interactions, sub-ordinance and unwillingness to interact, and alert their cohorts to potential danger (Randall and Lewis 1997; Randall 1997;

Randall, 2001.) *Dipodomys* species, such as the Tipton kangaroo rat, are known to use footdrumming as a means of communication and attracting mates (Randall and Lewis 1997; Randall 1997; Randall 2001). These species are also known to have highly-developed auditory senses capable of detecting low-frequency sound. The temporal bone of the kangaroo rat, which is characterized by an enlarged middle ear known as the auditory bulla, is commonly believed to be responsible for the improved low-frequency sensitivity (Shaffer and Long 2004). The Tipton kangaroo rat species are known to have enlarged auditory bulla relative to their small size.

All areas of the HST that are at-grade within suitable habitat are expected to experience increased noise exposure that may exceed the 100 dBA SEL threshold and potentially elicit a temporary startle, avoidance or negative behavior from Tipton kangaroo rats. The increased noise exposure may also interfere with communication and disrupt mating behavior (footdrumming) for this species. Tipton kangaroo rats may vacate habitats located adjacent to the HST in response to the increased exposure to noise and vibration resulting from operation of the HST or, this species may also become adapted to the increased noise exposure and vibration over time. However, there is insufficient information regarding the specific response of Tipton kangaroo rats to exposure to increased noise disturbance and vibration available to the Service at this time. Therefore, it is difficult to anticipate the response of this species and potential for disruption of its natural behaviors such as feeding, breeding, burrowing, and communication among cohorts.

#### *Conservation measures for the Tipton kangaroo rat*

Implementation of the proposed conservation measures will significantly reduce adverse effects to Tipton kangaroo rats during project construction, maintenance, and operational activities. However, some mortality of Tipton kangaroo rats may still occur because they may be difficult for operators of maintenance equipment and vehicles to observe. The CHST-FB Project will result in the permanent loss of up to 453.58 acres of habitat for the Tipton kangaroo rat (Table 5). The FRA and the Authority has proposed to mitigate for the final calculated permanent habitat loss for Tipton kangaroo rat through the acquisition of permittee-responsible mitigation sites within Fresno, Tulare, Kings, and Kern counties that will be protected in perpetuity through conservation easements. These lands will be protected and managed for the conservation of the Tipton kangaroo rat and provide habitat for breeding, feeding, or sheltering commensurate with or better than habitat lost as a result of the proposed project. Several permittee-responsible mitigation sites identified in the Compensatory Mitigation Plan (FRA and Authority 2012) support habitat with documented occurrences of this species are proposed.

#### *Central California tiger salamander*

##### *Effects associated with construction activities*

Mortality, injury, or harassment of central California tiger salamanders may occur from being crushed by project related equipment or vehicles, or construction debris within the action area during construction activities. These small, cryptic animals are at risk from being crushed by project related equipment or vehicles, or construction debris within the action area. The collapse of small mammal burrows could expose individuals to predation or adverse environmental

conditions. Central California tiger salamanders could fall into trenches, pits, or other excavations, and may be directly killed or unable to escape and be subjected to desiccation, entombment, or starvation. Disturbance from construction activities may increase the potential for predation, desiccation, competition for food and shelter, or strike by vehicles on roadways. However, implementation of conservation measures proposed specifically for the central California tiger salamander, such as minimizing the total area disturbed by project activities, conducting pre-construction surveys, and inspecting burrows to make sure individuals are not inadvertently crushed, providing escape ramps in trenches, and wildlife exclusion fencing will minimize mortality, injury, or harassment. Up to 18.7 acres of upland habitat and 18.3 acres of aquatic habitat for the central California tiger salamander will be permanently lost as a result of construction of the CHST-FB Project.

In the event that central California tiger salamanders are discovered during pre-construction surveys or become accidentally trapped within the project action area, the FRA and the Authority will immediately contact the Service. Capture and relocation of central California tiger salamanders is not currently proposed or authorized as a conservation measure for this project.

*FCMS: Construction Activities for Habitat Restoration:*

Construction activities associated with the proposed wetland and riparian restoration will occur within the 405-acre FCMS. Construction activities will occur over a short duration (less than 3 months) during the dry season. Disturbance to upland habitat during construction activities is expected to be minimal within the Vernal Pool Preservation Area because established routes for movement of equipment will be designated and monitored by the Service-approved biologist. Pre-construction surveys for potentially occupied burrows may be used to designate areas to be avoided by construction equipment and workers. However, some central California tiger salamanders that were not detected while inhabiting burrows during preconstruction surveys may suffer injury or mortality if the burrows are crushed by construction equipment. The FRA and the Authority are proposing to develop a plan for relocating central California tiger salamanders from burrows within work areas to burrows in upland habitat that will not be disturbed by construction activities. The relocation plan will be submitted to the Service for review and approval prior to implementation. It is reasonably likely that Central California tiger salamanders will be subject to harassment during the relocation.

Effects to the central California tiger salamander resulting from disturbance generated by use of construction equipment and construction activities are expected to be minimal and temporary because the proposed habitat restoration will occur over a short duration (less than 3 months) during the summer months, and there is sufficient alternative habitat available for use and movement by the this species within the FCMS.

The FRA and the Authority has proposed conservation measures, such as use of Service-approved biological monitors and daily inspections of construction areas to avoid injury and mortality of central California tiger salamander. The FCMS will provide 7.6 acres of preserved vernal habitat, 10 acres of vernal pool restoration, and 365.7 acres of upland habitat to support

breeding, foraging, and sheltering for the central California tiger salamander, and will be protected and managed for the conservation of this species in perpetuity.

*Effects associated with operation activities*

Operation of the Fresno to Bakersfield Section may result in injury or mortality to central California tiger salamanders within the right-of-way. Security fencing along at-grade tracks will prohibit central California tiger salamanders from accessing the right-of-way and at-grade tracks or track ballast. Dedicated wildlife crossings structures specifically designated for use by this species have not been proposed for the CHST-FB Project. However, central California tiger salamanders may gain access under the alignment through any dedicated wildlife crossings intended for San Joaquin kit fox, drainage culverts, or small bridges that may be coincidentally located within their habitat.

Movement of central California tiger salamanders within the project action area may be permanently altered as a result of the construction of at-grade tracks with security fencing in areas where installation of potential crossing structures are not proposed. This may also result in the permanent subdivision of central California tiger salamander populations, fragmentation of habitat, and preclude recolonization of currently unoccupied historic habitat.

Implementation of the proposed conservation measures will significantly reduce adverse effects to central California tiger salamanders during project construction, maintenance, and operational activities. However, some mortality of central California tiger salamanders may still occur because they may be difficult for operators of maintenance equipment and vehicles to observe.

*Conservation measures for the central California tiger salamander*

Implementation of the proposed conservation measures will significantly reduce adverse effects to Central California tiger salamanders during project construction, maintenance, and operational activities. However, some mortality of central California tiger salamanders may still occur because they may be difficult for operators of maintenance equipment and vehicles to observe.

The CHST-FB Project will result in the permanent loss of up to 18.7 acres of upland habitat and 18.3 acres of aquatic habitat for the central California tiger salamander (Table 5). The FRA and the Authority has proposed to mitigate for the final calculated permanent habitat loss for central California tiger salamander through the purchase of mitigation credits at an approved conservation bank or the acquisition of permittee-responsible mitigation sites within Fresno, Tulare, Kings, and Kern counties that will be protected in perpetuity through conservation easements. These lands will be protected and managed for the conservation of the central California tiger salamander and provide habitat for breeding, feeding, or sheltering commensurate with or better than habitat lost as a result of the proposed project. The proposed permittee-responsible mitigation sites identified in the Compensatory Mitigation Plan (FRA and Authority 2012) may support suitable breeding and aestivation habitat with documented occurrences of this species in all of its life stages.

*Blunt-nosed leopard lizard**Effects associated with construction activities*

Mortality, injury, or harassment of blunt-nosed leopard lizards may occur from being crushed by project related equipment or vehicles, or construction debris within the action area during construction activities. These small animals are at risk from being crushed by project related equipment or vehicles, or construction debris within the action area. The collapse of small mammal burrows could expose individuals to predation or adverse environmental conditions. Blunt-nosed leopard lizards could fall into trenches, pits, or other excavations, and may be directly killed or unable to escape and be subjected to desiccation, entombment, or starvation. Disturbance and displacement may increase the potential for predation, desiccation, competition for food and shelter, or strike by vehicles on roadways. However, implementation of conservation measures proposed specifically for the blunt-nosed leopard lizard, such as minimizing the total area disturbed by project activities, conducting pre-construction surveys, daily clearance surveys, and inspecting burrows to make sure individuals are not inadvertently crushed, providing escape ramps in trenches, and wildlife exclusion fencing will minimize mortality, injury, or harassment.

Access to suitable habitat such as alkali desert scrub, annual grasslands, and barren habitats will become restricted or permanently lost due to permanent structures associated with the CHST-FB Project. Movement of blunt-nosed leopard lizards within the project action may be altered as a result of these effects.

*Effects associated with operation activities*

Operation of the Fresno to Bakersfield Section may result in injury or mortality to blunt-nosed leopard lizards within the right-of-way. However, security fencing along at-grade tracks will prohibit blunt-nosed leopard lizards from accessing the right-of-way and at-grade tracks or track ballast. Dedicated wildlife crossings structures specifically designated for use by this species have not been proposed for the CHST-FB Project. However, blunt-nosed leopard lizards may gain access across the alignment through any dedicated wildlife crossings intended for San Joaquin kit fox, drainage culverts, or small bridges that may happen to be constructed within their habitat.

Movement of blunt-nosed leopard lizards within the project action area may be permanently altered as a result of the construction of at-grade tracks with security fencing in areas where installation of potential crossing structures are not proposed. This may also result in the permanent subdivision of blunt-nosed leopard lizard populations, fragmentation of habitat, and preclude recolonization of currently unoccupied historic habitat. Loss of connectivity among blunt-nosed leopard lizard populations among habitats surrounding the project action area may result in increased demographic stochasticity, genetic isolation and inbreeding (Gilpin and Soule 1986; Soule and Mills 1998; Mills 2007). Restricted movement of blunt-nosed leopard lizards may limit or entirely prohibit access to suitable habitat, resources, and mates on either side of the HST track. Mortality of blunt-nosed leopard lizards may occur because the species may be

difficult for operators of maintenance equipment and vehicles to observe. However, implementation of the proposed conservation measures will significantly reduce adverse effects, including mortality, to blunt-nosed leopard lizards during project construction, maintenance, and operational activities.

*Conservation measures for the blunt-nosed leopard lizard*

Implementation of the proposed conservation measures will significantly reduce adverse effects to blunt-nosed leopard lizards during project construction, maintenance, and operational activities. However, some mortality of blunt-nosed leopard lizards may still occur because they may be difficult for operators of maintenance equipment and vehicles to observe. The CHST-FB Project will result in the permanent loss of up to 98.06 acres of suitable habitat for the blunt-nosed leopard lizards (Table 5). The FRA and the Authority has proposed to mitigate for the final calculated permanent habitat loss for blunt-nosed leopard lizard through the acquisition of permittee-responsible mitigation sites within Fresno, Tulare, Kings, and Kern counties that will be protected in perpetuity through conservation easements. These lands will be protected and managed for the conservation of the blunt-nosed leopard lizard and provide habitat for breeding, feeding, or sheltering commensurate with or better than habitat lost as a result of the proposed project. Several permittee-responsible mitigation sites identified in the Compensatory Mitigation Plan (FRA and Authority 2012) support habitat with documented occurrences of this species are proposed.

*Vernal pool habitat for vernal pool fairy shrimp and vernal pool tadpole shrimp*

For the purposes of the impact assessment for vernal pool habitat for vernal pool fairy shrimp and vernal pool tadpole shrimp, the FRA and the Authority has considered that permanent effects will occur as a result of excavation or fill to vernal pool habitat within the footprint of the HST, and any vernal pool habitat within 250 feet of the footprint. Adverse effects from HST construction and operation activities will be caused by erosion, soil compaction, increased siltation/sedimentation, fractures in the hardpan soils, destruction of native vegetation, and significant alteration of hydrology for vernal pools or seasonal wetlands that provide habitat for vernal pool species. The hydrology of vernal pools may be altered from the loss of a watershed, up-slope destruction of the water restricting layer, and changes in surface topography. Published scientific works conducted in vernal pool complexes have shown that vernal pools depend not just on rain falling into the pool basin and water flowing overland, but also water flowing below the soil surface (Rains et al. 2006; Rains et al. 2008; Williamson et al. 2005). The proposed project may result in up-slope and or down-slope destruction of the water restricting soil layers and changes in surface topography. When functioning properly, this perched groundwater system flows from the upland landscape to vernal pools and stabilizes vernal pool water levels, causing them to be inundated over larger areas for longer period of time than will be the case if they were recharged only by precipitation (Rains et al. 2006). This subsurface flow occurs on top of the claypan or hardpan that equipment has been perforated or excavated. Excavation of areas with higher elevation inter-mound areas or hardpan perforation in lower areas effectively serves to drain this water from the soil before it enters the vernal pools. Therefore, alteration of the



hydrology of vernal pool habitat for the vernal pool fairy shrimp and the vernal pool tadpole shrimp are reasonably likely to occur as a result of the proposed project.

Further effects to vernal pool habitat include the introduction or further spread of invasive plant species that could potentially affect pool hydrology, and long-term degradation of both vernal pool and upland plant communities. It may be difficult to limit the spread of existing non-native plant species within vernal pool habitat during construction activities. Some invasive species may inadvertently be introduced through seeds carried on workers clothing and footwear. However, the introduction of plant species into vernal pool and wetland habitat by construction equipment and vehicles will be limited, to the maximum extent feasible, through implementation of the WCP. All disturbed areas of upland habitat will be restored and revegetated with native plants and seeds following construction under the guidance of the RRP. Construction vehicles and equipment will be limited to existing roads and other developed areas within the construction footprint.

The implementation of BMPs and the Stormwater Pollution Prevention Plan will avoid adverse effects from fuel or chemical spills, sedimentation, erosion, hydromodification and runoff from construction areas into vernal pool and wetland habitat for the vernal pool species. Therefore, adverse effects to vernal pool habitat from spills, sedimentation, and runoff are not expected to occur.

#### *Effects associated with construction and operation activities*

Vernal pool habitat occurs within the project action area that may be suitable for vernal pool fairy shrimp and vernal pool tadpole shrimp. The Service anticipates that direct and indirect effects to these species will occur in areas where vernal pool habitat is identified within the project action area. Effects to each of these listed branchiopod species was calculated by summing the acreage of potentially suitable vernal pool habitats within the project action area, and linking these habitats to CNDDDB records for each species within specific USGS 7.5-minute quadrangles as they occur within the Fresno to Bakersfield Section of the HST. The construction and operation of the Fresno to Bakersfield Section may result in direct effects on populations of vernal pool fairy shrimp and vernal pool tadpole shrimp through degradation or loss of seasonally inundated depressions such as vernal pools that support the reproductive cycle of these species. Direct adverse effects, such as harm or mortality from heavy equipment, may also occur during construction of the CHST-FB Project. Construction of the CHST-FB Project may result in disruption of upland areas surrounding vernal pool branchiopod habitat that will alter water retention and flow within the landscape and influence the timing and intensity of inundation necessary to support the life cycle of these species.

#### *Conservation measures for the vernal pool fairy shrimp and the vernal pool tadpole shrimp*

Implementation of the proposed conservation measures, such as installation of exclusion fencing around vernal pool habitat, and use of erosion control materials, will reduce adverse effects to the vernal pool fairy shrimp and the vernal pool tadpole shrimp during project construction, maintenance, and operations. It is expected that all vernal pool and wetland habitat for the vernal

pool fairy shrimp and the vernal pool tadpole shrimp within the project footprint and 250 feet of the footprint will be permanently lost as a result of the direct and indirect effects that will occur from construction of the HST. Up to 29.77 acres of suitable vernal pool habitat for the vernal pool fairy shrimp and 0.0041 acre for the vernal pool tadpole shrimp may be permanently lost as a result of the proposed CHST-FB Project (Table 5). The FRA and the Authority has proposed to mitigate for the final calculated permanent habitat loss resulting from direct effects to vernal pool habitat within the project footprint and indirect effects to vernal pool habitat within 250-feet of the project footprint for the vernal pool fairy shrimp and the vernal pool tadpole shrimp through acquisition of permittee-responsible mitigation sites within Fresno, Tulare, Kings, and Kern counties that will be protected in perpetuity through conservation easements and/or through purchase of credits at a Service-approved conservation banks. These lands will be protected and managed for the conservation of the vernal pool fairy shrimp and the vernal pool tadpole shrimp and provide habitat for breeding, feeding, or sheltering commensurate with or better than habitat lost as a result of the proposed project.

#### *Valley elderberry longhorn beetle*

Up to 36 elderberry shrubs are estimated to potentially occur within the project action area. All elderberry shrubs within the project action area may be lost and will be subject to Service transplanted guidelines *Conservation Guidelines for the Valley Elderberry Longhorn Beetle* (Service 1999a) (Table 7). Surveys for the valley elderberry longhorn beetle and suitable habitat for this species have not been completed throughout most of the project action area because of limited access.

#### *Effects associated with construction and operation activities*

Negative effects to elderberry shrubs may directly affect the survival of valley elderberry longhorn beetle because they are host-specific to this plant species. Valley elderberry longhorn beetle populations may be temporarily affected, both directly and indirectly, by construction, maintenance, and operational activities within the project action area. Construction, maintenance, and operational activities may result in direct effects on valley elderberry longhorn beetle through the removal or partial destruction of elderberry shrubs within the project action area. Valley elderberry longhorn beetle mortality may occur from collisions or crushing by vehicles, equipment, human destruction or disturbance of occupied elderberry shrubs, or destruction of native riparian habitat. The construction footprint and areas extending up to 100 feet from the edge of the project footprint have the potential to directly and indirectly affect elderberry shrubs and thus potential habitat for valley elderberry longhorn beetle. However, the extent of effects to valley elderberry longhorn beetle will be determined through the number of elderberry shrubs and stems that will actually be directly or indirectly affected.

#### *Conservation measures for the valley elderberry longhorn beetle*

Implementation of the proposed conservation measures will significantly reduce adverse effects to the valley elderberry longhorn beetle during project construction, maintenance, and operations. The FRA and the Authority will follow compensatory mitigation measures provided within the

*Conservation Guidelines for the Valley Elderberry Longhorn Beetle* (Table 7) (Service 1999a). The Authority has proposed to implement compensatory mitigation for this species at several permittee-responsible mitigation sites identified in the Compensatory Mitigation Plan (FRA and Authority 2012). These sites, located within Fresno, Tulare, Kings, and Kern counties, will be acquired, protected in perpetuity through conservation easements, protected and managed for the conservation of valley elderberry longhorn beetle, and provide habitat for breeding, feeding, or sheltering commensurate with or better than habitat lost as a result of the proposed project. Implementation of these mitigation measures and proposed revegetation of disturbed areas will enhance and protect habitat that will support the survival and recovery of the valley elderberry longhorn beetle.

**Table 7. Summary of proposed compensation for permanent effects to suitable habitat for the Valley elderberry longhorn beetle.<sup>a</sup>**

Stem Size Class (maximum diameter at ground level, in inches)	Exit Holes on Shrub <sup>b</sup>	Elderberry Seedling/Cutting Ratio <sup>c</sup>	Associated Native Plant Ratio <sup>d</sup>
<b>Riparian Habitat</b>			
Stems 1 to 3	Yes	1:1	1:1
	No	2:1	2:1
Stems 3 to 5	Yes	2:1	1:1
	No	4:1	2:1
Stems > 5	Yes	3:1	1:1
	No	6:1	2:1
<b>Non-Riparian Habitat</b>			
Stems 1 to 3	Yes	2:1	1:1
	No	4:1	2:1
Stems 3 to 5	Yes	3:1	1:1
	No	6:1	2:1
Stems > 5	Yes	4:1	1:1
	No	8:1	2:1

<sup>a</sup> Compensation was determined following the guidelines in the *Conservation Guidelines for the Valley Elderberry Longhorn Beetle* (Service 1999a).

<sup>b</sup> All stems measuring at least 1 inch in diameter at ground level on a single shrub are considered occupied when exit holes are present anywhere on the shrub.

<sup>c</sup> Ratios in the *Elderberry Seedling Ratio* column correspond to the number of cuttings or seedlings to be planted per elderberry stem (at least 1 inch in diameter at ground level) affected by the proposed project.

<sup>d</sup> Ratios in the *Associated Native Plant Ratio* column correspond to the number of associated native species to be planted per elderberry (seedling or cutting) planted.

### *California jewelflower, Hoover's spurge, Kern mallow, and San Joaquin woolly-threads*

Direct and indirect effects to California jewelflower, Hoover's spurge, Kern mallow, and San Joaquin woolly-threads will be presumed where suitable habitat occurs within the project action area. Effects to each of these listed plant species were calculated by summing the acreage of potentially suitable habitats within the project footprint that occur within the range of each species. The proposed project will result in the permanent loss of potentially suitable habitat for

for the California jewelflower (up to 15 acres), the Hoover's spurge (up to 6.35 acres), the Kern mallow (up to 214 acres), and the San Joaquin woolly-threads (up to 489.34 acres) (Table 5).

*Effects associated with construction activities*

Construction of the Fresno to Bakersfield Section may result in adverse effects to small, isolated populations of California jewelflower, Hoover's spurge, Kern mallow, and San Joaquin woolly-threads that occur within the project footprint. Suitable habitat for these plants within the project action area will be permanently affected through the spread of non-native invasive plant species introduced as seeds and propagules. The introduction and/or spread of non-native plants increase competition for resources (i.e., sun, water, soil nutrients), which may negatively affect flowering success, pollination, seeding, and germination (Gerhardt and Collinge 2003). The introduction of non-native plant species may also significantly alter habitat heterogeneity by out-competing native plants, thereby further facilitating successful invasion of the non-natives. Successful invasion of non-native plant species could result in permanent degradation of suitable habitat for the California jewelflower, Hoover's spurge, Kern mallow, and San Joaquin woolly-threads and negatively affect the fitness of populations that occur within the project footprint.

*Effects associated with operation and maintenance activities*

In some areas, where the track is at-grade and drainage swales will be constructed, suitable habitat for California jewelflower, Hoover's spurge, Kern mallow, and San Joaquin woolly-threads may occur within the operational right-of-way. If the right-of-way becomes recolonized by these plant species, the species may be directly affected by operation and maintenance in a similar manner as described for construction. California jewelflower, Hoover's spurge, Kern mallow, San Joaquin woolly-threads, and other native vegetation will be allowed to reestablish after construction in areas associated with temporary construction easements from the natural soil seed bank. If operation and maintenance activities occur adjacent to locations where any of these species have recolonized adjacent to the right-of-way, indirect effects similar to those described for construction activities may occur during maintenance activities.

*Conservation measures for California jewelflower, Hoover's spurge, Kern mallow, and San Joaquin woolly-threads*

Implementation of the proposed conservation measure, such as installation of exclusion fencing, and use of erosion control materials, will reduce adverse effects to California jewelflower, Hoover's spurge, Kern mallow, and San Joaquin woolly-threads during project construction, maintenance, and operations. It is expected that all suitable habitat for the California jewelflower, Hoover's spurge, Kern mallow, and San Joaquin woolly-threads within the project footprint (and 250 feet of the footprint for vernal pool habitat for the Hoover's spurge) will be permanently lost as a result of the direct and indirect effects that will occur from construction of the HST.

The FRA and the Authority has proposed to mitigate for the actual permanent loss of occupied habitat for the California jewelflower, the Hoover's spurge, the Kern mallow, and the San Joaquin woolly-threads (as identified by conservation measure #5 for the California jewelflower,

the Hoover's spurge, the Kern mallow, and the San Joaquin woolly-threads) through a combination of (1) acquisition of permittee-responsible mitigation sites within Fresno, Kings, Tulare, and Kern counties that will be protected in perpetuity through conservation easements; and (2) placement of seeds and plant materials at either Pixley National Wildlife Refuge, Allensworth Ecological Reserve/State Historic Park, Kern National Wildlife Refuge, Atwell Island, Alkali Sink Ecological Reserve, Semitropic Ecological Reserve, Kern Water Bank, or other locations approved by the Service under a Service-approved plan as described in conservation measure # 1 for the California jewelflower, the Hoover's spurge, the Kern mallow, and the San Joaquin woolly-threads. These lands will be protected and managed for the conservation of the California jewelflower, Hoover's spurge, Kern mallow, and San Joaquin woolly-threads and provide suitable habitat for these species commensurate with, or better than, habitat lost as a result of the proposed project.

The proposed permittee-responsible mitigation sites identified in the Compensatory Mitigation Plan (FRA and Authority 2012) will be located within core areas identified in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* and the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (Service 1998 and 2005). The protection of both occupied and suitable habitat within these core areas is identified as important criteria for the delisting and/or recovery of these species. Implementing the mitigation proposal described in the Compensatory Mitigation Plan (FRA and Authority 2012) will preserve and restore suitable habitat in the same recovery area affected by constructing and operating the CHST-FB Project.

### **Cumulative Effects**

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

While we are not aware of any specific non-federal actions that are reasonably likely to occur in the 48,452-acre project action area, we believe it is reasonable to assume that land use changes will continue within the project action area that will be more detrimental than beneficial to habitat for the Federally listed species considered in this biological opinion. The Service does not have specific information regarding future non-federal actions within the project action area. However, increased agriculture, urbanization, and human development is reasonably likely to result in increased loss of habitat and a reduction in available food resources to support these species.

### **Conclusion**

#### *San Joaquin kit fox*

Even with the implementation of the proposed Conservation Measures, the Service still believes that there is a likelihood of take of San Joaquin kit fox from the proposed project. However, after reviewing the current status of the San Joaquin kit fox, the environmental baseline for the

action area, the effects of the proposed project, and the cumulative effects, it is the Service's biological opinion that the CHST-FB Project, as proposed, is not likely to jeopardize the continued existence of this listed species. Based on the proposed project design and all of the conservation measures, the amount of incidental take anticipated is small relative to the rangewide condition of the species. The project, as proposed, is not likely to restrict or preclude movement among San Joaquin kit fox populations. The protection of habitats within the permittee-responsible mitigation sites as identified in the Compensatory Mitigation Plan (FRA and Authority 2012) will minimize the effect on the San Joaquin kit fox from incidental take resulting from permanent habitat loss. Permanent protection of these lands through conservation easements will provide beneficial effects for this species and contribute to its survival and recovery.

*Tipton kangaroo rat*

Even with the implementation of the proposed Conservation Measures, the Service still believes that there is a likelihood of take of Tipton kangaroo rat from the proposed project. However, after reviewing the current status of the Tipton kangaroo rat, the environmental baseline for the action area, the effects of the proposed project, and the cumulative effects, it is the Service's biological opinion that the CHST-FB Project, as proposed, is not likely to jeopardize the continued existence of this listed species. Based on the proposed project design and all of the conservation measures, the amount of incidental take anticipated is small relative to the rangewide condition of the species. The protection of habitats within the permittee-responsible mitigation sites as identified in the Compensatory Mitigation Plan (FRA and Authority 2012) will minimize the effect on the Tipton kangaroo rat from incidental take resulting from permanent habitat loss. Permanent protection of these lands through conservation easements will provide beneficial effects for this species and contribute to its survival and recovery.

*Central California tiger salamander*

Even with the implementation of the proposed Conservation Measures, the Service still believes that there is a likelihood of take of central California tiger salamander from the proposed project. However, after reviewing the current status of the central California tiger salamander, the environmental baseline for the action area, the effects of the proposed project, and the cumulative effects, it is the Service's biological opinion that the CHST-FB Project, as proposed, is not likely to jeopardize the continued existence of this listed species. Based on the proposed project design and all of the conservation measures, the amount of incidental take anticipated is small relative to the rangewide condition of the species. The protection of habitats within the permittee-responsible mitigation sites as identified in the Compensatory Mitigation Plan (FRA and Authority 2012) will minimize the effect on the central California tiger salamander from incidental take resulting from permanent habitat loss. Permanent protection of these lands through conservation easements will provide beneficial effects for this species and contribute to its survival and recovery.

*Blunt-nosed leopard lizard*

Even with the implementation of the proposed Conservation Measures, the Service still believes that there is a likelihood of take of blunt-nosed leopard lizard from the proposed project. However, after reviewing the current status of the blunt-nosed leopard lizard, the environmental baseline for the action area, the effects of the proposed project, and the cumulative effects, it is the Service's biological opinion that the CHST-FB Project, as proposed, is not likely to jeopardize the continued existence of this listed species. Based on the proposed project design and all of the conservation measures, the amount of incidental take anticipated is small relative to the rangewide condition of the species. The protection of habitats within the permittee-responsible mitigation sites as identified in the Compensatory Mitigation Plan (FRA and Authority 2012) will minimize the effect on the blunt-nosed leopard lizard from incidental take resulting from permanent habitat loss. Permanent protection of these lands through conservation easements will provide beneficial effects for this species and contribute to its survival and recovery.

*Vernal pool fairy shrimp and vernal pool tadpole shrimp*

Even with the implementation of the proposed Conservation Measures, the Service still believes that there is a likelihood of take of the vernal pool fairy shrimp and the vernal pool tadpole shrimp from the proposed project. However, after reviewing the current status of the vernal pool fairy shrimp and the vernal pool tadpole shrimp, the environmental baseline for the action area, the effects of the proposed project, and the cumulative effects, it is the Service's biological opinion that the CHST-FB Project, as proposed, is not likely to jeopardize the continued existence of this listed species. Based on the proposed project design and all of the conservation measures, the amount of incidental take anticipated is small relative to the rangewide condition of the species. The protection of habitats within the permittee-responsible mitigation sites as identified in the Compensatory Mitigation Plan (FRA and Authority 2012) will minimize the effect on the vernal pool fairy shrimp and the vernal pool tadpole shrimp from incidental take resulting from permanent habitat loss. Permanent protection of these lands through conservation easements will provide beneficial effects for this species and contribute to its survival and recovery.

*Valley elderberry longhorn beetle*

Even with the implementation of the proposed Conservation Measures, the Service still believes that there is a likelihood of take of the valley elderberry longhorn beetle from the proposed project. However, after reviewing the current status of the valley elderberry longhorn beetle, the environmental baseline for the action area, the effects of the proposed project, and the cumulative effects, it is the Service's biological opinion that the CHST-FB Project, as proposed, is not likely to jeopardize the continued existence of this listed species. Based on the proposed project design and all of the conservation measures, the amount of incidental take anticipated is small relative to the rangewide condition of the species. The protection of habitats within the permittee-responsible mitigation sites as identified in the Compensatory Mitigation Plan (FRA and Authority 2012) will minimize the effect on the valley elderberry longhorn beetle from incidental

take resulting from permanent habitat loss. Permanent protection of these lands through conservation easements will provide beneficial effects for this species and contribute to its survival and recovery.

*California jewelflower*

Even with the implementation of the proposed Conservation Measures, the Service still believes that there is a likelihood of adverse effects to the California jewelflower from the proposed project. However, after reviewing the current status of the California jewelflower, the environmental baseline for the action area, the effects of the proposed project, and the cumulative effects, it is the Service's biological opinion that the CHST-FB Project, as proposed, is not likely to jeopardize the continued existence of this listed species. Based on the proposed project design and all of the conservation measures, the amount of adverse effects anticipated will be minimal. The protection of habitats within the permittee-responsible mitigation sites as identified in the Compensatory Mitigation Plan (FRA and Authority 2012) will minimize the effect on the California jewelflower from adverse effects resulting from permanent habitat loss. Permanent protection of these lands through conservation easements will provide beneficial effects for this species and contribute to its survival and recovery.

*Hoover's spurge*

Even with the implementation of the proposed Conservation Measures, the Service still believes that there is a likelihood of adverse effects to the Hoover's spurge from the proposed project. However, after reviewing the current status of the Hoover's spurge, the environmental baseline for the action area, the effects of the proposed project, and the cumulative effects, it is the Service's biological opinion that the CHST-FB Project, as proposed, is not likely to jeopardize the continued existence of this listed species. Based on the proposed project design and all of the conservation measures, the amount of adverse effects anticipated will be minimal. The protection of habitats within the permittee-responsible mitigation sites as identified in the Compensatory Mitigation Plan (FRA and Authority 2012) will minimize the effect on the Hoover's spurge from adverse effects resulting from permanent habitat loss. Permanent protection of these lands through conservation easements will provide beneficial effects for this species and contribute to its survival and recovery.

*Kern mallow*

Even with the implementation of the proposed Conservation Measures, the Service still believes that there is a likelihood of adverse effects to the Kern mallow from the proposed project. However, after reviewing the current status of the Kern mallow, the environmental baseline for the action area, the effects of the proposed project, and the cumulative effects, it is the Service's biological opinion that the CHST-FB Project, as proposed, is not likely to jeopardize the continued existence of this listed species. Based on the proposed project design and all of the conservation measures, the amount of adverse effects anticipated will be minimal. The protection of habitats within the permittee-responsible mitigation sites as identified in the Compensatory Mitigation Plan (FRA and Authority 2012) will minimize the effect on the Kern



allow from adverse effects resulting from permanent habitat loss. Permanent protection of these lands through conservation easements will provide beneficial effects for this species and contribute to its survival and recovery.

### *San Joaquin woolly-threads*

Even with the implementation of the proposed Conservation Measures, the Service still believes that there is a likelihood of adverse effects to the San Joaquin woolly-threads from the proposed project. However, after reviewing the current status of the San Joaquin woolly-threads, the environmental baseline for the action area, the effects of the proposed project, and the cumulative effects, it is the Service's biological opinion that the CHST-FB Project, as proposed, is not likely to jeopardize the continued existence of this listed species. Based on the proposed project design and all of the conservation measures, the amount of adverse effects anticipated will be minimal. The protection of habitats within the permittee-responsible mitigation sites as identified in the Compensatory Mitigation Plan (FRA and Authority 2012) will minimize the effect on the San Joaquin woolly-threads from adverse effects resulting from permanent habitat loss. Permanent protection of these lands through conservation easements will provide beneficial effects for this species and contribute to its survival and recovery.

## **INCIDENTAL TAKE STATEMENT**

Section 9(a)(1) of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened fish and wildlife species without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by impairing behavioral patterns including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with this Incidental Take Statement.

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

**Amount or Extent of Take***San Joaquin kit fox*

It is not possible to quantify the number of individual San Joaquin kit foxes that will be taken as a result of the proposed project because this species is relatively sparsely distributed and we believe that the number of individuals foxes impacted will be relatively small. Therefore, the amount of habitat for this species that will be impacted as a result of the CHST-FB Project will be used as a surrogate for quantifying take. The Service anticipates that any San Joaquin kit foxes that may be in the section of the action area undergoing construction at any given time, a total area of 11,941 acres (including the project footprint, areas within 200 feet of the project footprint, and the 405-acre FCMS) will be harassed by project activities in areas undergoing construction, operations, and maintenance activities which will result in the likelihood of injury by annoying foxes to such an extent as to significantly disrupt normal behavior patterns. In addition, the Service anticipates that 755 acres of highly suitable habitat will be directly impacted and permanently lost as a result of the CHST-FB Project alignment resulting in harm to the species by significantly impairing essential behaviors, including breeding foraging, and denning. Upon implementation of the Reasonable and Prudent Measures, incidental take associated with the CHST-FB Project in the form of harassment over 11,941 acres, and harm of the San Joaquin kit fox caused by the loss of 755 acres of highly suitable habitat, will become exempt from the prohibitions described under section 9 of the Act.

*Tipton kangaroo rat*

It is not possible to quantify the number of individual Tipton kangaroo rats that will be impacted as a result of the proposed project because the number of individuals within the project action area is unknown. The anticipated loss of individuals of this species also may be difficult to quantify due to seasonal fluctuations in their numbers, random environmental events, changes in their habitat, or additional environmental disturbances. Therefore, the amount of habitat for this species that will be impacted as a result of the CHST-FB Project will be used as a surrogate for quantifying take. The Service anticipates that up to 453.85 acres of suitable habitat for the Tipton kangaroo rat will be permanently lost as a result of the CHST-FB Project. Upon implementation of the Reasonable and Prudent Measures, these levels of incidental take associated with the CHST-FB Project in the form of harm, harassment, capture, injury, and death of the Tipton kangaroo rat caused by habitat loss and construction activities will become exempt from the prohibitions described under section 9 of the Act.

*Central California tiger salamander*

It is not possible to quantify the number of individual central California tiger salamanders that will be impacted as a result of the proposed project because the number of individuals within the project action area is unknown. The anticipated loss of individuals of this species also may be difficult to quantify due to seasonal fluctuations in their numbers, random environmental events, changes in their habitat, or additional environmental disturbances. Therefore, the amount of habitat for this species that will be impacted as a result of the CHST-FB Project will be used as a

surrogate for quantifying take. The Service anticipates that up to 18.7 acres of upland habitat and 18.3 acres of aquatic habitat for the central California tiger salamander will be permanently lost as a result of the CHST-FB Project. Temporary effects of construction activities associated with proposed habitat restoration within the 405-acre FCMS may result in harassment of central California tiger salamanders. Some individuals may suffer mortality during construction activities associated with proposed habitat restoration. Individuals may also be subject to harm and harassment if they are captured and relocated outside of the Vernal Pool Preservation Area during inoculum collection or the Vernal Pool Restoration Area during land contouring. In addition, permanent loss of 10 acres of upland habitat that will be converted to vernal pool habitat at the FCMS. Upon implementation of the Reasonable and Prudent Measures, these levels of incidental take associated with the CHST-FB Project in the form of harm, harassment, capture, injury, and death of the central California tiger salamander caused by habitat loss and construction activities will become exempt from the prohibitions described under section 9 of the Act.

*Blunt-nosed leopard lizard*

It is not possible to quantify the number of individual blunt-nosed leopard lizards that will be impacted as a result of the proposed project because the number of individuals within the project action area is unknown. The anticipated loss of individuals of this species also may be difficult to quantify due to seasonal fluctuations in their numbers, random environmental events, changes in their habitat, or additional environmental disturbances. Therefore, the amount of habitat for this species that will be impacted as a result of the CHST-FB Project will be used as a surrogate for quantifying take. The Service anticipates that up to 98.06 acres of suitable habitat for the blunt-nosed leopard lizard will be permanently lost as a result of the CHST-FB Project. Upon implementation of the Reasonable and Prudent Measures, these levels of incidental take associated with the CHST-FB Project in the form of harm, harassment, capture, injury, and death of the blunt-nosed leopard lizard caused by habitat loss and construction activities will become exempt from the prohibitions described under section 9 of the Act.

*Vernal pool fairy shrimp and vernal pool tadpole shrimp*

It is not possible to quantify the number of individual vernal pool fairy shrimp and vernal pool tadpole shrimp that will be taken as a result of the proposed project. The anticipated loss of individuals of this species also may be difficult to quantify due to seasonal fluctuations in their numbers, random environmental events, changes in water regime at their vernal pool habitat, or additional environmental disturbances. Therefore, the quantity of acres of habitat for this species impacted by the project will be used as a surrogate for quantifying take. The Service anticipates that up to 29.77 acres of vernal pool habitat suitable for vernal pool fairy shrimp and 0.0041 acre of vernal pool habitat suitable for vernal pool tadpole shrimp will be permanently lost as a result of the CHST-FB Project. Upon implementation of the Reasonable and Prudent Measures, these levels of incidental take associated with the CHST-FB Project in the form of harm, harassment, capture, injury, and death of the vernal pool fairy shrimp and vernal pool tadpole shrimp caused by habitat loss and construction activities will become exempt from the prohibitions described under section 9 of the Act.

*Valley elderberry longhorn beetle*

It is not possible to quantify the number of individual valley elderberry longhorn beetles will be taken as a result of the proposed project. The anticipated loss of individuals of this species also may be difficult to quantify due to seasonal fluctuations in their numbers, random environmental events, changes in their habitat, or additional environmental disturbances. Therefore, the number of elderberry shrubs that will be impacted will be used as a surrogate for quantifying take. The Service anticipates that up to 36 elderberry shrubs for the valley elderberry longhorn beetle will be permanently lost as a result of the CHST-FB Project. Upon implementation of the Reasonable and Prudent Measures, these levels of incidental take associated with the CHST-FB Project in the form of harm, harassment, capture, injury, and death of the valley elderberry longhorn beetle caused by habitat loss and construction activities will become exempt from the prohibitions described under section 9 of the Act.

**Effect of the Take**

The Service has determined this level of anticipated take is not likely to result in jeopardy to the San Joaquin kit fox, the Tipton kangaroo rat, the central California tiger salamander, the blunt-nosed leopard lizard, the vernal pool fairy shrimp, the vernal pool tadpole shrimp, and the valley elderberry longhorn beetle.

**Reasonable and Prudent Measure**

The Service has determined that the following reasonable and prudent measure is necessary and appropriate to minimize and avoid effects of the CHST-FB Project on the San Joaquin kit fox, the Tipton kangaroo rat, the central California tiger salamander, the blunt-nosed leopard lizard, the vernal pool fairy shrimp, the vernal pool tadpole shrimp, and the valley elderberry longhorn beetle:

All of the conservation measures as proposed by the FRA and the Authority in the biological assessment, and restated in the project description section of this biological opinion, must be fully implemented and adhered to.

**Terms and Conditions**

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

1. The FRA and the Authority shall ensure that the FRA and the Authority and all of its contractors fully implement and adhere to the proposed conservation measures. All terms and conditions that apply to contractor activities shall be conditioned in contracts for the work.

2. In order to monitor whether the amount or extent of incidental take anticipated from implementation of the project is approached or exceeded, the FRA and the Authority shall adhere to the following reporting requirements. Should this anticipated amount or extent of incidental take be exceeded, the FRA and the Authority must immediately reinitiate formal consultation as per 50 CFR 402.16.
  - a. For those components of the action that will result in habitat degradation or modification whereby incidental take in the form of harm is anticipated, the FRA and the Authority shall provide monthly updates to the Service with a precise accounting of the total acreage when the following habitats are impacted: (1) habitat for the San Joaquin kit fox (Table 4) (2) habitat for the Tipton kangaroo rat (Table 5); (3) upland habitat for the California tiger salamander (Table 5); (4) habitat for the blunt-nosed leopard lizard (Table 5); (5) vernal pool habitat for vernal pool species (Table 5); and (6) actual number of elderberry shrubs and stems for the valley elderberry longhorn beetle (Table 5). Updates shall also include any information about changes in project implementation that result in habitat disturbance not described in the *Description of the Proposed Action* and not analyzed in this biological opinion.
  - b. For those components of the action that may result in direct encounters between listed wildlife species and project workers and their equipment whereby incidental take in the form of harassment, harm, injury, or death is anticipated, the FRA and the Authority shall immediately contact the Service's SFWO at (916) 414-6600, to report the encounter. If an encounter occurs after normal working hours, the FRA shall contact the SFWO at the earliest possible opportunity the next working day. When injured or killed individuals of the listed species are found, the FRA shall follow the steps outlined in the *Salvage and Disposition of Individuals* section.
  - c. A post-construction report detailing compliance with the project design criteria and proposed conservation measures described under the *Description of the Proposed Action* section of this biological opinion shall be provided to the Service within 30 calendar days of completion of the project. The report shall include: (1) dates of project groundbreaking and completion; (2) pertinent information concerning the success of the project in meeting compensation and other conservation measures; (3) an explanation of failure to meet such measures, if any; (4) known project effects listed species, if any; (5) observed incidences of injury to or mortality of any listed species, if any; and, (6) any other pertinent information.
3. The FRA and the Authority will submit a final Compensatory Mitigation Plan to the Service prior to initiation of construction of the CHST-FB Project. In addition, prior to commencement of construction for any phase, the FRA will provide a phase specific final mitigation plan that implements mitigation consistent with the Compensatory Mitigation Plan (Authority 2012), and identifies long term management measures, appropriate conservation instruments, and appropriate financial assurances (e.g., proof of credit purchase from Service-approved conservation banks) to the Service for each phase of construction. The FRA will also submit all proposed conservation easements or similar instruments, management plans,

and financial assurances to the Service for review and approval prior to initiation of construction activities.

4. The FRA and the Authority will submit a final Fagundes Compensatory Mitigation Proposal to the Service for review and approval by the Service that will include performance standards/success, contingency planning, performance monitoring requirements, and an LTMP. Performance monitoring success criteria will ensure adaptive management action will be taken if performance criteria are not met.

### **Salvage and Disposition of Individuals**

In the case of an injured and/or dead federally listed wildlife species, the Service shall be notified of events within one day and the animal shall only be handled by a Service-approved biologist. Injured federally listed wildlife species shall be cared for by a licensed veterinarian or other qualified person. In the case of a dead federally listed wildlife species, the animal shall be preserved, as appropriate, and shall be bagged and labeled (i.e. species type; who found or reported the incident; when the report was made; when and where the incident occurred; and if possible, cause of death). Carcasses shall be held in a secure location, such as a freezer or cooler, until instructions are received from the Service regarding the disposition of the specimen or until the Service, or another appropriate agency or qualified person, takes custody of the specimen. The FRA must report to the Service within one calendar day any information about take or suspected take of federally-listed species not exempted in this opinion. Notification must include the date, time, and location of the incident or of the finding of a dead or injured animal. The Service contacts are Daniel Russell, Deputy Assistant Field Supervisor, Endangered Species Program, Sacramento, at (916) 414-6600 and the Service's Law Enforcement Division at (916) 414-6660.

### **CONSERVATION RECOMMENDATIONS**

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities that can be implemented to further the purposes of the Act, such as preservation of endangered species habitat, implementation of recovery actions, or development of information and data bases.

1. The Service recommends the FRA develop and implement the appropriate restoration measures in areas designated in the *Valley Elderberry Longhorn Beetle Recovery Plan* (Service 1984), *Recovery Plan for Upland Species of the San Joaquin Valley, California* (Service 1998), and the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (Service 2005c).
2. The FRA and the Authority should incorporate "environmentally friendly" erosion and stabilization techniques whenever possible in this project, such as use of biodegradable materials constructed from natural fibers (e.g. coconut fiber).

3. Sightings of any listed or sensitive animal species should be reported to the CNDDDB of the CDFW. A copy of the reporting form and a topographic map clearly marked with the location the animals were observed also should be provided to the Service.

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

### REINITIATION--CLOSING STATEMENT

This concludes formal consultation on the CHST-FB Project. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action.

If you have any questions regarding the revised biological opinion on the proposed California High-speed Rail Train system: Fresno to Bakersfield Section Project, please contact Florence Gardipee, Senior Fish and Wildlife Biologist, (Flo\_Gardipee@fws.gov), or Thomas Leeman, San Joaquin Valley Division Chief, of this office at (916) 414-6600, or by email.

Sincerely,



Jennifer M. Norris  
Field Supervisor

cc:

Stephanie Perez, Federal Rail Administration, Washington, D.C.  
Kathleen A. Dadey, U.S. Army Corps of Engineers, Sacramento, California  
Sarvy Mahdavi, Environmental Protection Agency, San Francisco, California  
Enrique Manzanilla, Environmental Protection Agency, San Francisco, California  
Julie Vance, California Department of Fish and Wildlife, Bakersfield, California  
Mark McLoughlin, Sacramento, California High Speed Rail Authority  
Stephanie Parsons, Parsons-Brinckerhoff, Sacramento, California

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**Appendix C:**  
**Mitigation Monitoring and Enforcement Plan**  
**(MMEP)**

# CALIFORNIA HIGH-SPEED TRAIN

Project Environmental Impact Report/Environmental Impact Statement

Fresno to Bakersfield

## Mitigation Monitoring and Enforcement Program

June 2014





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## Introduction

In April 2014, the Federal Railroad Administration (FRA) and California High-Speed Rail Authority (Authority) prepared a joint Final Project Environmental Impact Report/ Environmental Impact Statement (EIR/EIS) for the Fresno to Bakersfield Section of the California High-Speed Train (HST) System (Project). The Final Project EIR/EIS satisfies the requirements of National Environmental Policy Act (NEPA) and is the basis for the FRA's Record of Decision (ROD). As part of the ROD, FRA has selected the BNSF Alternative in combination with the Corcoran Bypass, Allensworth Bypass, and the Bakersfield Hybrid alternatives and the Kings/Tulare Regional Station-East Alternative and the Bakersfield Station-Hybrid Alternative.

This Mitigation Monitoring and Enforcement Plan (MMEP) has been prepared for the Fresno to Bakersfield Section of the HST Project and adheres to the Council on Environmental Quality's (CEQ) regulations (40 Code of Federal Regulations [CFR] Section 1505) and FRA Procedures for Considering Environmental Impacts (64 Federal Register 28545, May 26, 1999). On January 14, 2011, the CEQ finalized guidance entitled *Appropriate Use of Mitigation and Monitoring and Clarifying the Appropriate Use of Mitigated Findings of No Significant Impact* (CEQ Guidance). The CEQ Guidance is intended to assist federal agencies to develop mitigation programs that provide effective documentation, implementation, and monitoring of mitigation commitments. FRA considered the CEQ Guidance in the preparation of this MMEP.

Table 1 and Attachment A of the MMEP describe mitigation measures that would mitigate the potential adverse environmental impacts to construct and operate and Table 2 describes measures that would avoid or minimize potential impacts to construct and operate the Project. These measures were developed by the FRA and the Authority in consultation with appropriate agencies, as well as with input from the public, to meet the requirements of NEPA and the California Environmental Quality Act (CEQA).

The Authority is required to comply with all mitigation measures adopted when the project was approved by the California High Speed Rail Authority Board, including any that were identified specifically to comply with CEQA as well as those addressing federal laws and requirements. The Project incorporates project design features and best management practices (BMPs) identified in the Final Project EIR/EIS and described in detail in a series of technical reports that accompanied preparation of the environmental document. As a result of applying these project design features and BMPs, the HST Project will avoid potential adverse environmental impacts in several resource areas, including electromagnetic interference/electromagnetic fields (EMI/EMF), hydrology and water resources, geology and soils, and hazardous materials and wastes. In addition, the Project's compliance with the regulatory requirements, including permitting and coordination with regulatory agencies for many project-related activities, provide additional assurance that potential adverse environmental impacts will not occur. Representative agencies include the U.S. Fish and Wildlife Service (USFWS), U.S. Army Corps of Engineers (USACE), and Environmental Protection Agency<sup>1</sup> with jurisdiction under the Endangered Species Act and the Clean Water Act, respectively. Like the mitigation measures listed in Table 1 and Attachment A, the project design features (see Table 2) and compliance with regulatory requirements are a condition of project approval and must be implemented by the Authority during design, construction, and operation of the Project.

The laws and orders the project is subject to and the design features that are part of the Project are described for the following resource areas in more detail in the corresponding chapters of the Final Project EIR/EIS:

- Transportation – Chapter 3.2, section 3.2.2, section 3.2.6
- Air Quality and Global Climate Change – Chapter 3.3, section 3.3.2, section 3.3.8
- Noise and Vibration – Chapter 3.4, section 3.4.2, section 3.4.6
- EMI/EMF – Chapter 3.5, section 3.5.2, section 3.5.6
- Public Utilities and Energy – Chapter 3.6, section 3.6.2, section 3.6.6
- Biological Resources and Wetlands – Chapter 3.7, section 3.7.2, section 3.7.6
- Hydrology and Water Resources – Chapter 3.8, section 3.8.2, section 3.8.6
- Geology and Soils – Chapter 3.9, section 3.9.2, section 3.9.6
- Hazardous Materials and Wastes – Chapter 3.10, section 3.10.2, section 3.10.6
- Safety and Security – Chapter 3.11, section 3.11.2, section 3.11.6
- Socioeconomics, Communities, and Environmental Justice – Chapter 3.12, section 3.12.2, section 3.12.6
- Station Planning, Land Use, and Development – Chapter 3.13, section 3.13.2, section 3.13.16
- Agricultural Lands – Chapter 3.14, section 3.14.2, section 3.14.6
- Parks, Recreation, and Open Space, Chapter 3.15, section 3.15.2
- Aesthetics and Visual Resources – Chapter 3.16, section 3.16.2, section 3.16.6
- Cultural and Paleontological Resources – Chapter 3.17, section 3.17.2, section 3.17.6
- Regional Growth – Chapter 3.18, section 3.18.1
- Cumulative Impacts – Chapter 3.19, section 3.19.1, section 3.19.4

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<sup>1</sup> EPA delegated authority under Section 401 of the Clean Water Act to the State of California.



## Mitigation Monitoring and Enforcement Plan

The environmental effects of the Preferred Alternative and station locations for the Fresno to Bakersfield Section of the HST Project would result in effects that would be considered significant under NEPA. Mitigation measures that would reduce or eliminate potential adverse environmental effects are described in Chapter 3 of Volume 1 of the Final Project EIR/EIS. The specific provisions contained in the MMEP are presented as a table and include the mitigation measures identified in the Final Project EIR/EIS, organized by environmental issue and topical areas addressed in the EIR/EIS. In collaboration with FRA and the appropriate agencies, the Authority may refine the means by which it will implement a mitigation measure, as long as the alternative means ensure compliance with the intent of the original measure during project implementation. The MMEP describes implementation and monitoring procedural guidance, responsibilities, and timing for each mitigation measure identified in the Final Project EIR/EIS, including:

**Significant Impact:** Provides a brief description of the impact expected to occur from the proposed project as identified in the Final EIR/EIS.

**Mitigation Measure:** Provides the mitigation measure and monitoring requirements as identified the Final EIR/EIS.

**Implementing Party/Monitoring /Reporting Party:** Identifies the entity that will be responsible for directly implementing the mitigation measures, monitoring, and reporting. Implementation can be the responsibility of the Authority or its Design Build Contractor (Contractor). Monitoring will generally be the responsibility of the Contractor, with oversight provided by the Authority during construction. Long-term mitigation monitoring responsibilities will be the responsibility of the Authority. The following roles are utilized in the text of mitigation measures in the MMEP:

As the proponent of the Project, the Authority will implement the mitigation measures through its own actions, those of its contractors, and actions taken in cooperation with other agencies and entities. The Authority is accountable for the overall administration of the mitigation monitoring program and for assisting relevant individuals and parties in their oversight and reporting responsibilities. The responsibilities of mitigation implementation, monitoring, and reporting extend to several entities as discussed above; however, the Authority will bear the primary responsibility for verifying that the mitigation measures are implemented.

The FRA and Authority define the mitigation measures required for the project. When project work is undertaken by the Authority's contractor, the Contractor shall implement the mitigation measures that are pertinent to their scope of work. The Contractor shall monitor construction activities to ensure that the mitigation measures are being properly implemented and accurately report their activity and results to the Authority. The Authority will periodically check the Contractor's activity, reports, and effectiveness of mitigation activities.

### Roles and Responsibilities

- **Authority:** Implementation and reporting on mitigation, avoidance and minimization measures as specified in the this MMEP as the responsibility of the Authority may be carried out by an Authority representative or a contractor hired independent of the Design Build Contractor or the Environmental Team. Authority responsible implementation and reporting may include certain measures outside of the scope of the Design Build Contractor such as future studies or operations-phase implementation. In addition, oversight of implementation and reporting may be provided by Authority contractor or representatives as lead agency representatives to facilitate regulatory oversight agency coordination and compliance during implementation and reporting.
- **Contractor:** Design Build Contractor or the Environmental Team provided by the Design Build Contractor responsible for implementing or monitoring and reporting mitigation, avoidance and minimization measures as specified in this MMEP.
- **Mitigation Manager:** Design Build Contractor's representative responsible for overseeing their Environmental Team's implementation and reporting of environmental commitments. Reports the status of each mitigation measure to Authority in accordance with this MMEP.
- **Project Biologist:** The Design Build Contractor provided Biologist, upon approval by regulatory oversight agencies, is responsible for implementing mitigation measures in compliance with the terms and conditions outlined in the MMEP and U.S. Fish and Wildlife (USFWS), U.S. Army Corps of Engineers (USACE), State Water Resource Control Board (SWRCB), and California Department of Fish and Wildlife (CDFW) permits. The Project Biologist will direct compliance activities carried out by the Project Biological Monitors.
- **Biological Monitor(s):** The Design Build Contractor provided Biological Monitor(s) will be approved by and report directly to the Contractor's Biologist. The Project Biological Monitor(s) will be present onsite within a reasonable monitoring distance during all ground-disturbing activities that have the potential to affect biological resources as directed by the Project Biologist and will be the principal agent(s) in the direct implementation of the MMEP and compliance assurance.
- **Project Biologist, Regulatory Specialist (Waters), Project Botanist:** The Project Biologist(s), Regulatory Specialist(s), and Project Botanist(s) provided by the Design-Build Contractor will represent the construction management team, will report directly to the Authority, will implement the mitigation reflected in the construction drawings and specifications, and will be responsible for reporting and overseeing the biological resources mitigation measures from the Final Fresno to Bakersfield Section EIR/EIS. The Project Biologist(s), Regulatory Specialist(s), and Project Botanist(s) will also be responsible for implementing mitigation measures in compliance with the MMEP and with the terms and conditions outlined in the USFWS, USACE, SWRCB, and CDFW permits. The Project Biologist(s), Regulatory Specialist(s), Project Botanist(s) will report to the overall construction management team Mitigation Manager (Mitigation Compliance Manager), interact with the designated Resident Engineer for the Fresno to Bakersfield Section and work to provide quality assurance of the implementation of the biological resources mitigation program as performed by the Contractor and the designated Project Biological Monitor(s). It is anticipated that the Project Biologist(s), Regulatory Specialist(s), and Project Botanist(s) will have specialized support from other biological monitors and work with the Mitigation Manager during deployment of the monitors and in performance of their respective responsibilities.
- **Cultural Resources Compliance Manager/Principal Investigator:** The Design Build Contractor provided Archaeologist, who meets the Secretary of the Interior (SOI) Standards of Archaeologist, is responsible for implementing mitigation measures in compliance with the terms and conditions outlined in the MMEP and treatment plans, and coordinating the status of archaeological mitigation with the Authority in accordance with this MMEP, PA and MOA. Per



the Archaeological Treatment Plan (ATP) and MOA, the Cultural Resources Compliance Manager shall determine whether a Native American monitor is required to be present during ground-disturbing activities in various Archaeologically Sensitive Areas of the Project.

- **Cultural Resources Monitor(s):** The Design Build Contractor provided Cultural Resources Monitor(s) will be approved by and report directly to the Cultural Resources Compliance Manager/Principal Investigator. The Archaeological Monitor(s) will be present onsite within a reasonable monitoring distance during ground disturbing activities in areas indicated as culturally sensitive and will be the principal agent(s) in the direct implementation of the MMEP and compliance assurance as directed by the Cultural Resources Compliance Manager/Principal Investigator.
- **Paleontological Resources Specialist:** The Design Build Contractor provided Paleontological Resources Specialist is responsible for implementing mitigation measures in compliance with the terms and conditions outlined in the MMEP including preparation of the Paleontological Resources Management Plan and approval and direction of the Paleontological Resource Monitor(s).
- **Paleontological Resources Monitor(s):** The Design Build Contractor provided Paleontological Resources Monitor(s) will be approved by and report directly to the Paleontological Resources Specialist. The Paleontological Resources Monitor(s) will be present onsite within a reasonable monitoring distance during ground disturbing activities in areas indicated as resource sensitive and will be the principal agent(s) in the direct implementation of the MMEP and compliance assurance as directed by the Paleontological Resources Specialist.
- **Contractor's Biologist/Mitigation Timing (Implementation Schedule/Reporting Schedule):** Not all mitigation actions will occur at the same time. Depending upon the measure, it may be undertaken prior to construction, during construction, or during project operations. Measures may also be undertaken in conjunction with different construction packages or at such time as project operations reach a certain level. This column of the table identifies the stage of the project during which the mitigation action will be taken and when reporting is to occur, if reporting is required.
- **Implementation Mechanism or Tool:** Identifies the actions required to implement the measures, including any required agreements and/or conditions.

## Environmental Management System (EMS)

The Authority will implement an Environmental Management System (EMS) consisting of strategic planning, policies and procedures, organizational structure, staffing and responsibilities, milestones, schedule, and resources devoted to achieving the Authority's environmental commitments. The EMS will also include a component that tracks the implementation of mitigation measures (as well as environmental commitments, BMPs, and design features) and can produce reports on compliance. FRA will receive periodic reports on compliance and may request additional reports as necessary to ensure that the MMEP is fully implemented. This system will rely on data provided by the design-build contractor, regional consultants, and others to produce status reports regarding construction status, permitting activities, monitoring, inspections, and other compliance activities.

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**Table 1**  
**Fresno to Bakersfield Mitigation Monitoring and Enforcement Program**



**Table 1**  
 Fresno to Bakersfield Mitigation Monitoring and Enforcement Plan

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact #	Impact Text
<b>Air Quality</b>											
AQ-MM#1	Reduce Criteria Exhaust Emissions from Construction Equipment	This mitigation measure will apply to heavy-duty construction equipment used during the construction phase. All off-road construction diesel equipment will use the cleanest reasonably available equipment (including newer equipment and/or tailpipe retrofits), but in no case less clean than the average fleet mix for the current calendar year, as set forth in CARB's OFFROAD 2011 database, and no less than a 40% reduction compared to a Tier 2 engine standard for NOx emissions. The Contractor will document efforts undertaken to locate newer equipment (such as, in order of priority, Tier 4, Tier 3, or Tier 2 equipment) and/or tailpipe retrofit equivalents. The Contractor will provide documentation of such efforts, including correspondence with at least two construction equipment rental companies. A copy of each unit's certified tier specification and any required CARB or SJVAPCD operating permit will be made available at the time of mobilization of each piece of equipment. The Contractor will keep a written record (supported by equipment-hour meters where available) of equipment usage during project construction for each piece of equipment.	Construction	Reporting	Weekly	Contractor	Contractor	Daily Record Keeping and Weekly Reporting	A copy of each unit's certified tier specification and any required California Air Resources Board (CARB) or San Joaquin Valley Air Pollution Control District (SJVAPCD) operating permit will be made available at the time of mobilization of each piece of equipment.	AQ#1	Construction of the HST alternatives would exceed the CEQA emissions thresholds for VOCs, NO <sub>x</sub> , PM <sub>10</sub> , and PM <sub>2.5</sub> . Therefore, it could potentially cause violations of NO <sub>2</sub> , O <sub>3</sub> , PM <sub>10</sub> , and PM <sub>2.5</sub> air quality standards or contribute substantially to NO <sub>2</sub> , O <sub>3</sub> , PM <sub>10</sub> , and PM <sub>2.5</sub> existing or projected air quality violations.
										AQ #2	Construction of the HST alternatives would exceed the CEQA emissions thresholds for VOC, NO <sub>x</sub> , PM <sub>10</sub> , and PM <sub>2.5</sub> . Therefore, it would conflict with the 1-hour Ozone Attainment Plan, the 8-hour Ozone Attainment Plan, and the PM <sub>10</sub> and PM <sub>2.5</sub> Attainment Plans.
										LU Impact #1	Temporary and intermittent construction equipment emissions would inconvenience nearby residents on some lands along 31 miles of the Preferred Alternative.
AQ-MM#2	Reduce Criteria Exhaust Emissions from On-Road Construction Equipment	This mitigation measure applies to all on-road trucks used to haul construction materials, including fill, ballast, rail ties, and steel. Material-hauling trucks will consist of an average fleet mix of equipment model year 2010, or newer, but no less than the average fleet mix for the current calendar year as set forth in CARB's EMFAC 2011 database. The Contractor will provide documentation of efforts to secure such a fleet mix. The Contractor will keep a written record of equipment usage during project construction for each piece of equipment.	Construction	Reporting	Weekly	Contractor	Contractor	Weekly reporting	Contract Requirement/ Specification	AQ #1	Construction of the HST alternatives would exceed the CEQA emissions thresholds for VOCs, NO <sub>x</sub> , PM <sub>10</sub> , and PM <sub>2.5</sub> . Therefore, it could potentially cause violations of NO <sub>2</sub> , O <sub>3</sub> , PM <sub>10</sub> , and PM <sub>2.5</sub> air quality standards or contribute substantially to NO <sub>2</sub> , O <sub>3</sub> , PM <sub>10</sub> , and PM <sub>2.5</sub> existing or projected air quality violations
										AQ#2	Compliance with Air Quality Plans: Construction of the HST alternatives would exceed the CEQA emissions thresholds for VOC, NO <sub>x</sub> , PM <sub>10</sub> , and PM <sub>2.5</sub> . Therefore, it would conflict with the 1-hour Ozone Attainment Plan, the 8-hour Ozone Attainment Plan, and the PM <sub>10</sub> and PM <sub>2.5</sub> Attainment Plans.
										AQ#3	Material hauling outside the SJVAB would exceed CEQA emission thresholds for NO <sub>x</sub> in the BAAQMD, Mojave Desert AQMD, Eastern Kern County APCD, and the South Coast AQMD, and would exceed the VOC threshold in South Coast AQMD for certain hauling scenarios. Therefore, it could potentially cause violations of NO <sub>2</sub> , and O <sub>3</sub> air quality standards or contribute substantially to NO <sub>2</sub> and O <sub>3</sub> existing or projected air quality violations in those air basins.
										LU Impact #1:	Temporary and intermittent construction equipment emissions would inconvenience nearby residents on some lands along 31 miles of the Preferred Alternative.

**Table 1**  
 Fresno to Bakersfield Mitigation Monitoring and Enforcement Plan

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact #	Impact Text
AQ-MM#3	Reduce the Potential Impact of Concrete Batch Plants	Concrete batch plants would be sited at least 1,000 feet from sensitive receptors, including daycare centers, hospitals, senior care facilities, residences, parks, and other areas where people may congregate. The concrete batch plant will utilize typical control measures to reduce the fugitive dust, such as water sprays, enclosures, hoods, curtains, shrouds, movable and telescoping chutes, central dust collection systems and other suitable technology, to reduce emissions to be equivalent to the U.S. EPA AP-42 controlled emission factors for concrete batch plants.	Pre-construction	Design/Reporting	Weekly	Contractor	Contractor	Weekly Reporting	Contract Requirements/ Specifications	AQ #8	Construction of the alignment may expose sensitive receptors to temporary substantial pollutant concentrations from concrete batch plants.
										LU Impact #1	Temporary and intermittent construction equipment emissions would inconvenience nearby residents on some lands along 31 miles of the Preferred Alternative.
AQ-MM#4	Offset Project Construction Emissions Through an SJVAPCD VERA	This mitigation measure would address AQ Impact #1 (Common Regional Air Quality Impacts During Construction) that would exceed the GC applicability and CEQA emissions thresholds for VOC and NOx, and the CEQA emission thresholds for PM10 and PM2.5. The Authority and SJVAPCD will enter into a contractual agreement to mitigate (by offsetting) to net zero the project's actual emissions from construction equipment and vehicle exhaust emissions of VOC, NOx, PM10, and PM2.5. The agreement will provide funds for the district's Emission Reduction Incentive Program[1] (SJVAPCD 2011) to fund grants for projects that achieve emission reductions, with preference given to highly impacted communities, thus offsetting project-related impacts on air quality. To lower overall cost, funding for the VERA program to cover estimated construction emissions for any funded construction phase will be provided at the beginning of the construction phase. At a minimum, mitigation/offsets will occur in the year of impact, or as otherwise permitted by 40 C.F.R. Part 93 Section 93.163.	Pre-construction	Reporting/Funding	Weekly	Authority	Contractor	Weekly Reporting	The Authority and SJVAPCD will enter into a contractual agreement to mitigate the project's emissions by providing funds for the district's Emission Reduction Incentive Program to fund grants for projects that achieve emission reductions, thus offsetting project-related impacts on air quality.	AQ #1	Construction of the HST alternatives would exceed the CEQA emissions thresholds for VOCs, NOx, PM10, and PM2.5. Therefore, it could potentially cause violations of NO2, O3, PM10, and PM2.5 air quality standards or contribute substantially to NO2 O3, PM10, and PM2.5 existing or projected air quality violations.
										AQ #2	Construction of the HST alternatives would exceed the CEQA emissions thresholds for VOC, NOx, PM10, and PM2.5. Therefore, it would conflict with the 1-hour Ozone Attainment Plan, the 8-hour Ozone Attainment Plan, and the PM10 and PM2.5 Attainment Plans.
										LU Impact #1	Temporary and intermittent construction equipment emissions would inconvenience nearby residents on some lands along 31 miles of the Preferred Alternative.
AQ-MM#5	Purchase Offsets and Offsite Emission Mitigation for Emissions Associated with Hauling Ballast Material in Certain Air Districts	This mitigation measure will apply if ballast material is hauled from quarries outside the SJVAB and the hauling activities result in the exceedance of the annual applicable General Conformity threshold(s) or local air basin CEQA threshold(s) for NOx. To determine whether an exceedance will occur based on actual hauling activities, the Authority shall at the beginning of each calendar year or as soon as practicable thereafter to obtain the most up-to-date information, based on actual or projected contractor-specific information about hauling in the Mojave AQMD, South Coast AQMD and Bay Area AQMD, calculate for the next calendar year using the same methodology used in this EIR/EIS the expected NOx emissions from hauling activities in those districts. If, based on that calculation, exceedance of the applicable NOx threshold(s) is anticipated to occur in that next calendar year, the Authority will secure	Pre-construction/Construction	Reporting/Funding	Weekly reporting	Contractor and Authority	Contractor and Authority	Weekly Reporting	Authority to coordinate the purchase of offsets with pertinent AQMDs per contractor reports.	AQ #3	Material hauling outside the SJVAB would exceed CEQA emission thresholds for NOx in the BAAQMD, Mojave Desert AQMD and the South Coast AQMD.

**Table 1**  
 Fresno to Bakersfield Mitigation Monitoring and Enforcement Plan

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact #	Impact Text
		from the appropriate air district(s) or other appropriate source the production or generation of a sufficient quantity of NOx offsets for that calendar year necessary to achieve conformity (in the case of exceedance of GC thresholds) and/or to result in net NOx generation below the applicable CEQA threshold(s). At a minimum, sufficient mitigation/offsets will be secured so they are generated in the year of impact or as otherwise permitted by 40 C.F.R. Part 93 Section 93.163. The Mojave Desert AQMD's emission bank has 2,061 tons of NOx credits (Mojave Desert AQMD 2012); therefore, there should be enough NOx credits to offset approximately 6 tons per year from this project in the Mojave Desert AQMD. The exact number of NOx credits in the SCAQMD RECLAIM program is unknown, but 1,199 tons of NOx credits were traded in 2011 and 235 tons of NOx credits were traded in 2012 (SCAQMD 2012). Therefore, there should be enough available NOx credits in the program to offset approximately 75 tons of NOx per year from this project in the SCAQMD. In the Bay Area AQMD, any material emissions above the district's significance threshold will be mitigated through an offsite emission mitigation program to achieve emission reduction due to material hauling in the Bay Area AQMD. Potential offsite mitigation programs include the Bay Area AQMD's Carl Moyer Memorial Air Quality Standards Attainment Program (CMP) or other air district emission reduction incentive programs. Depending on the final location selected to obtain ballast material, this would amount to a maximum of 3 tons of NOx credits.									
<b>Noise and Vibration</b>											
N&V-MM #1	Construction Noise Mitigation Measures	During construction the Contractor will monitor construction noise to verify compliance with the noise limits (An 8-hour Leq, dBA of 80 during the day and 70 at night for residential land use, 85 for both day and night for commercial land use, and 90 for both day and night for industrial land use). The Contractor would be given the flexibility to meet the FRA construction noise limits in the most efficient and cost-effective manner. This can be done by either prohibiting certain noise-generating activities during nighttime hours or providing additional noise control measures to meet the noise limits. A noise-monitoring program will be developed to meet required noise limits, the following noise control mitigation measures will be implemented as necessary, for nighttime and daytime:	Construction	Reporting	Weekly	Contractor	Contractor	Weekly	Contract Requirements/ Specifications	N&V#1	Construction Noise
										LU Impact #1	The generation of noise would temporarily inconvenience nearby residents on some lands along 31 miles of the Preferred Alternative.
										PK#1	Construction activities would increase noise exposure at McMurtrey Aquatic Center.
										PK#1	Construction activities would increase noise exposure at Mill Creek Linear Park.

**Table 1**  
 Fresno to Bakersfield Mitigation Monitoring and Enforcement Plan

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact #	Impact Text
		<ul style="list-style-type: none"> <li>• Install a temporary construction site sound barrier near a noise source.</li> <li>• Avoid nighttime construction in residential neighborhoods.</li> <li>• Locate stationary construction equipment as far as possible from noise-sensitive sites.</li> <li>• Re-route construction truck traffic along roadways that will cause the least disturbance to residents.</li> <li>• During nighttime work, use smart back-up alarms, which automatically adjust the alarm level based on the background noise level, or switch off back-up alarms and replace with spotters.</li> <li>• Use low-noise emission equipment.</li> <li>• Implement noise-deadening measures for truck loading and operations.</li> <li>• Monitor and maintain equipment to meet noise limits.</li> <li>• Line or cover storage bins, conveyors, and chutes with sound-deadening material.</li> <li>• Use acoustic enclosures, shields, or shrouds for equipment and facilities.</li> <li>• Use high-grade engine exhaust silencers and engine-casing sound insulation.</li> <li>• Prohibit aboveground jackhammering and impact pile driving during nighttime hours.</li> <li>• Minimize the use of generators to power equipment.</li> <li>• Limit use of public address systems.</li> <li>• Grade surface irregularities on construction sites.</li> <li>• Use moveable sound barriers at the source of the construction activity.</li> <li>• Limit or avoid certain noisy activities during nighttime hours.</li> <li>• To mitigate noise related to pile driving, the use of an auger to install the piles instead of a pile driver would reduce noise levels substantially. If pile driving is necessary, limit the time of day that the activity can occur</li> <li>• CHSRA will establish and maintain in operation until completion of construction a toll-free "hotline" regarding the Section construction activities. CHSRA shall arrange for all incoming messages to be logged (with summaries of the contents of each message) and for a designated representative of CHSRA to respond to hotline messages within 24 hours (excluding weekends and holidays). CHSRA shall make a reasonable good faith effort to address all concerns and answer all questions, and shall include on the log its responses to all callers. CHSRA shall make a log of the incoming messages and CHSRA's responsive actions publicly available on its website.</li> <li>• Mitigation for construction noise should include a requirement to adhere to the city's noise requirements and restrictions on construction activities in and around school</li> </ul>									



**Table 1**  
 Fresno to Bakersfield Mitigation Monitoring and Enforcement Plan

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact #	Impact Text
		areas to weekends and near all other sensitive receptors to weekdays and daytime hours only (Vol. V, City of Bakersfield comment). The Authority will consider the suggested mitigation measure for construction in conjunction with future decisions regarding an alignment through Bakersfield.									
N&V-MM #2	Construction Vibration Mitigation Measures	Building damage from construction vibration is only anticipated from impact pile driving at very close distances to buildings. If pile driving occurs more than 25 to 50 feet from buildings, or if alternative methods such as push piling or auger piling can be used, damage from construction vibration is not expected to occur. Other sources of construction vibration do not generate high enough vibration levels for damage to occur. When a construction scenario has been established, pre-construction surveys are conducted at locations within 50 feet of pile driving to document the existing condition of buildings in case damage is reported during or after construction. The contractor will arrange for the repair of damaged buildings or will pay compensation to the property owner.	Pre-construction/ Construction / Post-construction	Reporting	Weekly	Contractor	Contractor	Ongoing monitoring during construction/post-construction monitoring as needed to assess damage to buildings.	Contract Requirements/Specifications	N&V#2	Construction Vibration
										LU Impact #1:	The generation of noise would temporarily inconvenience nearby residents on some lands along 31 miles of the Preferred Alternative.
										PK#1	Construction activities would increase noise exposure at McMurtrey Aquatic Center.
N&V-MM #3	Implement Proposed California High-Speed Train Project Noise Mitigation Guidelines	To determine the appropriate mitigation measure for properties experiencing severe noise impacts, noise mitigation guidelines would be applied as follows:  Prior to operation of the HST the Authority will install sound barriers where they can achieve between 5 and 15 dB of noise reduction, depending on their height and location relative to the tracks. The primary requirements for an effective sound barrier are that the barrier must (1) be high enough and long enough to break the line-of-sight between the sound source and the receiver, (2) be of an impervious material with a minimum surface density of 4 pounds per square foot, and (3) not have any gaps or holes between the panels or at the bottom. Because many materials meet these requirements, aesthetics, durability, cost, and maintenance considerations usually determine the selection of materials for sound barriers. Depending on the situation, sound barriers can become visually intrusive. Typically, the sound barrier style is selected with input from the local jurisdiction to reduce the visual effect of barriers on adjacent lands uses. For example, sound barriers could be solid or transparent, and made of various colors, materials, and surface treatments.  The minimum number of affected sites should be at least 10, and the length of a sound barrier should be at least 800 feet. The maximum sound barrier height would be 14	Pre-construction/ Construction / Post-construction	Reporting	Weekly	Authority	Authority	Ongoing monitoring during construction/post-construction monitoring as needed to assess damage to buildings	Contract Requirements/ Specifications Noise and Vibration Mitigation Guidelines	N&V#3	Moderate and Severe Noise Impacts from Project Operation to Sensitive Receivers. Project Noise Impacts Preferred Alternative: 6,601 moderate and 3,378 severe impacts.
										N&V#6	The Hanford East Station Alternative would result in increases in traffic volume that would result in an increase in the future peak-hour noise level.
										PK#4	McMurtrey Aquatic Center. HST operation of the Preferred Alternative would increase noise exposure.
										PK#4	Kern River Parkway. Project impacts from operation of the HST would increase noise exposure.
										BIO#6	Project impacts from the HST would permanently impact suitable habitat that has the potential to support special-status invertebrate species through the creation of noise that would reduce the desirability of the habitat.
										BIO#6	Project impacts from the HST would permanently impact suitable habitat that has the potential to support special-status reptiles and amphibian species through the creation of noise that would reduce the desirability of the habitat.
										BIO#6	Project impacts from the HST would permanently impact suitable habitat that has the potential to support special-status bird species through the creation of noise that would reduce the desirability of the habitat.
BIO#6	Project impacts from the HST would permanently impact suitable habitat that has the potential to support special-status mammal species through the creation of noise that would reduce the desirability of the habitat.										

**Table 1**  
 Fresno to Bakersfield Mitigation Monitoring and Enforcement Plan

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact #	Impact Text
		<p>feet for at-grade sections; however, all sound barriers would be designed to be as low as possible to achieve a substantial noise reduction. Berm and berm/wall combinations are the preferred types of sound barriers where space and other environmental constraints permit. On aerial structures, the maximum sound barrier height would also be 14 feet, but barrier material would be limited by engineering weight restrictions for barriers on the structure. Sound barriers on the aerial structure will still be designed to be as low as possible to achieve a substantial noise reduction. Sound barriers on both aerial structures and at-grade structures could consist of solid, semitransparent, or transparent materials.</p> <p>The Authority will work with the communities to identify how the use and height of sound barriers would be determined using jointly developed performance criteria. Other solutions may result in higher numbers of residual impacts than reported herein. Options may be to reduce the height of sound barriers and combine barriers with sound insulation or to accept higher noise thresholds than the FRA's current noise thresholds.</p> <p>If sound walls are not proposed or do not reduce sound levels to below a severe impact level, building sound insulation can be installed. Sound insulation of residences and institutional buildings to improve the outdoor-to-indoor noise reduction is a mitigation measure that can be provided when the use of sound barriers is not feasible in providing a reasonable level (5 to 7 dB) of noise reduction. Although this approach has no effect on noise in exterior areas, it may be the best choice for sites where sound barriers are not feasible or desirable and for buildings where indoor sensitivity is of most concern. Substantial improvements in building sound insulation (on the order of 5 to 10 dB) can often be achieved by adding an extra layer of glazing to windows, by sealing holes in exterior surfaces that act as sound leaks, and by providing forced ventilation and air conditioning so that windows do not need to be opened. Performance criteria would be established to balance existing noise events and ambient roadway noise conditions as factors for determining mitigation measures.</p> <p>If sound walls or sound installation is not effective, the Authority can acquire easements on properties severely affected by noise. Another option for mitigating noise impacts is for the authority to acquire easements on residences likely to be impacted by HST operations in which the homeowners would</p>									

**Table 1**  
 Fresno to Bakersfield Mitigation Monitoring and Enforcement Plan

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact #	Impact Text
		accept the future noise conditions. This approach is usually taken only in isolated cases where other mitigation options are infeasible, impractical, or too costly.									
N&V-MM#4	Vehicle noise specification	In the procurement of an HST vehicle technology, the Authority will require bidders to meet the federal regulations (40 CFR Part 201.12/13) at the time of procurement for locomotives (currently a 90-dB-level standard), for cars operating at speeds of greater than 45 mph). Depending on the available technology, this could significantly reduce the number of impacts throughout the corridor.	Pre-construction/ Construction / Post-construction	Reporting	Weekly	Authority	Authority	Ongoing monitoring during construction/post-construction monitoring as needed	Contract Requirements/Specifications Noise and Vibration Mitigation Guidelines	N&V#3	Moderate and Severe Noise Impacts from Project Operation to Sensitive Receivers. Project Noise Impacts Preferred Alternative: 2,564 moderate and 1,553 severe impacts,
N&V-MM#5	Special trackwork at crossovers and turnouts	Because the impacts of HST wheels over rail gaps at turnouts increases HST noise by approximately 6 dB over typical operations, turnouts can be a major source of noise impact. If the turnouts cannot be moved from sensitive areas, the project can use special types of trackwork that eliminate the gap.	Pre-construction/ Construction / Post-construction	Reporting	Weekly	Authority	Authority	Ongoing monitoring during construction/post-construction monitoring as needed	Contract Requirements/ Specifications Noise and Vibration Mitigation Guidelines	N&V#3	Moderate and Severe Noise Impacts from Project Operation to Sensitive Receivers. Project Noise Impacts Preferred Alternative: 2,564 moderate and 1,553 severe impacts.
N&V-MM #6	Additional Noise Analysis Following Final Design	If final design or final vehicle specifications result in changes to the assumptions underlying the noise analysis, reassess noise impacts and recommendations for mitigation and provide supplemental environmental documentation, as required by CEQA.	Pre-construction/ Design/ Operation	Reporting	Final design/Final vehicle specification	Contractor/Authority (vehicle)	Contractor/Authority (vehicle)	Final design/Final vehicle specification	Submit assessment and supplemental environmental documentation	N&V#3	Moderate and Severe Noise Impacts from Project Operation to Sensitive Receivers. Project Noise Impacts Preferred Alternative: 6,601 moderate and 3,378 severe impacts.
										N&V#6	The Hanford East Station Alternative would result in increases in traffic volume that would result in an increase in the future peak-hour noise level.
<b>EMI/EMF</b>											
EMF/EMI-MM #1	Protect Sensitive Equipment In Accordance with the EMCPP	<p>The contractor will coordinate with Mercy Hospital regarding the potential impacts of HST-related EMF or RF interference on imaging equipment prior to completion of final design. Where necessary to avoid interference, the final design will include suitable design provisions to prevent interference. These design provisions may include establishing magnetic field shielding walls around sensitive equipment, or installing RF filters into sensitive equipment.</p> <p>HST-related EMI may affect highly susceptible, unshielded sensitive RF equipment such as older magnetic resonance imaging (MRI) systems and other measuring devices common to medical and research laboratories. Most of the devices manufactured today have adequate shielding from all potential EMI sources; however, the potential exists for older devices to be affected and require shielding.</p> <p>In general, a shielding range between 60 and 90 dB may be considered a high level of protection, while 90 to 120 dB is exceptional.</p>	Pre-construction/ Design	Reporting	Monthly	Contractor	Contractor	During construction report monthly	Reporting Contractor (unless Authority has 3rd party agreement with Mercy) to meet with Mercy West Hospital Representatives regarding potential impacts and provide shielding	EMF/EMI Impact #5:	Impacts to Sensitive Equipment from EMI. Under the Preferred Alternative, the worst-case EMFs are 1.8 mG at the edge of Mercy Hospital closest to the centerline of the HST right-of-way. Therefore, EMI may occur to sensitive medical devices or imaging equipment in the study area if the equipment is unshielded.

**Table 1**  
 Fresno to Bakersfield Mitigation Monitoring and Enforcement Plan

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact #	Impact Text
<b>Public Utilities and Energy</b>											
PU&E-MM #1	Reconfigure or relocate substations and/or substation components	Reconfigure existing substation ancillary components located at the southwest corner of Grangeville Boulevard and 7½ Avenue, east of the city of Hanford.	Pre-construction/Design	Design/Reporting	Monthly	Contractor	Contractor	During construction report monthly	Condition of Design Build Contract	PU&E#8	Potential Conflicts with Fixed Electrical Facilities
<b>Biological Resources</b>											
BIO-MM#1	Designate Project Biologist(s) and Project Biological Monitor(s)	A Project Biologist shall be designated by the Environmental Compliance Manager to oversee regulatory compliance requirements and monitor the restoration activities associated with ground-disturbing activities in accordance with the adopted mitigation measures and applicable laws. The Project Biologist, Regulatory Specialist, and Project Botanist are responsible for the timely implementation of the biological mitigation measures as outlined in the MMEP, construction documents, and pertinent resource agency permits. Resumes for the Designated Project Biologist(s), Regulatory Specialists (Waters), and Project Botanists, and Project Biological Monitors(s) must be submitted to the USFWS during final design. Additional duties of the Project Biologist, Regulatory Specialist (Waters) and Project Botanist include reviewing design documents and construction schedules, determining project biological monitoring needs, and guiding and directing the work of the Project Biological Monitors. The duties of the Project Biological Monitor include monitoring construction crew activities, as needed, to document applicable mitigation measures and permit conditions. The Project Biologist(s), Regulatory Specialist(s) (Waters), Project Botanist(s) and the Project Biological Monitor(s) report to the Mitigation Manager. The Project Biologist(s), Regulatory Specialist(s) (Waters), Project Botanist(s) and/or the Project Biological Monitor(s) may require special approval from the USFWS and CDFW to implement certain mitigation measures. In these circumstances, they are referred to as agency-approved biologist(s)	Pre-construction	Mitigation Manager will identify Project Biologist, Regulatory Specialist (Waters), Project Botanist. Contractor will identify Project Biological Monitors and provide resumes to regulatory agencies as required.	Final Design	Contractor	Contractor	Final Design	Condition of Design Build Contract	BIO-MM#1 Applies to all BIO Impacts	
BIO-MM#2	Regulatory Agency Access	If requested, before, during, or on completion of ground-disturbing activities, the Contractor will allow access by USFWS, USACE, SWRCB, and CDFW staff to the construction site. Because of safety concerns, all visitors will be required to check in with the Contractor before accessing the construction site. If agency personnel access the construction site, the Project Biologist will prepare a memorandum within 1 day of the visit to document agency access and the issues raised during the field meeting. This memorandum will be submitted	Pre-construction/Construction/Post-construction	Access Granted to Regulatory Agencies	1 day following agency site visit	Contractor, Project Biologist	Contractor	1 day following agency site visit	Condition of Design Build Contract	Bio MM#2 applies to all BIO Impacts	

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Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact #	Impact Text
		to the Mitigation Manager. Any non-compliance issues will be reported to the Contractor and Authority.									
BIO-MM#3	Prepare and Implement a Worker Environmental Awareness Program (WEAP)	Before the start of ground-disturbing activities, the Project Biologist, Regulatory Specialist (Waters) and Project Botanist will prepare and implement a WEAP for construction crews. WEAP training materials will include the following: discussion 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), and the Clean Water Act (CWA); the consequences and penalties for violation or noncompliance with these laws and regulations and project permits; identification of special-status plants, special-status wildlife, jurisdictional waters, and special-status plant communities and explanations about their 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 mitigation measures. In the WEAP, 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. A fact sheet conveying this information will be prepared by the Project Biologist, Regulatory Specialist (Waters) and Project Botanist for distribution to the construction crews and to others who enter the construction footprint. 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 Project Biologist, Regulatory Specialist (Waters) and Project Botanist will submit the signed WEAP training forms to the Mitigation Manager on a monthly basis. Construction crews will be informed during the WEAP training that, except when necessary as determined in consultation with the Project Biologist, Regulatory Specialist (Waters) and Project Botanist travel within the marked project site will be restricted to established roadbeds. Established roadbeds include all pre-existing and project-constructed unimproved and improved roads.	Pre-construction/Construction	Training of all crew/construction personnel prior to start of construction. Provide daily weekly/monthly report as required by permit conditions or as additional crew/construction personnel receive training.	Daily Tracking	Contractor	Contractor	Monthly training forms submitted monthly.	Condition of Design/Build Contract	BIO-MM#3 applies to all BIO Impacts	
BIO-MM#4	Prepare and Implement a Weed Control Plan and Annual Vegetation Control Plan	A construction-phase Weed Control Plan and an operation phase Annual Vegetation Control Plan will be developed and implemented. Before the start of ground-disturbing activities, the Project Botanist will prepare and oversee the implementation a Weed Control Plan to minimize or avoid the spread of weeds during ground-disturbing activities. The Weed Control	Pre-construction/Construction / Post-construction/Operation	Plan to be prepared prior to construction followed by Monthly memorandum to document the progress	Monthly	Contractor, Authority	Contractor, Authority	Monthly	Condition of the Design/Build Contract	BIO-MM#4 applies to all BIO Impacts	

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 Fresno to Bakersfield Mitigation Monitoring and Enforcement Plan

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact #	Impact Text
		<p>Plan will address the following:</p> <ul style="list-style-type: none"> <li>Schedule for noxious weed surveys to be conducted in coordination with the Biological Resources Management Plan (BRMP) (BIO-MM#5).</li> <li>The success criteria for noxious and invasive weed control, as established by a qualified biologist. The success criteria will be linked to the Biological Resources Management Plan [BRMP] (BIO-MM#5) standards for onsite work during construction. In particular, the criteria will limit the introduction and spread of highly invasive species, as defined by the California Invasive Plant Council (CalIPC), to less than or equal to the pre-disturbance conditions in areas temporarily impacted by construction activities. If invasive species cover is found to exceed by 10% the pre-disturbance conditions during monitoring—or is 10% more compared with a similar, nearby reference site with similar vegetation communities and management—a control effort will be implemented. If the target, or other success criteria identified in the Comprehensive Mitigation and Monitoring Plan (CMMP), has not been met by the end of the BRMP monitoring and implementation period, the Authority or its designee will continue the monitoring and control efforts, and remedial actions would be identified and implemented until the success criteria are met. Depending on monitoring results, additional or revised measures may be needed to ensure that the introduction and spread of noxious weeds are not promoted by the construction and operation of the project.</li> <li>Provisions to ensure that the development of the Weed Control Plan will be coordinated with development of the Restoration and Revegetation Plan (RRP) (BIO-MM#6) so that the RRP incorporates measures to reduce the spread and establishment of noxious weeds, and incorporates percent cover of noxious weeds into revegetation performance standards.</li> <li>Identification of weed control treatments, including the use of permitted herbicides, and manual and mechanical removal methods. Herbicide application will be restricted from use in Environmentally Sensitive Areas and on compensatory mitigation sites, which are defined in BIO-MM#7, Delineate Environmentally Sensitive Area and Environmental Restricted Area (on plans and in field).</li> <li>Determination of timing of the weed control treatment for each plant species.</li> <li>Identification of fire prevention measures.</li> </ul> <p>During operation, the Authority will generally follow the procedures established in Chapter</p>		and implementation of the Weed Control Plan.							



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Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact #	Impact Text
		<p>C2 of the Caltrans Maintenance Manual to manage vegetation on Authority property (Caltrans 2010). Vegetation would be controlled by chemical, thermal, biological, cultural, mechanical, structural, and manual methods. A separate plan, the Annual Vegetation Control Plan, would also be developed each winter for implementation no later than April 1 of each year. That plan would consist of site-specific vegetation control methods, as outlined below:</p> <ul style="list-style-type: none"> <li>Chemical vegetation control noting planned usage.</li> <li>Mowing program.</li> <li>Other non-chemical vegetation control plans (manual, biological, cultural, thermal (includes the use of propane heat or steam and is not specific to controlled burning) and structural).</li> <li>List of sensitive areas.</li> <li>Other chemical pest control plans (e.g., insects, snail, rodent).</li> </ul> <p>Only Caltrans-approved herbicides will be used in the vegetation control program. Pesticide application will be conducted in accordance with all requirements of the California Department of Pesticide Regulation and County Agricultural Commissioners by certified pesticide applicators. Noxious/invasive weeds will be treated where requested by County Agricultural Commissioners. The Authority will cooperate in area-wide control of noxious/invasive weeds if established by local agencies. Farmers/landowners who request weed control on state right-of-way that is not identified in the annual vegetation control plan will be encouraged to submit a permit request application for weed control that identifies the target weeds and control method desired. The Contractor will implement the Weed Control Plan during the construction period. The Authority will require that HST maintenance crews follow the guidelines in the Weed Control Plan and Annual Vegetation Control Plan during project operation. The Authority or its designee will appoint the responsible party during the operations period to ensure the Annual Vegetation Control Plan is being carried out appropriately and effectively. A monthly memorandum will be prepared by the Project Botanist to document the progress of the plan and its implementation.</p>									
BIO-MM#5	Prepare and Implement a Biological Resources Management Plan	During final design, the Mitigation Manager, or its designee (Project Biologist, Regulatory Specialist or Project Botanist) will prepare the Biological Resources Management Plan (BRMP) and assemble the biological resources mitigation measures. The BRMP will include terms and conditions from applicable permits and agreements and make provisions for monitoring assignments, scheduling, and	Plan required Pre-construction, Implementation will occur during Construction and Post-construction.	Plan to be prepared prior to construction followed by reporting schedule s established by agency permit conditions.	TBD in the Biological Resource Management Plan in accordance with reporting schedule established by	Contractor	Contractor	TBD in the Biological Resource Management Plan in accordance with reporting schedule	Condition of the Design/Build Contract	BIO-MM#5 applies to all BIO Impacts	

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 Fresno to Bakersfield Mitigation Monitoring and Enforcement Plan

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact #	Impact Text
		responsibility. The BRMP will also include habitat replacement and revegetation, protection during ground-disturbing activities, performance (growth) standards, maintenance criteria, and monitoring requirements for temporary and permanent native plant community impacts. The parameters for the BRMP will be formed with the mitigation measures from this project-level EIR/EIS, including terms and conditions as applicable from the USFWS, USACE, SWRCB, and CDFW permits. The goal of the BRMP is to provide an organized reporting tool to ensure that the mitigation measures and terms and conditions are implemented in a timely manner and are reported on. These measures, terms, and conditions include all avoidance, minimization, repair, mitigation, and compensatory actions stated in the mitigation measures or terms and conditions from the permits referenced above. These measures, terms, and conditions are tracked through final design, implementation, and post-construction phases. The BRMP will help the long-term perpetuation of biological resources within the temporarily disturbed areas and protect adjacent targeted habitats. The BRMP will be submitted to the Contractor and will contain, but not be limited to, the following information: a. A master schedule that shows that construction of the project, Pre-construction surveys, and establishment of buffers and exclusions zones to protect sensitive biological resources. b. Specific measures for the protection of special-status species. c. 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. d. Procedures for vegetation analyses of temporarily affected habitats to approximate their relative composition and procedures for site preparation, irrigation, planting, and maintenance. This information may be used to determine the requirements of the revegetation areas for both onsite temporary impacts and offsite compensatory sites. e. Sources of plant materials and methods of propagation. f. Identification of specific parameters consistent with mitigation ratios and permit conditions for determining the amount of replacement habitat for temporary disturbance areas. g. Specification of parameters for maintenance and monitoring of re-established habitats, including weed control measures, frequency of field checks, and monitoring reports for temporary disturbance areas.			agency permit conditions			established by agency permit conditions			



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		h. Specification of performance standards for the re-established plant communities within the construction limits. i. Specification of the remedial measures to be taken if performance standards are not met (e.g., a form of adaptive management). j. Methods and requirements for monitoring restoration/replacement efforts, which will be a combination of qualitative and quantitative data consistent with mitigation measures and permit conditions. k. Measures to preserve topsoil and control erosion. l. Design of protective fencing around Environmentally Sensitive Areas (ESAs), environmentally restricted areas (ERAs), and the construction staging areas. m. Specification of the locations and quantities of gallinaceous guzzlers (catch basin/artificial watering structures) and the monitoring of water levels in them. n. Locations of trees to be protected as wildlife habitat (roosting sites) and locations for planting replacement trees. o. 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. p. Specific construction monitoring programs for habitats of concern and special-status species, as needed. q. 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. r. Provisions for biological monitoring during ground-disturbing activities to confirm compliance and success of protective measures. The monitoring procedures 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), and (4) identify the reporting requirements.									
BIO-MM#6	Prepare and Implement a Restoration and Revegetation Plan	During final design, the Project Botanist will prepare a Restoration and Revegetation Plan (RRP) for temporarily disturbed upland communities. (Site restoration will also be conducted to restore temporary impacts on valley foothill riparian areas [BIO-MM#47] and jurisdictional waters [BIO-MM#48].) In the RRP, impacts on habitat subject to temporary ground disturbances that will require	Prepare the plan Pre-construction, Implement the plan during construction, Monitoring during Post-	Prepare and Implement RRP.	Finalize the RRP Pre-construction. Follow reporting requirements as established by agency permit	Contractor	Contractor	Finalize the RRP Pre-construction. Follow reporting requirements as established by agency	Condition of the Design/Build Contract Restoration and Revegetation Plan (RRP) Compliance report to document implementation	BIO-MM#6 applies to all BIO Impacts	

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Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact #	Impact Text
		decompaction or re-grading will be addressed, if appropriate. The Project Biologist will approve the seed mix. The standards for onsite work during construction will limit highly invasive species, as defined by the California Invasive Plant Council, to less than 10% greater than the pre-disturbance condition or as determined through a comparison with an appropriate reference site with similar natural communities and management. During ground-disturbing activities, the Contractor will implement the RRP in temporarily disturbed areas. The Project Biologist will prepare and submit compliance reports to the Mitigation Manager to document implementation and performance of the RRP.	construction		conditions during Construction, and Post-Construction			permit conditions during Construction, and Post-Construction	and performances standards.		
BIO-MM#7	Delineate Environmentally Sensitive Areas and Environmentally Restricted Areas (on plans and in field)	Before the start of ground-disturbing activities, the Project Biologist, Regulatory Specialist (Waters), and Project Botanist will verify that ESAs and ERAs are delineated on final construction plans (including grading and landscape plans) and in the field and will update as necessary. ESAs are areas within the construction zone, or on compensatory mitigation sites, containing suitable habitat for special-status species and habitats of concern that may allow construction activities but have restrictions based on the presence of special-status species or habitats of concern at the time of construction. ERAs are sensitive areas that are typically outside the construction footprint that must be protected in place during all construction activities. Before and during the implementation of ground-disturbing activities, the Project Biologist, Regulatory Specialist (Waters), and Project Botanist, will mark ESAs and ERAs with high-visibility temporary fencing, flagging, or other agency-approved barriers to prevent encroachment of construction personnel and equipment. Sub-meter accurate Global Positioning System (GPS) equipment will be used to delineate all ESAs and ERAs. The Contractor will remove ESA and ERA fencing when construction is complete or when the resource has been cleared according to agency permit conditions in the MMEP and construction drawings and specifications. The Project Biologist, Regulatory Specialist (Waters), and Project Botanist, will submit a memorandum regarding the field delineation and installation of all ESAs/ERAs to the Mitigation Manager.	Pre-construction, Construction	Identify and Establish ESAs and ERAs; Remove Fencing, Memo to Mitigation Manager	Prior to Construction. Following reporting schedule established by agency permit requirements	Contractor	Contractor	Prior to Construction. Following reporting schedule established by agency permit requirements	Condition of Design/Build Contract	BIO-MM#7 applies to all BIO Impacts	

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Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact #	Impact Text
BIO-MM#8	Wildlife Exclusion Fencing	The Contractor, under the supervision of the Project Biologist will install wildlife-specific exclusion barriers at the edge of the construction footprint. Exclusion barriers will be made of durable material, regularly maintained, and installed below-grade by the Contractor under the supervision of the Project Biologist. Wildlife exclusion fencing will be installed along the outer perimeter of ESAs and ERAs and below-grade (e.g., 6 to 10 inches below-grade). The design specifications of the exclusion fencing will be determined through consultation with USFWS and/or CDFW. The wildlife exclusion barrier will be monitored, maintained at regular intervals throughout construction, and removed after the completion of major construction activities. The Project Biologist will submit a memorandum to the Mitigation Manager to document compliance with this measure.	Pre-construction, Construction	Installation of wildlife-specific exclusion barriers; Memo to Mitigation Manager	Following reporting schedule established by agency permit requirements	Contractor	Contractor	Following reporting schedule established by agency permit requirements	Condition of Design/Build Contract	BIO#6	Project impact from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status reptiles and amphibian species.
										BIO#6	Project impact from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status mammal species.
BIO-MM#9	Equipment Staging Areas	Before the start of ground-disturbing activities, the Project Biologist, Regulatory Specialist (Waters), and Project Botanist will confirm that staging areas for construction equipment are outside areas of sensitive biological resources, including habitat for special-status species, habitats of concern, and wildlife movement corridors, to the extent feasible. The Project Biologist, Regulatory Specialist (Waters), and Project Botanist will submit a memorandum to the Mitigation Manager to document compliance with this measure.	Pre-construction, Construction	Monitoring and Reporting	Following reporting schedule established by agency permit requirements	Contractor	Contractor	Following reporting schedule established by agency permit requirements	Condition of Design/Build Contract	BIO-MM#9 applies to all BIO Impacts	
BIO-MM#10	Mono-Filament Netting	Thirty days before and during the implementation of ground-disturbing activities, the Project Biologist will verify that that the Contractor is not using plastic mono-filament netting (erosion-control matting) or similar material in erosion control materials; acceptable substitutes include coconut coir matting, tackified hydroseeding compounds, rice straw wattles (e.g., Earthsaver wattles: biodegradable, photodegradable, burlap), and other reusable erosion, sediment, and wildlife control systems that may be approved by the regulatory agencies (e.g., ERTEC Environmental Systems products). The Project Biologist will submit memoranda to the Mitigation Manager to document compliance with this measure; the memoranda will be submitted monthly or as appropriate throughout project construction.	Pre-construction, Construction	Monitoring and Reporting	Monthly or in accordance with reporting schedule established by agency permit requirements	Project Biologist	Project Biologist	Monthly or in accordance with reporting schedule established by agency permit requirements	Condition of Design/Build Contract	BIO#2	Construction of the Preferred Alternative would disturb the suitable habitat that has potential to support special-status reptile and amphibian species.
										BIO#2	Construction of the Preferred Alternative would disturb suitable habitat that has the potential to support special-status mammal species.
										BIO#6	Project impact from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status reptiles and amphibian species.
										BIO#6	Project impact from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status mammal species.

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Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact #	Impact Text
BIO-MM#11	Vehicle Traffic	During ground-disturbing activities, the contractor will restrict project vehicle traffic within the construction area to established roads, construction areas, and other designated areas. The contractor will establish vehicle traffic in locations disturbed by previous activities to prevent further adverse effects, require observance of a 15 mile per hour (mph) speed limit for construction areas with potential special-status species habitat, clearly flag and mark access routes, and prohibit off-road traffic. The Project Biologist will submit a memorandum to the Mitigation Manager to document compliance with this measure; memoranda will be submitted on a weekly basis or as appropriate throughout project construction.	Construction	Establish vehicle routes, clearly flag and mark access routes, and prohibit off-road traffic, monitor and report	Weekly	Contractor	Contractor	Weekly	Condition of Design/Build Contract	BIO-MM#11 applies to all BIO Impacts	
BIO-MM#12	Entrapment Prevention	To prevent inadvertent entrapment of protected species, the Contractor, under the guidance of the Project Biologist, will cover all excavated, steep-sided holes or trenches more than 8 inches deep at the close of each work day with plywood or similar materials or provide a minimum of one escape ramp per 10 feet of trenching (with slopes no greater than a 3:1) constructed of earth fill or wooden planks. The Project Biologist will thoroughly inspect holes and trenches for trapped animals before leaving the construction site each day. The Contractor will either screen, cover, or store more than 1 foot off the ground all construction pipe, culverts, or similar structures with a diameter of 3 inches or greater that are stored at the construction site for one or more overnight periods and these pipes, culverts, and similar structures will be inspected by the Project Biologist for wildlife before the material is moved, buried, or capped. The Project Biologist will clear stored material for common and special-status wildlife species before the pipe is subsequently buried, moved, or capped (covered). The Project Biologist will submit memoranda to the Mitigation Manager to document compliance with this measure; the memoranda will be submitted on a weekly basis or as appropriate throughout project construction.	Construction	Cover holes and trenches and protect pipes >3 inches in diameter	Weekly	Contractor	Contractor	Weekly	Condition of Design/Build Contract	BIO#2	Construction of the Preferred Alternative would disturb the suitable habitat that has potential to support special-status reptile and amphibian species.
										BIO#2	Construction of the Preferred Alternative would disturb suitable habitat that has the potential to support special-status mammal species.
										BIO#6	Project impact from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status reptiles and amphibian species.
										BIO#6	Project impact from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status mammal species.

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Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact #	Impact Text
BIO-MM#13	Work Stoppage	During ground-disturbing activities, the Project Biologist, Regulatory Specialist (Waters), and Project Botanist or Project Biological Monitor will halt work in the event that a special-status wildlife species gains access to the construction footprint. This work stoppage will be coordinated with the resident engineer and/or the Authority or its designee. The Contractor will suspend ground-disturbing activities in the immediate construction area where the potential construction activity could result in "take" of special-status wildlife species; work may continue in other areas. Before construction, the Contractor will obtain written permission from CDFW to capture and relocate any non-listed wildlife species (does not include domesticated animals) from within the project footprint.	Construction	Stop Work, relocate species (if possible), and report	1 day following work stoppage	Contractor	Contractor	1 day following work stoppage	Condition of Design/Build Contract	BIO-MM#13 applies to all BIO Impacts	
BIO-MM#14	"Take" Notification and Reporting	The Project Biologist, Regulatory Specialist (Water), or Project Botanist will immediately notify the Mitigation Manager in the event of an accidental death or injury to a federal- or state-listed species during project activities. The Project Biologist will then notify USFWS and/or CDFW within 24 hours in the event of an accidental death or injury to a federal- or state-listed species during project activities. The Project Biologist will submit a memorandum to the Mitigation Manager to document compliance with this measure. The memorandum will also identify suggested revisions to the construction activities or additional measures that will be implemented to minimize or prevent future impacts.	Construction	Notification of Mitigation Manager, USFWS and/or CDFW and recommendation of additional measures	Immediate notification of Mitigation Manager; Notify USFWS and/or CDFW within 24 hours	Contractor	Contractor	Immediate notification of Mitigation Manager; Notify USFWS and/or CDFW within 24 hours	Condition of Design/Build Contract	BIO#2	Construction of the Preferred Alternative would disturb suitable habitat that has potential to support special-status invertebrate species.
										BIO#2	Construction of the Preferred Alternative would disturb suitable habitat that has potential to support special status reptiles and amphibians
										BIO#2	Construction of the Preferred Alternative would disturb suitable habitat that has potential to support special status bird species
										BIO#2	Construction of the Preferred Alternative would disturb suitable habitat that has potential to support special status mammal species
										BIO#6	Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status invertebrate species.
										BIO#6	Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status reptile and amphibian species.
										BIO#6	Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status bird species (including raptors).
BIO-MM#15	Post-Construction Compliance Reports	After each construction package, construction phase, permitting phase, or other portion of the HST section as defined by Authority is completed, the Mitigation Manager, or their designee, will submit post-construction compliance reports consistent with the requirements of the protocols of each appropriate agency (e.g., USFWS, CDFW), including compliance with regulatory agency permits. The Mitigation Manager will submit a memorandum to the regulatory agencies to document compliance with this measure. The frequency of the memorandum compilation and submission will be consistent with the requirements in the regulatory agency permits.	Post-construction	Compliance Reporting	In accordance with reporting schedule established by agency permit requirements	Contractor	Contractor	In accordance with reporting schedule established by agency permit requirements	Condition of Design/Build Contract	BIO-MM#15 applies to all BIO Impacts	

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Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact #	Impact Text
BIO-MM#16	Conduct Protocol-Level Pre-construction Surveys for Special-Status Plant Species and Special-Status Plant Communities	<p>Prior to construction, the Project Botanist will conduct protocol-level, pre-construction botanical surveys for special-status plant species and special-status plant communities in all potentially suitable habitats where permission to enter was not granted prior to construction. The surveys will be conducted during the appropriate blooming period(s) for the species before the start of ground-disturbing activities for salvage and relocation activities. The Project Botanist will mark the locations of all special-status plant species and special-status plant communities observed for the Contractor to avoid. Before the start of ground-disturbing activities, all populations of special-status plant species and special-status plant communities identified during pre-construction surveys within 100 feet of the construction footprint will be protected and delineated by the Contractor (directed by the Project Botanist) as ERAs. As appropriate, the Project Botanist will update the mapping of special-status species or habitats of concern within the construction limits based on resource agency permits.</p> <p>Portions of the construction footprint that support special-status plant species that will be temporarily disturbed will be restored onsite to pre-construction conditions. Before disturbance, pre-construction conditions, including species composition, species richness, and percent cover of key species will be documented, and photo points will be established. If special-status plant species cannot be avoided, mitigation for impacts on these species will be documented (density, percent cover, key habitat characteristics, including soil type, associated species, hydrology, topography, and photo documentation of pre-construction conditions) and incorporated into a relocation/compensation program, as defined in BIO-MM#17. The Project Botanist will provide verification of survey results and report findings through a memorandum to the Mitigation Manager to document compliance with this measure.</p>	Pre-construction, Construction, and Post-construction	Conduct protocol level surveys for special-status plant species; Report findings; Restore temporary disturbed areas	Report findings at least 30 days prior to ground disturbance	Contractor	Contractor	Report findings at least 30 days prior to ground disturbance	Condition of Design/Build Contract Following requirements established by regulatory compliance permits	BIO#1	Construction of the Preferred Alternative would directly or indirectly impact suitable habitat that has potential to support special-status plant species.
										BIO#3	Construction of the Preferred Alternative would disturb special-status plant communities, and riparian areas.
										BIO#5	Project impacts from the Preferred Alternative would permanently impact special-status plant species or suitable habitat that has potential to support these species.
										BIO#7	Project impacts from the Preferred Alternative would permanently impact special-status plant communities, and riparian areas.
										BIO#7	Project impacts from the Preferred Alternative would disturb portions of recovery plans.
BIO-MM#17	Prepare and Implement Plan for Salvage, Relocation and/or Propagation of Special-Status Plant Species	<p>The Project Botanist will prepare a plan before the start of ground-disturbing activities to address monitoring, salvage, relocation, and propagation of special-status plant species. The relocation or propagation of plants and seeds will be performed at a suitable mitigation site approved by the appropriate regulatory agencies, and as appropriate per species. Documentation will include provisions that address the techniques, locations, and procedures required for the successful establishment of the plant populations. The plan will include provisions for performance that address survivability requirements,</p>	Pre-construction (Plan), Implementation during construction, Monitoring post-construction	Prepare/Implement Plan and Report Compliance	Follow reporting requirements as established by regulatory compliance permits.	Contractor	Contractor	Follow reporting requirements as established by regulatory compliance permits.	Condition of Design Build Contract Salvage, Relocation, and Propagation of Special Status Plant Species Following requirements established by regulatory compliance permits	BIO#1	Construction of the Preferred Alternative would directly or indirectly impact suitable habitat that has potential to support special-status plant species.
										BIO#5	Project impacts from the Preferred Alternative would permanently impact special-status plant species or suitable habitat that has potential to support these species.
										BIO#7	Project impacts from the Preferred Alternative would disturb portions of recovery plans.



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		maintenance, monitoring, implementation, and the annual reporting requirements. Permit conditions issued by the appropriate resource agencies (e.g., USFWS, CDFW) will guide the development of the plan and performance standards. The Project Botanist will submit a memorandum to the Mitigation Manager to document compliance with this measure.									
BIO-MM#18	Conduct Pre-construction Sampling and Assessment for Vernal Pool Fauna	Before the start of ground-disturbing activities, the Project Biologist will conduct pre-construction aquatic assessment and sampling in seasonal wetlands and vernal pools in the construction footprint. The approved biologists will visit the sites after initial storm events to determine when seasonal wetlands and vernal pools have been inundated. A seasonal wetland/vernal pool is considered to be inundated when it holds greater than 3 cm of standing water 24 hours after a rain event. Approximately 2 weeks after the pools are inundated, the biologists will conduct general aquatic surveys in appropriate seasonal wetland and vernal pool habitats. The sampling is an assessment that will be useful in understanding the species present and will help guide the implementation of the performance standards to be consistent with BIO-MM#20: Implement and Monitor Vernal Pool Protection. The Project Biologist will submit a report to the Mitigation Manager and Authority or its designee within 30 days of completing the field work. The report will provide the documentation and the results of the sampling, including the results of the data collection and a comparison with the performance standards.	Pre-construction	Aquatic assessment and sampling; reporting	Report findings at least 30 days prior to ground disturbance	Contractor	Contractor	Report findings at least 30 days prior to ground disturbance	Condition of Design Build Contract Following requirements established by regulatory compliance permits	BIO#2	Construction of the Preferred Alternative would disturb suitable habitat that has potential to support special-status invertebrate species.
										BIO#6	Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status invertebrate species.
										BIO#7	Project impacts from the Preferred Alternative would disturb portions of recovery plans.
BIO-MM#19	Seasonal Vernal Pool Work Restriction	For seasonal avoidance of special-status vernal pool branchiopods and vernal-pool-dependent species (e.g., vernal pool branchiopods, western spadefoot toads, California tiger salamanders), the Contractor will not work within 250 feet of suitable aquatic habitats (e.g., vernal pools, seasonal wetlands) from October 15 to June 1 (corresponding to the rainy season) or as determined through informal or formal consultation with the USFWS or USACE. Ground-disturbing activities may begin once the habitat is no longer inundated for the season and it is after April 15. If any work remains to be completed after October 15, the Contractor (under the direction of the Project Biologist) will install exclusion fencing and erosion control measures in those areas where construction activities need to be completed. The Project Biologist will document compliance through memoranda to the Mitigation Manager during the establishment of the fencing activities.	Construction	Exclusion fencing, Reporting	Follow reporting requirements as established by regulatory compliance permits	Contractor	Contractor	Follow reporting requirements as established by regulatory compliance permits	Condition of Design Build Contract Following requirements established by regulatory compliance permits	BIO#2	Construction of the Preferred Alternative would disturb suitable habitat that has potential to support special-status invertebrate species.
										BIO#6	Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status invertebrate species.
										BIO#7	Project impacts from the Preferred Alternative would disturb portions of recovery plans.

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Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact #	Impact Text
BIO-MM#20	Implement and Monitor Vernal Pool Protection	Although all temporary impacts on vernal pools are considered to be permanent and will be mitigated through offsite compensatory mitigation (see BIO-MM#63), vernal pools within the temporary construction footprint will be protected by erecting exclusion fencing, if they can be avoided. The Contractor will erect and maintain the exclusion fencing. For impacts on vernal pools within the temporary construction footprint that cannot be avoided, the Contractor, under the guidance of the Regulatory Specialist (Waters), will place rinsed gravel within the affected vernal pools and will cover the affected vernal pools with geotextile fabric before the start of ground-disturbing activities to minimize damage to the soils and protect the contours. The Contractor, under the direction of the Regulatory Specialist (Waters), will collect a representative sampling of soils from the vernal pools before initiating ground-disturbing activities within the vernal pools. The representative soil samples will contain viable plant seeds and vernal pool branchiopod cysts to be preserved from the vernal pools. These samples may be incorporated into other vernal pools, as applicable, with USFWS and/or CDFW consultation. The Contractor will implement these measures within temporary impact areas adjacent to or within the construction footprint. Resource agency consultations with the USFWS and USACE will occur as needed and based on permit conditions. The Regulatory Specialist (Waters) will submit a memorandum on a weekly basis or at other appropriate intervals to the Mitigation Manager to document compliance with this measure. Because impacts to vernal pools within the temporary construction footprint are considered to be permanent impacts, these impacts will be mitigated through offsite mitigation, as described in BIO-MM#63. The Contractor will obtain approval from USACE, before the implementation of the above-described mitigation measures, for any unanticipated temporary impacts on vernal pools. If unanticipated temporary impacts last more than one full wet-dry season cycle, offsite mitigation will be implemented.	Construction	Exclusion fencing, collection of soil material, off-site compensatory mitigation; reporting	Weekly or reporting requirements as established by regulatory compliance permits	Contractor	Contractor	Weekly or reporting requirements as established by regulatory compliance permits	Condition of Design Build Contract Following requirements established by regulatory compliance permits	BIO#2	Construction of the Preferred Alternative would disturb suitable habitat that has potential to support special-status invertebrate species.
										BIO#6	Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status invertebrate species.
										BIO#7	Project impacts from the Preferred Alternative would disturb portions of recovery plans.
BIO-MM#21	Implement Avoidance and Minimization Measures for the Valley Elderberry Longhorn Beetle	Before and during the implementation of ground-disturbing activities, the Project Biologist will direct the Contractor to implement the avoidance and minimization measures detailed in the Conservation Guidelines for the Valley Elderberry Longhorn Beetle (USFWS 1999a). These measures include conducting protocol-level presence/absence surveys for this species, establishing and maintaining appropriate buffer areas around elderberry	Pre-construction, Construction, Post-construction	Protocol-level surveys, implementation of avoidance and minimization measures, restore temporary disturbances	Weekly or reporting requirements as established by regulatory compliance permits	Contractor	Contractor	Weekly or reporting requirements as established by regulatory compliance permits	Condition of Design Build Contract Following requirements established by regulatory compliance permits	BIO#2	Construction of the Preferred Alternative would disturb suitable habitat that has potential to support special-status invertebrate species.
										BIO#6	Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status invertebrate species.
										BIO#7	Project impacts from the Preferred Alternative would disturb portions of recovery plans.



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		plants, restricting the use of chemicals that might harm beetles, and mowing restrictions. After ground-disturbing activities are completed, any damage to temporarily disturbed buffer areas surrounding elderberry shrubs will be restored as detailed in the Conservation Guidelines for the Valley Elderberry Longhorn Beetle (USFWS 1999a). The Project Biologist will submit a memorandum, on a weekly basis or at other appropriate intervals, to the Mitigation Manager to document compliance with this measure.		following construction							
BIO-MM#22	Conduct Pre-construction Surveys for Special-Status Reptile and Amphibian Species	Before the start of ground-disturbing activities, the Project Biologist will conduct pre-construction surveys in suitable habitats to determine the presence or absence of special-status reptiles and amphibian species within the construction footprint. Surveys will be conducted no more than 30 days before the start of ground-disturbing activities and will be phased with project build-out. The results of the pre-construction survey will be used to guide the placement of the environmentally sensitive areas, ERAs, and wildlife exclusion fencing. The Project Biologist will submit a memorandum, on a weekly basis or at other appropriate intervals, to the Mitigation Manager to document compliance with this measure.	Pre-construction, Construction	Pre-construction surveys for special status species, and establishment of ESAs and ERAs	Weekly or at other appropriate interval	Contractor	Contractor	Surveys conducted 30 days prior to ground disturbance, During construction submit weekly reports or reporting requirements as established by regulatory compliance permits	Condition of Design Build Contract Following requirements established by regulatory compliance permits	BIO#2	Construction of the Preferred Alternative would disturb the suitable habitat that has potential to support special-status reptiles and amphibian species.
										BIO#6	Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status reptiles and amphibian species
										BIO#7	Project impacts from the Preferred Alternative would disturb portions of recovery plans.
BIO-MM#23	Conduct Special-Status Reptile and Amphibian Monitoring, Avoidance, and Relocation	During ground-disturbing activities, the Project Biological Monitor will observe all construction activities in habitat that supports special-status reptiles and amphibians. If suitable habitat is present and environmentally sensitive areas are deemed necessary, the Project Biological Monitor will conduct a clearance survey within the area for special-status reptiles and amphibians after wildlife exclusion fencing is installed. If a special-status reptile or amphibian is present during construction, the Contractor will avoid the special-status reptile or amphibian species. Otherwise, the Project Biological Monitor will relocate special-status reptiles or amphibians (other than California tiger salamander) found in the Environmentally Sensitive Area or construction footprint to an area outside the construction area as determined through consultation with USFWS and/or CDFW. If necessary, clearance surveys will be conducted daily. The Project Biologist will submit a memorandum, on a weekly basis or at other appropriate intervals, to the Mitigation Manager to document compliance with this measure.	Construction	Monitoring during construction, reporting	Contractor	Contractor	Contractor	Daily monitoring, weekly or reporting requirements as established by regulatory compliance permits	Condition of Design Build Contract Following requirements established by regulatory compliance permits	BIO#2	Construction of the Preferred Alternative would disturb the suitable habitat that has potential to support special-status reptiles and amphibian species.
										BIO#6	Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status reptiles and amphibian species
										BIO#7	Project impacts from the Preferred Alternative would disturb portions of recovery plans.

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BIO-MM#24	Conduct Protocol and Pre-construction Surveys for California Tiger Salamander	In the annual grassland and pasture habitats in the Cross Creek grassland region, protocol-level surveys will be conducted in accordance with the Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander (USFWS and CDFG 2003). The purpose of these surveys will be to determine presence or absence of the California tiger salamander within the study area. Before the start of ground-disturbing activities, a qualified, agency-approved biologist (designated by the Project Biologist) will conduct visual pre-construction surveys in suitable habitats in the Cross Creek grassland region. Surveys will be conducted no more than 30 days before the start of ground-disturbing activities and will be phased with project build-out. In the unlikely event that California tiger salamander individuals are found within the project footprint during protocol-level pre-construction surveys, the Project Biologist will contact the USFWS and CDFW to identify appropriate avoidance and minimization measures to be implemented for this species. The Project Biologist will submit a memorandum, on a weekly basis or at other appropriate intervals, to the Mitigation Manager to document compliance with this measure.	Pre-construction	Protocol and Pre-construction level surveys	Protocol level surveys, Pre-construction 30 day prior to construction; Weekly reporting or reporting requirements as established by regulatory compliance permits	Contractor	Contractor	Protocol level surveys (at least 1 year prior to ground disturbance), pre-construction 30 day prior to construction; Weekly reporting or reporting requirements as established by regulatory compliance permits	Condition of Design Build Contract Following requirements established by regulatory compliance permits	BIO#2	Construction of the Preferred Alternative would disturb the suitable habitat that has potential to support special-status reptiles and amphibian species.
										BIO#6	Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status reptiles and amphibian species
										BIO#7	Project impacts from the Preferred Alternative would disturb portions of recovery plans.
BIO-MM#25	Implement Avoidance and Minimization Measures for California Tiger Salamander	The measures listed below will be implemented in the Cross Creek grassland region to avoid and minimize potential adverse effects to this species: • The Contractor, under the direction of the Project Biologist will install, and maintain exclusion fencing along the perimeter of the construction footprint. The Project Biological Monitor will monitor the exclusion fencing to ensure that no take of California tiger salamander or destruction of their potential habitat outside of the project footprint occurs. Exclusion fencing will be composed of a combination of high-visibility construction fence and wildlife exclusion fence. Exclusion fencing must be trenched into the soil at least 4 inches in depth, with the soil compacted against both sides of the fence for its entire length to prevent central California tiger salamanders from passing under the fence. Barriers must be inspected by an USFWS-approved Project Biological Monitor at least twice weekly on non-consecutive days outside of the breeding season. Barriers will be inspected daily following any rain event and during months when juvenile central California tiger salamanders are most likely emigrating from their breeding ponds in search of burrows in surrounding upland habitat. Barriers will be installed by the Contractor with turn-arounds	Construction	Establish exclusion fencing	Daily or Twice per week inspections (non-consecutive days), weekly reporting	Contractor	Contractor	Daily or twice per week inspections (non-consecutive days), weekly reporting	Condition of Design Build Contract	BIO#2	Construction of the Preferred Alternative would disturb the suitable habitat that has potential to support special-status reptiles and amphibian species.
										BIO#6	Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status reptiles and amphibian species
										BIO#7	Project impacts from the Preferred Alternative would disturb portions of recovery plans.

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		at any access openings needed in the fencing, to redirect central California tiger salamanders away from openings. • The Contractor will not conduct construction activities within 250 feet of potential California tiger salamander breeding habitat during the wet season (October 15 through June 1); however, construction activities may begin once the habitat is no longer inundated for the season and it is after April 15. The Project Biologist will submit a memorandum, on a weekly basis or at other appropriate intervals, to the Mitigation Manager to document compliance with this measure.									
BIO-MM#26	Conduct Protocol-Level Surveys for Blunt-Nosed Leopard Lizard	The Project Biologist will conduct protocol-level surveys in suitable habitats for the blunt-nosed leopard lizard within 1 year of each construction phase. These surveys will be conducted in areas of potential blunt-nosed leopard lizard habitat in accordance with the Approved Survey Methodology for the Blunt-Nosed Leopard Lizard (CDFG 2004). The Project Biologist will submit a memorandum, on a weekly basis or at other appropriate intervals, to the Mitigation Manager to document compliance with this measure.	Pre-construction	Conduct Protocol level surveys; Reporting	Surveys within 1 year prior to construction; Reporting weekly or in Survey Methodology	Contractor	Contractor	Within 1 year prior to construction or as required in Survey Methodology	Condition of Design Build Contract	BIO#2	Construction of the Preferred Alternative would disturb the suitable habitat that has potential to support special-status reptiles and amphibian species.
										BIO#6	Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status reptiles and amphibian species
										BIO#7	Project impacts from the Preferred Alternative would disturb portions of recovery plans.
BIO-MM#27	Phased Pre-construction Surveys for Blunt-Nosed Leopard Lizard	The Project Biologist will conduct visual pre-construction surveys in areas of potential blunt-nosed leopard lizard habitat no more than 30 days before ground-disturbing activities. The Project Biological Monitor will conduct daily clearance surveys before construction activities. The Project Biologist will submit a memorandum, on a weekly basis or at other appropriate intervals, to the Mitigation Manager to document compliance with this measure.	Pre-construction	Pre-construction Surveys; Daily clearance surveys; reporting	Surveys within 30 days prior to ground disturbance; daily clearance surveys; weekly reporting or reporting requirements as established by regulatory compliance permits	Contractor	Contractor	Surveys within 30 days prior to ground disturbance; daily clearance surveys; weekly reporting or reporting requirements as established by regulatory compliance permits	Condition of Design Build Permit	BIO#2	Construction of the Preferred Alternative would disturb the suitable habitat that has potential to support special-status reptiles and amphibian species.
										BIO#6	Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status reptiles and amphibian species
										BIO#7	Project impacts from the Preferred Alternative would disturb portions of recovery plans.
BIO-MM#28	Blunt-Nosed Leopard Lizard Avoidance	During the active season (April 15 through October 15), in areas where blunt-nosed leopard lizards or blunt-nosed leopard lizard signs are present, the following measures will be implemented:  • Following the phased pre-construction survey for blunt-nosed leopard lizard within the construction footprint (see BIO-MM#27), if active burrows or egg clutch sites are identified within the construction footprint, the Contractor and Project Biologist will establish, maintain, and monitor 50-foot buffers around	Construction	Establish buffers, vegetation removal, pre-construction survey, and passive relocation; erect barriers; monitoring and reporting	Weekly reporting	Contractor	Contractor	Weekly reporting	Condition of Design Build Contract	BIO#2	Construction of the Preferred Alternative would disturb the suitable habitat that has potential to support special-status reptiles and amphibian species.
										BIO#6	Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status reptiles and amphibian species
										BIO#7	Project impacts from the Preferred Alternative would disturb portions of recovery plans.

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		<p>active burrows and egg clutch sites. The 50-foot buffers will be established around the active burrow and clutch sites in a manner that allows for blunt-nosed leopard lizard to leave the construction footprint after the young have hatched. Project activities within the 50-foot buffers, including vegetation clearing and grubbing (as described below), will be prohibited until the eggs have hatched and blunt-nosed leopard lizard have been allowed to leave the construction footprint, as determined by the Project Biologist.</p> <ul style="list-style-type: none"> <li>Following the phased pre-construction survey for blunt-nosed leopard lizard within the construction footprint (see BIO-MM#27), if no active burrows or egg clutch sites are identified within the construction footprint, the Contractor, under the direction of the Project Biologist will conduct vegetation clearing and grubbing activities with hand tools. Cleared vegetation will be cut to 4 inches above the ground level, and all trimmings will be removed from the construction footprint. The vegetation-free work area will be allowed to sit undisturbed for a minimum of 72 hours to allow blunt-nosed leopard lizards to passively relocate from the site. A follow-up pre-construction survey will be conducted in the vegetation-free work area to look for blunt-nosed leopard lizards or their sign. Any blunt-nosed leopard lizards observed during the follow-up survey will be allowed to leave the work site on their own accord. Immediately after the follow-up pre-construction survey of the vegetation-free work area, the construction footprint will be delineated with high-visibility construction fence and a wildlife exclusion fence with "a non-gaping, non-climbable barrier using a rigid and non-climbable material." The vegetation-free work area within the wildlife exclusion fence will be maintained by the Contractor and monitored daily by the Project Biologist.</li> <li>The Contractor will conduct ground-disturbing activities when air temperatures are between 75 and 95 degrees Fahrenheit. The temperature range corresponds to the period when this species is moving around and can avoid danger.</li> </ul> <p>During the non-active season (October 16 through April 14), suitable blunt-nosed leopard lizard burrows identified during protocol-level and pre-construction surveys will be avoided by the Contractor. A 50-foot no-work buffer will be established around burrows to prevent impacts until the active season, when blunt-</p>									

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		<p>nosed leopard lizards will be able to leave the vegetation-free work area on their own accord. The no-work buffer will be established by routing the high-visibility construction fence and wildlife exclusion fence around the suitable burrow sites in a manner that allows for a connection between the burrow site and the suitable natural habitat adjacent to the footprint so that blunt-nosed leopard lizard individuals are able to leave the construction footprint during the active season. If construction activities are required during this period, the appropriate measures will be established through consultation with USFWS and CDFW.</p> <p>Non-disturbance exclusion zones will be maintained by the Contractor and monitored by USFWS-approved biological monitor(s) to avoid the possibility for take of lizards, their burrows/nests, or the species' habitat outside of the project footprint.</p> <p>If blunt-nosed leopard lizards are observed at any time during protocol-level surveys, phased pre-construction surveys, or during construction, USFWS and CDFW will be contacted. Appropriate measures to avoid take of the species will be established through consultation with the USFWS and CDFW. The Project Biologist will submit a memorandum, on a weekly basis or at other appropriate intervals, to the Mitigation Manager to document compliance with this measure.</p>									
BIO-MM#29	Conduct Pre-construction Surveys and Delineate Active Nest Exclusion Areas for Other Breeding Birds	<p>Before the start of ground-disturbing activities, the Project Biologist will conduct visual pre-construction surveys where suitable habitats are present for nesting birds protected by the MBTA if construction and habitat removal activities are scheduled to occur during the bird breeding season (February 1 to August 15). In the event active bird nests are encountered during the pre-construction survey, the Project Biologist in conjunction with the Contractor will establish nest avoidance buffer zones as appropriate. The buffer distances will be consistent with the intent of the MBTA. The Project Biologist will delineate nest avoidance buffers established for ground-nesting birds in a manner that does not create predatory bird perch points in close proximity (150 feet) to the active nest site. The Project Biologist or Biological Monitor will periodically monitor active bird nests. The Project Biologist will maintain the nest avoidance buffer zone until nestlings have fledged and are no longer reliant on the nest or parental care for survival or the nest is abandoned (as determined by</p>	Pre-construction	Pre-construction surveys, and establish nest buffers	Surveys conducted prior to disturbance; Report weekly or as established by regulatory compliance permits	Contractor	Contractor	Surveys conducted prior to disturbance; Report weekly or as established by regulatory compliance permits	Condition of Design Build Permit	BIO#2 BIO#6 BIO#7	<p>Construction of the Preferred Alternative would disturb suitable habitat that was potential to support nesting special-status bird species (including raptors).</p> <p>Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status bird species (including raptors).</p> <p>Project impacts from the Preferred Alternative would disturb portions of recovery plans.</p>



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		the Project Biologist). The Project Biologist will submit a memorandum, on a weekly basis or at other appropriate intervals, to the Mitigation Manager to document compliance with this measure.									
BIO-MM#30	Conduct Pre-construction Surveys and Monitoring for Raptors	No more than 14-days before the start of ground-disturbing activities, the Project Biologist will conduct visual pre-construction surveys where suitable habitats are present for nesting raptors if construction and habitat removal activities are scheduled to occur during the bird-breeding season (February 1 to August 15). Surveys will be conducted in areas within the construction footprint and, where permissible, within 500 feet of the construction footprint for raptor species (not Fully Protected species) and 0.5 mile of the construction footprint for Fully Protected raptor species. The required survey dates will be modified based on local conditions. If breeding raptors with active nests are found, the Project Biologist in conjunction with the Contractor will establish a 500-foot buffer around the nest to be maintained until the young have fledged from the nest and are no longer reliant on the nest or parental care for survival or the nest fails (as determined by the Project Biologist). If fully protected raptors (e.g., white tailed-kite) with active nests are found, the Project Biologist in conjunction with Contractor will establish a 0.5-mile buffer around the nest to be maintained until the young have fledged from the nest or the nest fails (as determined by the Project Biologist). Adjustments to the buffer(s) will require prior approval by USFWS and/or CDFW. The Project Biologist will submit a memorandum, on a weekly basis or at other appropriate intervals, to the Mitigation Manager to document compliance with this measure.	Pre-construction, Construction	Pre-construction surveys, and establishment of nest buffers	Surveys conducted no more than 14 days prior to construction; Report weekly or as established by regulatory compliance permits	Contractor	Contractor	Surveys conducted no more than 14 days prior to construction; Report weekly or as established by regulatory compliance permits	Condition of Design Build Permit	BIO#2	Construction of the Preferred Alternative would disturb suitable habitat that was potential to support nesting special-status bird species (including raptors).
										BIO#6	Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status bird species (including raptors).
										BIO#7	Project impacts from the Preferred Alternative would disturb portions of recovery plans.
BIO-MM#31	Bird Protection	During Final Design, the Project Biologist will verify that the catenary system, masts, and other structures such as fencing 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). The Project Biologist will check the final design drawings and submit a memorandum to the Mitigation Manager to document compliance with this measure.	Construction	Verify structures are raptor safe in accordance with APLIC guidance; Compliance Reporting	Prior to final design	Contractor	Contractor	Prior to final design	Condition of Design Build Contract Condition of regulatory permits	BIO#2	Construction of the Preferred Alternative would disturb suitable habitat that was potential to support nesting special-status bird species (including raptors).
										BIO#6	Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status bird species (including raptors).
										BIO#7	Project impacts from the Preferred Alternative would disturb portions of recovery plans.
BIO-MM#32	Conduct Protocol and Pre-construction	The Project Biologist will conduct pre-construction surveys for Swainson's hawks as described in the Recommended Timing and Methodology for Swainson's Hawk Nesting	Pre-construction	Conduct Protocol and Pre-construction	Weekly or as established by regulatory compliance	Contractor	Contractor	Weekly or as established by regulatory compliance	Condition of Design Build Contract Condition of regulatory	BIO#2	Construction of the Preferred Alternative would disturb suitable habitat that was potential to support nesting special-status bird species (including raptors).
										BIO#6	Project impacts from the Preferred Alternative would permanently impact

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	Surveys for Swainson's Hawks	Surveys in California's Central Valley (Swainson's Hawk Technical Advisory Committee [SHTAC] 2000). Surveys will be performed during the nesting season (March 1 through August 1) in the year before ground-disturbing activities within the construction footprint and within a 0.5-mile buffer, where access is permitted. The pre-construction nest surveys following the Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley (Swainson's Hawk Technical Advisory Committee 2000) will be phased with project build-out. The pre-construction surveys will determine the status (i.e., active, inactive) of observed nests. The Project Biologist will submit a memorandum, on a weekly basis or at other appropriate intervals, to the Mitigation Manager to document compliance with this measure.		Surveys; Compliance Reporting	permits			permits	permits		suitable habitat that has the potential to support special-status bird species (including raptors).  BIO#7 Project impacts from the Preferred Alternative would disturb portions of recovery plans.
BIO-MM#33	Swainson's Hawk Nest Avoidance and Monitoring	If active Swainson's hawk nests (defined as a nest used one or more times in the last 5 years) are found within 0.5-mile of the construction footprint during the nesting season (March 1 to August 1), the active nests within the 0.50-mile buffer of the construction footprint will be monitored daily by the Project Biological Monitor to assess whether the nest is occupied. If the nest is occupied, the health and status of the nest will be monitored until the young fledge or for the length of construction, whichever occurs first. The Project Biologist in conjunction with the Contractor, will implement buffers restricting construction activities, following CDFW's Staff Report Regarding Mitigation for Impacts to Swainson's Hawks (Buteo swainsoni) in the Central Valley of California (CDFG 1994). Adjustments to the buffer(s) may be made in consultation with CDFW. The Project Biologist will submit a memorandum, on a weekly basis or at other appropriate intervals, to the Mitigation Manager to document compliance with this measure.	Construction	Establish active nest buffers; Compliance Reporting	Weekly or as established by regulatory compliance permits	Contractor	Contractor	Weekly or as established by regulatory compliance permits	Condition of Design Build Contract Condition of regulatory permits	BIO#2  BIO#6  BIO#7	Construction of the Preferred Alternative would disturb suitable habitat that was potential to support nesting special-status bird species (including raptors).  Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status bird species (including raptors).  Project impacts from the Preferred Alternative would disturb portions of recovery plans.
BIO-MM#34	Monitor Removal of Nest Trees for Swainson's Hawks	Before the start of ground-disturbing activities, the Project Biological Monitor will monitor nest trees for Swainson's hawks in the construction footprint following the guidelines and methods presented in the Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley (SHTAC 2000). If an occupied Swainson's hawk nest must be removed, the Authority will obtain take authorization through a Section 2081 Incidental Take Permit (including compensatory mitigation to offset the loss of the nest tree) from CDFW. If ground-disturbing activities or other project activities may cause nest abandonment by a Swainson's hawk or forced fledging within the specified buffer area, monitoring of the nest site by the Project Biological Monitor will be	Construction	Monitor Swainson's hawk nest trees; Compliance Reporting	Weekly or as established by regulatory compliance permits	Contractor	Contractor	Weekly or as established by regulatory compliance permits	Condition of Design Build Contract Condition of regulatory permits	BIO#2  BIO#6  BIO#7  BIO#7	Construction of the Preferred Alternative would disturb suitable habitat that was potential to support nesting special-status bird species (including raptors).  Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status bird species (including raptors).  Project impacts from the Preferred Alternative would disturb portions of recovery plans.  Project impacts from the Preferred Alternative would disturb portions of recovery plans.

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		conducted to determine if the nest is abandoned. Removal of nesting trees outside of the nesting season (generally between October 1 and February 1) does not require authorization under the Section 2081 Incidental Take Permit. The Project Biologist will submit a memorandum, on a weekly basis or at other appropriate intervals, to the Mitigation Manager to document compliance with this measure.									
BIO-MM#35	Conduct Protocol Surveys for Burrowing Owls	Before the start of ground-disturbing activities a qualified, agency-approved biologist, designated by the Project Biologist, will conduct protocol-level surveys in accordance with CDFW's Staff Report on Burrowing Owl Mitigation (CDFG 2012c). The Project Biologist or designee will conduct these surveys at appropriate timeframes within suitable habitat located in the construction footprint. Results of the surveys will be used to inform BIO-MM#36. These surveys will be conducted within suitable habitat of the construction footprint and within a 150-meter (approximately 500-foot) buffer. The Project Biologist will submit a memorandum, on a weekly basis or at other appropriate intervals, to the Mitigation Manager to document compliance with this measure.	Pre-construction	Protocol level surveys; Compliance Reporting	Weekly or at other appropriate interval	Contractor	Contractor	Weekly or at other appropriate interval	Condition of Design Build Contract	BIO#2	Construction of the Preferred Alternative would disturb suitable habitat that was potential to support nesting special-status bird species (including raptors).
										BIO#6	Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status bird species (including raptors).
										BIO#7	Project impacts from the Preferred Alternative would disturb portions of recovery plans.
BIO-MM#36	Burrowing Owl Avoidance and Minimization	The Project Biologist will implement burrowing owl avoidance and minimization measures following CDFW's Staff Report on Burrowing Owl Mitigation (CDFG 2012). During the nesting season (February 1 through August 31) occupied burrowing owl burrows will not be disturbed unless it is verified that either the birds have not begun egg-laying and incubation or the juveniles from the occupied burrows are foraging independently and are capable of independent survival (as determined by the Project Biologist). Unless otherwise authorized by CDFW, the Project Biologist in conjunction with the Contractor will establish buffers (as an ESA) between the construction work area and occupied burrowing owl nesting sites as described in Table 3.7-19. Adjustments to the buffer(s) will require prior approval by CDFW.  Eviction of burrowing owls outside the nesting season may be permitted pending evaluation of eviction plans and receipt of formal written approval from the CDFW authorizing the eviction. If burrowing owls must be moved from the project area, the Project Biologist will undertake passive relocation measures, including monitoring, in accordance with CDFW's (CDFG 2012) guidelines. The Project Biologist will submit a memorandum, on a weekly basis or at other	Construction	Establish exclusion zones or buffers; Compliance Reporting	Weekly or at other appropriate interval	Contractor	Contractor	Weekly or at other appropriate interval	Condition of Design Build Contract	BIO#2	Construction of the Preferred Alternative would disturb suitable habitat that was potential to support nesting special-status bird species (including raptors).
										BIO#6	Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status bird species (including raptors).
										BIO#7	Project impacts from the Preferred Alternative would disturb portions of recovery plans.



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		appropriate intervals, to the Mitigation Manager to document compliance with this measure.  Table 3.7-19 California Department of Fish and Wildlife recommended restricted activity dates and setback distances by level of disturbance for burrowing owls Location Time of Year Level of Disturbance Low Medium High Nesting Sites April 1–Aug 15 200 m 500 m 500 m Nesting Sites Aug 16-Oct 15 200 m 200 m 500 m Nesting Sites Oct 16-March 31 50 m 100 m 500 m									
BIO-MM#37	Conduct Pre-construction Surveys for Nelson's Antelope Squirrel, Tipton Kangaroo Rat, Dulzura Pocket Mouse, and Tulare Grasshopper Mouse	Before the start of construction, the Project Biologist will conduct a habitat assessment in potentially suitable habitat within the project footprint to determine presence of special-status small mammal species burrows or their signs. The habitat assessment surveys will be conducted within 2 years, and no more than 14 days before the start of construction or ground-disturbing activities and may be phased with project build-out. If no burrows or signs of special-status small mammal species are detected, no further measures will be required. The Project Biologist will submit a memorandum, on a weekly basis or at other appropriate intervals, to the Mitigation Manager to document compliance with this measure.	Pre-construction	Habitat Assessment	Weekly or as established by regulatory compliance permits	Contractor	Contractor	Weekly or as established by regulatory compliance permits	Condition of Design Build Contract Condition of regulatory permits	BIO#2	Construction of the Preferred Alternative would disturb suitable habitat that has the potential to support special-status mammal species.
										BIO#6	Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status mammal species.
										BIO#7	Project impacts from the Preferred Alternative would disturb portions of recovery plans.
BIO-MM#38	Implement Avoidance and Minimization Measures for Nelson's Antelope Squirrel, Tipton Kangaroo Rat, Dulzura Pocket Mouse, and Tulare Grasshopper Mouse	If during the habitat assessment, burrows or signs of special-status small mammal species are detected, the Project Biologist will establish non-disturbance exclusion zones (i.e., wildlife exclusion fencing [e.g., a silt fence or similar material]) in areas where special-status small mammal species are believed to be present. Non-disturbance exclusion zones will be established at least 14 days before the start of ground-disturbing activities. The non-disturbance exclusion fence with one-way exit/escape points will be placed to exclude the special-status small mammals from the construction area. The wildlife exclusion fence will be established around burrows in a manner that allows state-listed species to leave the construction footprint. Additional measures such as one or both of the following will be implemented after the exclusion fencing is installed.  • The Contractor will trim and clear vegetation to the ground by hand or using hand-operated equipment to discourage the presence of special-status small mammal species in the	Construction	Establish Exclusion Zones, Vegetation Removal and Small Mammal Trapping; Compliance Reporting	Weekly or as established by regulatory compliance permits	Contractor	Contractor	Weekly or as established by regulatory compliance permits	Condition of Design Build Contract Condition of regulatory permits	BIO#2	Construction of the Preferred Alternative would disturb suitable habitat that has the potential to support special-status mammal species.
										BIO#6	Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status mammal species.
										BIO#7	Project impacts from the Preferred Alternative would disturb portions of recovery plans.

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Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact #	Impact Text
		<p>construction footprint. The cleared vegetation will remain undisturbed by project construction equipment for 14 days to allow species to passively relocate through the one-way exit/escape points along the wildlife exclusion fencing.</p> <ul style="list-style-type: none"> <li>A qualified, agency-approved biologist, designated by the Project Biologist, will conduct small-mammal trapping and relocation in general accordance with the survey protocols in the California Valley Solar Ranch Project: Plan for Relocation of Giant Kangaroo Rats (<i>Dipodomys ingens</i>) (H.T. Harvey &amp; Associates 2011) or as determined in consultation with CDFW and USFWS. The small-mammal trapping surveys will occur within the construction footprint in potentially suitable habitat for special-status small-mammal species. The trapping will be conducted before the start of construction and phased with project build-out; trapping will be limited to the dry, summer months on evenings when the nightly low temperature is forecast to exceed 50°F. The Project Biologist will submit a memorandum, on a weekly basis or at other appropriate intervals, to the Mitigation Manager to document compliance with this measure.</li> </ul>									
BIO-MM#39	Implement Avoidance and Minimization Measures for Fresno Kangaroo Rat	<p>Before the start of ground-disturbing activities, a qualified agency-approved biologist, designated by the Project Biologist, will conduct a habitat assessment on any parcels within the project footprint that may support the Fresno kangaroo rat to determine presence of kangaroo rat burrows or their signs. If no burrows or signs of kangaroo rats are detected and kangaroo rats are confirmed to be absent from the construction footprint, the following actions will be implemented:</p> <ul style="list-style-type: none"> <li>The Project Biologist will install, maintain, and monitor exclusion fencing along the perimeter of the construction footprint to ensure that no take of Fresno kangaroo rat or destruction of their potential habitat outside of the project footprint occurs.</li> <li>The Contractor, under the supervision of the Project Biologist, will trim and clear vegetation to the ground by hand or using hand-operated equipment to discourage small-mammal presence in the construction footprint. The area from which the vegetation was cleared will remain undisturbed by project construction equipment for 14 days to allow other small-mammal species to passively relocate through the one-way exit/escape points along the wildlife exclusion fencing.</li> </ul> <p>In the unlikely event that kangaroo rat individuals, their burrows, or signs of them are found within the project footprint during the</p>	Pre-construction	Habitat assessment; Agency Coordination; Compliance Reporting	Weekly Reporting or at other appropriate interval	Contractor	Contractor	Weekly Reporting or at other appropriate interval	Condition of Design Build Contract Condition of regulatory permits	BIO#2	Construction of the Preferred Alternative would disturb suitable habitat that has the potential to support special-status mammal species.
										BIO#6	Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status mammal species.
										BIO#7	Project impacts from the Preferred Alternative would disturb portions of recovery plans.

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Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact #	Impact Text
		habitat assessment, the USFWS and CDFW will be notified immediately and the FRA will reinitiate consultation to identify appropriate avoidance and minimization measures to be implemented for this species, such as: • With agency permission, small-mammal trapping may be conducted by a qualified biologist(s) with the necessary permits. The trapping surveys will be conducted in general accordance with California Valley Solar Ranch Project: Plan for Relocation of Giant Kangaroo Rats ( <i>Dipodomys ingens</i> ) (H.T. Harvey & Associates 2011) or as determined in consultation with either USFWS or CDFW and will be limited to the dry, summer months on evenings when the nightly low temperature is forecast to exceed 50°F. The Project Biologist will submit a memorandum, on a weekly basis or at other appropriate intervals, to the Mitigation Manager to document compliance with this measure.									
BIO-MM#40	Conduct Pre-construction Surveys for Special-Status Bat Species	Thirty days before the start of ground-disturbing activities, a qualified, agency-approved biologist, designated by the Project Biologist, will conduct a visual and acoustic pre-construction survey for roosting bats. A minimum of one day and one evening will be included in the visual pre-construction survey. The Project Biologist, in coordination with the Mitigation Manager and Authority, will contact CDFW if any hibernation roosts or active nurseries are identified within or immediately adjacent to the construction footprint, as appropriate. The Project Biologist will submit a memorandum, on a weekly basis or at other appropriate intervals, to the Mitigation Manager to document compliance with this measure.	Pre-construction	Pre-construction Surveys, Compliance Reporting	Weekly or at other appropriate interval	Contractor	Contractor	Weekly or at other appropriate interval	Condition of Design Build Contract	BIO#2	Construction of the Preferred Alternative would disturb suitable habitat that has the potential to support special-status mammal species.
										BIO#6	Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status mammal species.
										BIO#7	Project impacts from the Preferred Alternative would disturb portions of recovery plans.
BIO-MM#41	Bat Avoidance and Relocation	During ground-disturbing activities, if active or hibernation roosts are found, the Contractor will avoid them, if feasible, for the period of activity. If avoidance of the hibernation roost is not feasible, the Project Biologist will prepare a relocation plan and coordinate the construction of an alternative bat roost with CDFW. The Contractor, under the direction of the Project Biologist will implement the Bat Roost Relocation Plan before the commencement of construction activities. The Contractor, under the supervision of the Biological Monitors, will remove roosts with approval from CDFW before hibernation begins (October 31), or after young are flying (July 31), using exclusion and deterrence techniques described in BIO-MM#42, below. The timeline to remove vacated roosts is between August 1 and October 31. All efforts to avoid disturbance to	Construction	Bat Roost Relocation Plan; Compliance Reporting	Weekly or at other appropriate interval	Contractor	Contractor	Weekly or at other appropriate interval	Condition of Design Build Contract	BIO#2	Construction of the Preferred Alternative would disturb suitable habitat that has the potential to support special-status mammal species.
										BIO#6	Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status mammal species.
										BIO#7	Project impacts from the Preferred Alternative would disturb portions of recovery plans.

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		maternity roosts will be made during construction activities. The Project Biologist will submit a memorandum to the Mitigation Manager, on a weekly basis or at other appropriate intervals, to document compliance with this measure.									
BIO-MM#42	Bat Exclusion and Deterrence	During ground-disturbing activities, if non-breeding or non-hibernating individuals or groups of bats are found within the construction footprint, the Project Biologist will direct the Contractor to safely exclude the bats by either opening the roosting area to change the lighting and air-flow conditions or installing one-way doors or other appropriate methods specified by CDFW. The Contractor will leave the roost undisturbed by project activities for a minimum of 1 week after implementing exclusion and/or eviction activities. The Contractor will not implement exclusion measures to evict bats from established maternity roosts or occupied hibernation roosts. The Project Biologist will submit a memorandum, on a weekly basis or at other appropriate intervals, to the Mitigation Manager to document compliance with this measure.	Construction	Bat exclusion and deterrence; Compliance Reporting	Weekly or at other appropriate interval	Contractor	Contractor	Weekly or at other appropriate interval	Condition of Design Build Contract	BIO#2	Construction of the Preferred Alternative would disturb suitable habitat that has the potential to support special-status mammal species.
										BIO#6	Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status mammal species.
										BIO#7	Project impacts from the Preferred Alternative would disturb portions of recovery plans.
BIO-MM#43	Conduct Pre-construction Surveys for American Badger and Ringtail	Before the start of ground-disturbing activities, the Project Biologist will conduct pre-construction surveys for den sites within suitable habitats in the construction footprint. These surveys will be conducted no more than 30 days before the start of ground-disturbing activities and phased with project build-out. The Project Biologist will submit a memorandum, on a weekly basis or at other appropriate intervals, to the Mitigation Manager to document compliance with this measure.	Pre-construction	Conduct Pre-construction survey; Compliance Report	Weekly Reporting or other appropriate interval	Contractor	Contractor	Weekly Reporting or other appropriate interval	Condition of Design Build Contract	BIO#2	Construction of the Preferred Alternative would disturb suitable habitat that has the potential to support special-status mammal species.
										BIO#6	Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status mammal species.
										BIO#7	Project impacts from the Preferred Alternative would disturb portions of recovery plans.
BIO-MM#44	American Badger and Ringtail Avoidance	The Contractor, under the direction of the Project Biologist, will establish a 50-foot buffer around occupied dens. The Contractor and Project Biologist will establish a 100-foot buffer around maternity dens through the pup-rearing season (American badger: February 15 through July 1; Ringtail: May 1 through June 15). Adjustments to the buffer(s) will require prior approval by CDFW as coordinated by the Project Biologist, under the supervision of the Mitigation Manager. The Project Biologist will submit a memorandum, on a weekly basis or at other appropriate intervals, to the Mitigation Manager to document compliance with this measure.	Construction	Establish buffer around active dens; Compliance Reporting	Weekly Reporting or other appropriate interval	Contractor	Contractor	Weekly Reporting or other appropriate interval	Condition of Design Build Contract	BIO#2	Construction of the Preferred Alternative would disturb suitable habitat that has the potential to support special-status mammal species.
										BIO#6	Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status mammal species.
										BIO#7	Project impacts from the Preferred Alternative would disturb portions of recovery plans.
BIO-MM#45	Conduct Protocol-Level Pre-	Before the start of ground-disturbing activities, the Project Biologist will conduct pre-construction surveys in accordance with	Pre-construction	Conduct Pre-construction Survey for San	Weekly Reporting or as established by	Contractor	Contractor	Weekly Reporting or as	Condition of Design Build Contract Condition	BIO#2	Construction of the Preferred Alternative would disturb suitable habitat that has the potential to support special-status mammal species.
										BIO#6	Project impacts from the Preferred Alternative would permanently impact

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Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact #	Impact Text
	construction Surveys for San Joaquin Kit Fox	USFWS' San Joaquin Kit Fox Survey Protocol for the Northern Range (USFWS 1999b). Pre-construction surveys for the kit fox will be conducted between May 1 and September 30 within the study area in suitable habitat areas (alkali desert scrub, annual grassland, pasture, barren, and compatible-use agricultural lands) to identify known or potential San Joaquin kit fox dens. Pre-construction surveys will be conducted by a USFWS-approved project biologist within 30 days before the start of construction or ground-disturbing activities and will be phased with project build-out. The Project Biologist will submit a memorandum, on a weekly basis or at other appropriate intervals, to the Mitigation Manager to document compliance with this measure.		Joaquin kit fox; Compliance Reporting	regulatory compliance permits			established by regulatory compliance permits	of regulatory permits	BIO#7	suitable habitat that has the potential to support special-status mammal species.  Project impacts from the Preferred Alternative would disturb portions of recovery plans.
BIO-MM#46	Minimize Impacts on San Joaquin Kit Fox	The Contractor, under direction of the Project Biologist, will implement USFWS' Standardized Recommendations for Protection of the San Joaquin Kit Fox Prior to or During Ground Disturbance (USFWS [1999] 2011) to minimize ground disturbance-related impacts on this species. The Project Biologist will submit a memorandum, on a weekly basis or at other appropriate intervals, to the Mitigation Manager to document compliance with this measure.	Construction	Implement Standardized Recommendations for Protection of the San Joaquin Kit Fox Prior to or During Ground Disturbance; Compliance Reporting	Weekly Reporting or as established by regulatory compliance permits	Contractor	Contractor	Weekly Reporting or as established by regulatory compliance permits	Condition of Design Build Contract Condition of regulatory permits	BIO#2 BIO#6 BIO#7	Construction of the Preferred Alternative would disturb suitable habitat that has the potential to support special-status mammal species.  Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status mammal species.  Project impacts from the Preferred Alternative would disturb portions of recovery plans.
BIO-MM#47	Restore Temporary Riparian Impacts	During post-construction, the Contractor, under the direction of the Project Botanist, will revegetate all disturbed valley foothill riparian areas using appropriate plants and seed mixes. The Project Botanist will monitor restoration activities consistent with provisions in the RRP, as described in BIO-MM#6. The Project Botanist will submit a memorandum, on a weekly basis or at other appropriate intervals, to the Mitigation Manager documenting compliance and other reporting requirements required by the regulatory agency permits (e.g., 1600 Streambed Alteration Agreement).	Post-construction	Restoration of temporary disturbance areas; Compliance Reporting	Weekly Reporting or as established by regulatory compliance permits (BIO-MM#62)	Contractor	Contractor	Weekly Reporting or as established by regulatory compliance permits	Condition of Design Build Contract Condition of regulatory permits	BIO#3 BIO#3 BIO#7 BIO#7 BIO#7	Construction of the Preferred Alternative would disturb special-status plant communities, and riparian areas.  Construction of the Preferred Alternative would have direct and indirect impacts on jurisdictional waters.  Project impacts from the Preferred Alternative would permanently impact special-status plant communities, and riparian areas.  Project impacts from the Preferred Alternative would permanently affect jurisdictional waters.  Project impacts from the Preferred Alternative would disturb portions of recovery plans.
BIO-MM#48	Restore Temporary Impacts on Jurisdictional Waters	During or after the completion of construction, the Contractor, under direction of the Regulatory Specialist (Waters) and Project Botanist, will restore disturbed jurisdictional waters to original topography using stockpiled and segregated soils. In areas where gravel or geotextile fabrics have been placed to protect substrate and minimize impacts on jurisdictional waters, these materials will be removed and affected features will be restored. The Contractor, under supervision of the Project Botanist, will conduct revegetation using appropriate plants and seed mixes. The Authority will conduct maintenance monitoring consistent with the provisions in the RRP (BIO-MM#6). The Project Botanist will submit a	Construction or Post-construction	Restoration of temporary disturbance areas; Compliance Reporting	Weekly Reporting or as established by regulatory compliance permits	Contractor, Authority	Contractor	Weekly Reporting or as established by regulatory compliance permits	Condition of Design Build Contract Condition of regulatory permits	BIO#3 BIO#3 BIO#7	Construction of the Preferred Alternative would disturb special-status plant communities, and riparian areas.  Construction of the Preferred Alternative would have direct and indirect impacts on jurisdictional waters.  Project impacts from the Preferred Alternative would disturb portions of recovery plans.



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		memorandum, on a weekly basis or at other appropriate intervals, to the Mitigation Manager to document compliance with this measure.									
BIO-MM#49	Monitor Construction Activities within Jurisdictional Waters	During ground-disturbing activities, the Regulatory Specialist (Waters) and Project Biological Monitor will conduct monitoring within and adjacent to jurisdictional waters, including monitoring of the installation of protective devices (silt fencing, sandbags, fencing, etc.), installation and/or removal of creek crossing fill, construction of access roads, vegetation removal, and other associated construction activities. The Project Biological Monitor will conduct biological monitoring to document adherence to habitat avoidance and minimization measures addressed in the project mitigation measures, including, but not limited to, the provisions outlined in BIO-MM#5, BIO-MM#7, BIO-MM#8, BIO-MM#10, BIO-MM#12 through BIO-MM#15, BIO-MM#47, and BIO-MM#48. The monitor will also document adherence to all relevant conservation measures as listed in the USFWS, CDFW, SWRCB, and USACE permits. The Regulatory Specialist (Waters) will submit a memorandum, on a weekly basis or at other appropriate intervals, to the Mitigation Manager to document compliance with this measure.	Construction	Compliance Monitoring, Compliance Reporting	Weekly Reporting or as established by regulatory compliance permits	Contractor	Contractor	Weekly Reporting or as established by regulatory compliance permits	Condition of Design Build Contract Condition of regulatory permits	BIO#2	Construction of the Preferred Alternative would disturb suitable habitat that has potential to support special-status invertebrate species.
										BIO#2	Construction of the Preferred Alternative would disturb the suitable habitat that has potential to support special-status reptiles and amphibian species.
										BIO#3	Construction of the Preferred Alternative would disturb special-status plant communities, and riparian areas.
										BIO#3	Construction of the Preferred Alternative would have direct and indirect impacts on jurisdictional waters.
										BIO#6	Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status invertebrate species.
										BIO#6	Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status reptiles and amphibian species.
										BIO#7	Project impacts from the Preferred Alternative would permanently impact special-status plant communities, and riparian areas.
										BIO#7	Project impacts from the Preferred Alternative would permanently affect jurisdictional waters.
BIO-MM#50	Mitigation and Monitoring of Protected Trees	Before, during, and after construction, the following methods to preserve and/or mitigate for impacts on protected trees will be implemented: • A qualified biologist, designated by the Project Botanist, will conduct surveys before removal or disturbance to evaluate the condition of all protected trees found within areas directly and indirectly affected by the Fresno to Bakersfield Section. • The Authority will compensate for impacts and effects to protected tree resources, including removal or trimming of naturally occurring native protected trees and landscape or ornamental trees (see BIO-MM#64, Compensate for Impacts on Protected Trees). • The Contractor, under the direction of the Project Botanist, will fence protected trees that may be indirectly affected by construction activities 5 feet from their drip lines to form ERAs. • The Authority will prepare and implement a monitoring and maintenance program that monitors transplanted trees for re-establishment of root systems. The Project Botanist will submit a memorandum to the Mitigation Manager to document compliance with this measure.	Pre-construction, Construction, Post-construction	Conduct Surveys prior to removal; Provide tree protection; Authority Compensate for Impacts	Monthly	Contractor	Contractor	Monthly	Condition of Design Build Contract	BIO#7	Project impacts from the Preferred Alternative would disturb portions of recovery plans.
										BIO#7	Project impacts from the Preferred Alternative would permanently affect protected trees.

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BIO-MM#51	Install Flashing or Slats within Security Fencing	During construction, the Contractor, under the direction of the Project Biologist, will install permanent security fencing consistent with the final design along portions of the project that are adjacent to wildlife movement corridors and natural habitats (e.g., alkali desert scrub, annual grassland). The security fencing will be enhanced with flashing or slats for 6 inches below ground surface to 12 inches above to prevent special-status reptiles and mammals from moving into the right-of-way. The fencing with flashing or slats will be maintained during operation of the HST project. The Project Biologist will verify that the installation is consistent with the designated terms and conditions in the applicable permits. The design of the reptile and mammal-proof fencing and the exact locations where reptile and mammal-proof fencing will be installed will be determined in consultation with USFWS and CDFW. The Project Biologist will submit a memorandum, on a yearly basis or at other appropriate intervals, to the Mitigation Manager to document compliance with this measure.	Construction	Install fencing enhanced with flashing or slats; Reporting	Yearly	Contractor	Contractor	Yearly	Condition of Design Build Contract Requirement of Regulatory Agency Permits	BIO#7	Project impacts from the Preferred Alternative would disturb portions of recovery plans.
										BIO#8	Project impacts from the Preferred Alternative would permanently reduce the functionality of wildlife movement corridors and habitat linkages.
BIO-MM#52	Construction in Wildlife Movement Corridors	Before the start of ground-disturbing activities, the Project Biologist will submit a construction avoidance and minimization plan for wildlife movement linkages (e.g., SR 43-Garces Highway and Deer Creek-Sand Ridge linkages, Kern River linkage) to the Authority via the Mitigation Manager for concurrence. The plan will limit the use of construction and avoid permanent fencing in wildlife movement linkages where the viaducts (e.g., elevated platforms) or bridges are included in the final design. The Contractor will minimize ground-disturbing activities within the wildlife linkages (e.g., SR 43-Garces Highway and Deer Creek-Sand Ridge linkages) during nighttime hours to the extent practicable. The Contractor will also keep nighttime illumination (e.g., for security) from spilling into the linkages or shield nighttime lighting to avoid illumination spilling into the linkages. Inspections by the Project Biologist will verify compliance with this measure. The Project Biologist will submit a memorandum, on a weekly basis or at other appropriate intervals, to the Mitigation Manager to document compliance with this measure.	Pre-construction	Prepare Avoidance and Minimization Plan for Construction in Wildlife Movement linkages	Weekly or as established by regulatory compliance permits	Contractor	Contractor	Weekly or as established by regulatory compliance permits	Condition of Design Build Contract Construction in Wildlife Movement Linkages Plan	BIO#7	Project impacts from the Preferred Alternative would disturb portions of recovery plans.
										BIO#8	Project impacts from the Preferred Alternative would permanently reduce the functionality of wildlife movement corridors and habitat linkages.
BIO-MM#53	Compensate for Impacts on Special-Status Plant Species	Before final design, the Authority will mitigate the impacts on special-status plants in accordance with the USFWS Biological Opinion (USFWS 2013) by implementing the following measures:	Pre-construction, Construction, Post-Construction	Compliance Report	Before final design	Authority	Authority	Before final design	Authority to compensatory based on extent of special-status plant species impacted	BIO#1	Construction of the Preferred Alternative would directly or indirectly impact suitable habitat that has potential to support special-status plant species.
										BIO#5	Project impacts from Preferred Alternative would permanently impact special-status plant species or suitable habitat that has potential to support these species.

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Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact #	Impact Text
		Compensation for federally listed plant species that are observed within the project footprint and that cannot be avoided will be compensated at a 1:1 ratio based on actual acres of direct effects by the following: a. Identification of suitable sites to receive the listed plants. i. Pixley National Wildlife Refuge, Allensworth Ecological Reserve/State Historic Park, Kern National Wildlife Refuge, Atwell Island, Alkali Sink Ecological Reserve, Semitropic Ecological Reserve, and Kern Water Bank. ii. Authority-proposed permittee-responsible mitigation sites. iii. Other locations approved by USFWS. b. Collection of seeds, plant materials, and top soil from the project footprint before construction impacts. The Authority or its designee will submit a memorandum to the USFWS and or CDFW to document compliance with this measure.							by the Contractor Regulatory agency permit requirements	BIO#7	Project impacts from the Preferred Alternative would permanently impact special-status plant communities, and riparian areas.
										BIO#7	Project impacts from the Preferred Alternative would disturb portions of recovery plans.
BIO-MM#54	Compensate for Impacts on Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp	The Authority will mitigate direct and indirect impacts, including temporary and permanent, on vernal pool branchiopod habitat through compensation determined in consultation with the USFWS and USACE. Compensation for vernal pool branchiopod habitat (e.g., vernal pools, seasonal wetlands) is addressed under compensation for impacts on jurisdictional waters (BIO-MM#63). The Authority or its designee will submit a memorandum to the USFWS to document compliance with this measure.	Pre-construction, Construction, Post-construction	Compliance Report	Prior to Operation	Authority	Authority	Prior to Operation	Authority to compensatory based on amount suitable habitat for vernal pool fairy shrimp and vernal pool tadpole shrimp impacted by the Contractor Regulatory agency permit requirements	BIO#2	Construction of the Preferred Alternative would disturb suitable habitat that has potential to support special-status invertebrate species.
										BIO#6	Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status invertebrate species.
										BIO#7	Project impacts from the Preferred Alternative would disturb portions of recovery plans.
										BIO#8	Project impacts from the Preferred Alternative would permanently reduce the functionality of wildlife movement corridors and habitat linkages.
BIO-MM#55	Compensate for Impacts on Valley Elderberry Longhorn Beetle	The Authority will provide compensatory mitigation for the valley elderberry longhorn beetle, including transplantation and replacement of elderberry shrubs and maintenance for replacement shrubs following the Conservation Guidelines for the Valley Elderberry Longhorn Beetle (USFWS 1999a). The performance criteria include a minimum survival rate of at least 60% of the elderberry plants, and 60% of the associated native plants must be maintained throughout the monitoring period. If survival drops below 60%, failed plantings shall be replaced. The Authority will submit a memorandum to the USFWS to document compliance with this measure.	Pre-construction, Construction, Post-construction	Compliance Report	Transplant Pre-construction; Compensatory prior to Operation	Authority	Authority	Transplant Pre-construction; Compensatory prior to Operation	Authority to compensatory based on number of host plants for the valley elderberry longhorn beetle impacted by the Contractor Regulatory agency permit requirements	BIO#2	Construction of the Preferred Alternative would disturb suitable habitat that has potential to support special-status invertebrate species.
										BIO#6	Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status invertebrate species.
										BIO#7	Project impacts from the Preferred Alternative would disturb portions of recovery plans.
										BIO#8	Project impacts from the Preferred Alternative would permanently reduce the functionality of wildlife movement corridors and habitat linkages.
BIO-MM#56	Compensate for Impacts on California Tiger Salamander	If compensatory mitigation is required to offset the loss of habitat for California tiger salamander, the Authority will determine the compensation through consultation with the USFWS. Compensatory mitigation could include one of the following: • Purchase of credits from an agency-approved mitigation bank.	Pre-construction, Construction, Post-construction	Compliance Report	Prior to Operation	Authority	Authority	Prior to Operation	Authority to compensatory based on amount suitable habitat for California tiger salamander impacted by the Contractor	BIO#2	Construction of the Preferred Alternative would disturb the suitable habitat that has potential to support special-status reptiles and amphibian species.
										BIO#6	Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status reptiles and amphibian species.
										BIO#7	Project impacts from the Preferred Alternative would disturb portions of recovery plans.



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Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact #	Impact Text
		<ul style="list-style-type: none"> <li>• Fee-title-acquisition of natural resource regulatory agency-approved property.</li> <li>• Purchase or establishment of a conservation easement with an endowment for long-term management of the property-specific conservation values.</li> <li>• In-lieu fee contribution determined through negotiation and consultation with USFWS. The Authority will submit a memorandum to the USFWS and CDFW to document compliance with this measure</li> </ul>							Regulatory agency permit requirements	BIO#8	Project impacts from the Preferred Alternative would permanently reduce the functionality of wildlife movement corridors and habitat linkages.
BIO-MM#57	Compensate for Impacts on Blunt-Nosed Leopard Lizard, Tipton Kangaroo Rat, and Nelson's Antelope Squirrel	The Authority will determine compensatory mitigation to offset the permanent and temporary loss of suitable habitat for the blunt-nosed leopard lizard, Tipton kangaroo rat, and Nelson's antelope squirrel through consultation with the USFWS and/or CDFW. Compensatory mitigation could include one of the following: <ul style="list-style-type: none"> <li>• Purchase of credits from an agency-approved mitigation bank.</li> <li>• Fee-title-acquisition of natural resource regulatory agency-approved property.</li> <li>• Purchase or establishment of a conservation easement with an endowment for long-term management of the property-specific conservation values.</li> <li>• In-lieu fee contribution determined through negotiation and consultation with USFWS. The Authority will submit a memorandum to the USFWS and or CDFW to document compliance with this measure.</li> </ul>	Pre-construction, Construction, Post-construction	Compliance Reports	Prior to Operation	Authority	Authority	Prior to Operation	Authority to compensatory based on amount suitable habitat for Blunt-nosed leopard lizard, Tipton kangaroo rat and Nelson's Antelope Squirrel impacted by the Contractor Regulatory agency permit requirements	BIO#2	Construction of the Preferred Alternative would disturb the suitable habitat that has potential to support special-status reptiles and amphibian species.
										BIO#6	Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status reptiles and amphibian species.
										BIO#7	Project impacts from the Preferred Alternative would disturb portions of recovery plans.
										BIO#8	Project impacts from the Preferred Alternative would permanently reduce the functionality of wildlife movement corridors and habitat linkages.
BIO-MM#58	Compensate for Loss of Swainson's Hawk Nesting Trees	To compensate for the loss of occupied Swainson's hawk nesting trees or mortality to offspring, the Authority will provide project specific compensatory mitigation that replaces nesting trees and provides natural lands for foraging. Compensatory mitigation for Swainson's hawk will be based on the number of trees with "active" nests that are removed by construction activities, or where construction activities create a significant habitat modification that leads to a reduction in reproductive success, or nest abandonment. If project construction occurs within 0.5 mile of a documented or observed active nest, the Authority will acquire and preserve 150 acres of natural habitat, per active nest tree removed by construction activities, or where construction activities create a significant habitat modification that leads to reduce reproductive success or nest abandonment. At a minimum, the habitat preserved will contain trees suitable to support nesting and natural foraging habitat for Swainson's hawk. The Authority will submit a memorandum to the CDFW to document compliance with this measure.	Pre-construction, Construction, Post-construction	Compliance Reports	Prior to Operation	Authority	Authority	Prior to Operation	Authority to compensatory based on amount of habitat for Swainson's hawks impacted by the Contractor Regulatory agency permit requirements	BIO#2	Construction of the Preferred Alternative would disturb suitable habitat that has potential to support nesting special-status bird species (including raptors).
										BIO#6	Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status bird species (including raptors).
										BIO#7	Project impacts from the Preferred Alternative would disturb portions of recovery plans.
										BIO#8	Project impacts from the Preferred Alternative would permanently reduce the functionality of wildlife movement corridors and habitat linkages.

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Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact #	Impact Text
BIO-MM#59	Compensate for Loss of Burrowing Owl Active Burrows and Habitat	To compensate for permanent impacts on nesting, occupied, and satellite burrows and/or burrowing owl habitat, the Authority will provide compensatory mitigation based on CDFW's (CDFG 2012) Staff Report on Burrowing Owl Mitigation. The Authority will submit a memorandum to the CDFW to document compliance with this measure.	Pre-construction, Construction, Post-construction	Compliance Reports	Prior to Operation	Authority	Authority	Prior to Operation	Authority to compensate based on number of burrowing owl burrows impacted by the Contractor Regulatory agency permit requirements	BIO#2	Construction of the Preferred Alternative would disturb suitable habitat that has potential to support nesting special-status bird species (including raptors).
										BIO#6	Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status bird species (including raptors).
										BIO#7	Project impacts from the Preferred Alternative would disturb portions of recovery plans.
										BIO#8	Project impacts from the Preferred Alternative would permanently reduce the functionality of wildlife movement corridors and habitat linkages.
BIO-MM#60	Compensate for Destruction of San Joaquin Kit Fox Habitat	The Authority will mitigate the destruction of San Joaquin kit fox habitat by the purchase of suitable, approved habitat (USFWS and CDFW). Habitat will be replaced at a minimum ratio of 1:1 for natural lands and a ratio of 0.1:1 for suitable urban or agricultural lands to provide additional protection and habitat in a location that is consistent with the recovery of the species. The Authority will mitigate the impacts on San Joaquin kit fox in accordance with the USFWS Biological Opinion (USFWS 2013) and/or CDFW 2081(b). The Authority will submit a memorandum to the USFWS and CDFW to document compliance with this measure.	Post-construction	Compliance Memo	Prior to Operation	Authority	Authority	Prior to Operation	Authority to compensate based on area of habitat for San Joaquin kit fox impacted by the Contractor Regulatory agency permit requirements	BIO#2	Construction of the Preferred Alternative would disturb suitable habitat that has the potential to support special-status mammal species.
										BIO#3	Construction of the Preferred Alternative would disturb areas located in USFWS recovery plans.
										BIO#6	Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status mammal species.
										BIO#7	Project impacts from the Preferred Alternative would disturb portions of recovery plans.
BIO-MM#61	Compensate for Permanent Riparian Impacts	The Authority will compensate for permanent impacts on riparian habitats (i.e., valley foothill riparian), as determined in consultation with the appropriate agencies (e.g., CDFW), by restoring nearby areas to suitable habitat and/or by purchasing credits in a mitigation bank. The Comprehensive Mitigation and Monitoring Plan will provide the planning details. Compensation will be based on the following ratio (acres of mitigation to acres of impact), pending agency confirmation: • Valley Foothill Riparian: 2:1. The Authority will submit a memorandum to the SWRCB to document compliance with this measure.	Post-construction	Compliance Memo	Prior to Operation	Authority	Authority	Prior to Operation	Authority to compensate based on area of permanent riparian habitat impacted by the Contractor Regulatory agency permit requirements	BIO#3	Construction of the Preferred Alternative would disturb special-status plant communities, and riparian areas.
										BIO#3	Construction of the Preferred Alternative would have direct and indirect impacts on jurisdictional waters.
										BIO#7	Project impacts from the Preferred Alternative would permanently impact special-status plant communities, and riparian areas.
										BIO#7	Project impacts from the Preferred Alternative would permanently affect jurisdictional waters.
BIO-MM#62	Prepare and Implement a Site-Specific Comprehensive Mitigation and Monitoring Plan	As part of the USFWS, USACE, SWRCB, and CDFW permit applications and before the start of ground-disturbing activities, the Authority will prepare a CMMP to mitigate for temporary and permanent impacts on biological resources (i.e., special-status wildlife, jurisdictional waters, and riparian areas). In the CMMP, performance standards, including percent cover of native species, survivability, tree height requirements, wildlife utilization, the acreage basis, restoration ratios, and the combination of onsite and/or offsite mitigation will be detailed; preference will be given to conducting the mitigation within the same HUC-8 or HUC-6 watershed where the impact occurs. The Project Biologist will work with the	Pre-construction, Construction, Post-construction	Authority responsible for the preparation of and implementation of the CMMP, monitoring, and reporting. Implement CMMP, and prepare Monitoring Reports and Compliance Memos	Prepare CMMP Pre-construction; Implement CMMP During Construction and Post-Construction	Authority	Authority	Prepare CMMP Pre-construction; Implement CMMP During Construction and Post-Construction	Requirement to acquire regulatory agency permits Authority to compensate based on area of temporary and permanent jurisdictional waters impacted by the Contractor	BIO#3	Construction of the Preferred Alternative alternatives would disturb special-status plant communities, and riparian areas.
										BIO#3	Construction of the Preferred Alternative would have direct and indirect impacts on jurisdictional waters.
										BIO#7	Project impacts from the Preferred Alternative would permanently impact special-status plant communities and riparian areas.
										BIO#7	Project impacts from the Preferred Alternative would permanently affect jurisdictional waters.
									BIO#7	Project impact from the Proffered Alternative would disturb portions of recovery plans.	

**Table 1**  
 Fresno to Bakersfield Mitigation Monitoring and Enforcement Plan

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact #	Impact Text
		<p>USACE, SWRCB, and CDFW to develop appropriate avoidance, minimization, mitigation, and monitoring measures to be incorporated into the CMMP. The CMMP will outline the intent to mitigate for the lost conditions, functions, and values of impacts on jurisdictional waters and state streambeds consistent with resource agency requirements and conditions presented in Sections 404 and 401 of the CWA and Section 1600 of the CFGC. The CMMP will incorporate the following standard requirements consistent with USACE, SWRCB, and CDFW guidelines:</p> <ul style="list-style-type: none"> <li>• Description of the project impact/site.</li> <li>• Goal(s) (i.e., functions and values or conditions) of the compensatory mitigation project.</li> <li>• Description of the proposed compensatory mitigation site.</li> <li>• Implementation plan for the proposed compensatory mitigation site.</li> <li>• Maintenance activities during the monitoring period.</li> <li>• Monitoring plan for the compensatory mitigation site.</li> <li>• Completion of compensatory mitigation.</li> <li>• Financial assurances.</li> <li>• Contingency measures.</li> </ul> <p>Also, the following will be included at a minimum for the implementation plan:</p> <ul style="list-style-type: none"> <li>• Site analysis for appropriate soils and hydrology.</li> <li>• Site preparation specifications based on site analysis, including but not limited to grading and weeding.</li> <li>• Soil and plant material salvage from impact areas, as appropriate to the timing of impact and restoration as well as the location of restoration sites.</li> <li>• Specifications for plant and seed material appropriate to the locality of the mitigation site.</li> <li>• Specifications for site maintenance to establish the habitats, including but not limited to weeding and temporary irrigation.</li> </ul> <p>Habitat preservation, enhancement, and/or establishment or restoration activities will be conducted on some of the compensatory (i.e., selected permittee-responsible) mitigation sites to achieve the mitigation goals. A detailed design of the mitigation habitats will be created in coordination with the permitting agencies and be described in the CMMP. It is recognized that several CMMPs will be developed consistent with the selected mitigation sites and the resources mitigated at each. The primary engineering and construction Contractor will ensure, through coordination with the Project Biologist, that construction is implemented in a manner that minimizes</p>									

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Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact #	Impact Text
		<p>disturbance of such areas. Temporary fencing will be used during construction to avoid sensitive biological resources that are located adjacent to construction areas and can be avoided. Performance standards are targets for determining the effectiveness of the mitigation and assessing the need for adaptive management (e.g., mitigation design or maintenance revisions). The performance standards are developed so that progress towards meeting final success criteria can be assessed on an annual basis; the standard for each year is progressively closer to the final criteria (e.g. vegetation cover standards may increase annually until reaching the success criteria objective in the final year of monitoring). Success criteria are formal criteria that must be met after a specific timeframe to meet regulatory requirements of the permitting agencies. Where applicable, replacement planting/seeding will be implemented if monitoring demonstrates that performance standards or success criteria are not met during a particular monitoring interval. The performance standards will be used to determine whether the habitat improvement is trending toward sustainability (i.e., reduced human intervention) and to assess the need for adaptive management. These standards must be met for the habitat improvement to be declared successful, both during a particular monitoring year and at the end of the establishment period. These performance standards will be developed in consultation with the permitting agencies and described in the CMMP. The final success criteria will be developed in coordination with the regulatory agencies and presented in the CMMP. Examples of success criteria, which could be included in the CMMP, and would be assessed at the end of the monitoring period (assumed to be 5 years or as directed by agencies), include:</p> <ul style="list-style-type: none"> <li>• Percent survival of planted trees (65–85%, depending on species and habitat).</li> <li>• Percent absolute cover of highly invasive species, as defined by the California Invasive Plant Council (&lt;5%).</li> <li>• Percent total absolute cover of plant species (50-80%, depending on habitat type).</li> <li>• Designed wetlands will meet U.S. Army Corps of Engineers criteria for hydrophytic vegetation, hydric soils, and hydrology as defined in the "Corps of Engineers wetland delineation manual" (Environmental Laboratory 1987).</li> <li>• Designed vernal pools and seasonal wetlands will meet inundation and seasonal drying requirements as specified in the design and indicated by agencies.</li> </ul>									

**Table 1**  
 Fresno to Bakersfield Mitigation Monitoring and Enforcement Plan

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact #	Impact Text
		<p>• Species composition and community diversity, relative to reference sites, and/or as described in the guidelines issued by permitting agencies (e.g., USFWS conservation guidelines for valley elderberry longhorn beetle). Performance standards and success criteria will be provided for each of the years of monitoring and will be specific to habitat types at each permittee-responsible mitigation site. The monitoring schedule will be detailed in the site-specific CMMPs. To be deemed successful, the site will be required to meet the performance standards established for the year in which monitoring is being conducted (e.g., monitoring conducted at intervals with increasing performance requirements). However, if performance standards are not met in specific years, remedial measures, such as regrading, adjustment to modify the hydrological regime, and/or replacement planting or seeding, must be implemented and that year's monitoring must be repeated the following year until the performance standards are met. The success criteria specified must be reached without human intervention (e.g., irrigation, replacement plantings) aside from maintenance practices described in the site-specific CMMPs for maintenance during the establishment period. The Project Biologist will oversee the implementation of all CMMP elements and monitor consistent with the prescribed maintenance and performance monitoring requirements. The Authority, or its designee, will prepare annual monitoring reports for 5 years (or less if success criteria are met as described earlier) and/or other documentation prescribed in the resource agency permits. The Authority will submit a memorandum to the regulatory agencies to document compliance with this measure.</p>									
BIO-MM#63	Compensate for Permanent and Temporary Impacts on Jurisdictional Waters	<p>The Authority will mitigate permanent and temporary wetland impacts through compensation determined in consultation with the USACE, SWRCB, USFWS, and CDFW, in order to be consistent with the CMMP (BIO-MM#62). Regulatory compliance for jurisdictional waters includes relevant terms and conditions from the USACE 404 Permit, SWRCB 401 Permit, and CDFW 1600 Streambed Alteration Agreement. Compensation shall include aquatic resources restoration, establishment, enhancement, or preservation through one or more of the following methods:</p> <ul style="list-style-type: none"> <li>• Purchase of credits from an agency-approved mitigation bank.</li> <li>• Fee-title-acquisition of natural resource regulatory agency-approved property.</li> <li>• Permittee-responsible mitigation through the</li> </ul>	Pre-construction, Construction, Post-construction	Compliance Report	Prior to Operation	Authority	Authority	Prior to Operation	Condition of Regulatory Agency Permits Authority to compensate based on area of permanent and temporary impacts on jurisdictional waters impacted by the Contractor	BIO#2 BIO#3 BIO#3 BIO#6 BIO#6 BIO#7 BIO#7 BIO#7	<p>Construction of the Preferred Alternative would disturb suitable habitat that has potential to support special-status invertebrate species.</p> <p>Construction of the Preferred Alternative would disturb special-status plant communities, and riparian areas.</p> <p>Construction of the Preferred Alternative would have direct and indirect impacts on jurisdictional waters</p> <p>Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status invertebrate species.</p> <p>Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status reptiles and amphibian species.</p> <p>Project impacts from the Preferred Alternative would permanently impact special-status plant communities, and riparian areas.</p> <p>Project impacts from the Preferred Alternative would permanently affect jurisdictional waters</p> <p>Project impacts for the Preferred Alternative would permanently disturb portions of recovery plans.</p>



**Table 1**  
 Fresno to Bakersfield Mitigation Monitoring and Enforcement Plan

Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact #	Impact Text
		establishment, re-establishment, restoration, enhancement, or preservation of aquatic resources and the establishment of a conservation easement or other permanent site protection method, along with financial assurance for long-term management of the property-specific conservation values. <ul style="list-style-type: none"> <li>• In lieu fee contribution determined through negotiation and consultation with the various natural resource regulatory agencies.</li> </ul> The following ratios are proposed as a minimum for compensation for permanent impacts; final ratios will be determined in consultation with the appropriate agencies: <ul style="list-style-type: none"> <li>• Vernal pools: 2:1.</li> <li>• Seasonal wetlands: between 1.1:1 and 1.5:1 based on impact type and function and values lost.</li> <li>- 1:1 offsite for permanent impacts.</li> <li>- 1:1 onsite and 0.1:1 to 0.5:1 offsite for temporary impacts.</li> </ul> The Authority will mitigate impacts on jurisdictional waters by replacing, creating, restoring, enhancing or preserving aquatic resource at the ratios presented above or other ratios, as determined in consultation with the appropriate agencies, which compensates for functions and values lost. The Authority will consider modifying the vernal pool mitigation ratios in the final permits based on site-specific conditions and the specific life history requirements of vernal pool branchiopods, California tiger salamander, and western spadefoot toad. Where an HST alternative affects an existing conservation area (e.g., Allensworth ER), the Authority will modify the mitigation ratio to meet the vernal pool mitigation requirement. Either the affected portion of the conservation area will be relocated or compensation will be provided to the holder of Allensworth ER in accordance with the Uniform Relocation and Real Property Policy Act of 1970, as amended. Through the CMMP reporting program and the applicable terms and conditions from the USACE 404 Permit, SWRCB 401 Permit, and the CDFW 1600 Streambed Alteration Agreement, the Authority, or its designee, will document compliance and submit it to the regulatory agencies.									
BIO-MM#64	Compensate for Impacts on Protected Trees	The Authority will compensate for impacts, including removal or trimming of naturally occurring native protected trees and landscape or ornamental protected trees, in accordance with the local regulatory body (city or county government). The local regulations and laws allow for a number of potential mitigation opportunities. The Authority will provide mitigation commensurate with the regulations	Pre-construction, Construction, Post-construction	Compliance Report	Prior to Operation	Authority	Authority	Transplanting/Replacement/Compensation per Local Regulations	Local Regulation Requirement	BIO#3 BIO#7 BIO#7	Construction of the Preferred Alternative would disturb protected trees Project impacts for the Preferred Alternative would permanently disturb portions of recovery plans. Project impacts from the Preferred Alternative would permanent affect protected trees.

**Table 1**  
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Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact #	Impact Text
		and laws in that jurisdiction such that the resulting impact on protected trees is less than significant and may include, but is not limited to, the following, depending on the local jurisdiction: • Transplant directly affected protected trees that are judged by an arborist to be in good condition to a suitable site outside the zone of impact. • Replace directly affected protected trees at an onsite or offsite location, based on the number of protected trees removed, at a ratio not to exceed 3:1 for native trees or 1:1 for landscape or ornamental trees. • Contribute to a tree-planting fund The Authority will submit a memorandum to the local regulatory body to document compliance with this measure.									
BIO-MM#65	Offsite Habitat Restoration, Enhancement, and Preservation	Before site preparation at a mitigation site, the Authority will consider the offsite habitat restoration, enhancement, and preservation program and identify short-term temporary and/or long-term permanent effects on the natural landscape. A determination will be made on any effects from the physical alteration of the site to onsite biological resources, including plant communities, land cover types, and the distribution of special-status plant and wildlife. Appropriate seasonal restrictions (e.g., breeding season) on activities that result in physical alteration of the site may be applicable if suitable habitats for special-status species and sensitive habitats exist onsite. Activities resulting in the physical alteration of the site include grading/modifications to onsite topography, stockpiling, storage of equipment, installation of temporary irrigation, removal of invasive species, and alterations to drainage features. In general, the long-term improvements to habitat functions and values will offset temporary effects during restoration, enhancement, and preservation activities. The offsite habitat restoration, enhancement, and preservation program will be designed, implemented, and monitored in ways that are consistent with the terms and conditions of the USACE Section 404 Permit, CDFW 1600 Streambed Alteration Agreement, and CESA and federal ESA as they apply to their jurisdiction and resources onsite. Potential effects on site-specific hydrology and the downstream resources will be evaluated as a result of implementation of the restoration-related activity. Site-specific BMPs and a Storm Water Pollution Prevention Plan (SWPPP) will be implemented as appropriate. The Authority will report on compliance with the permitting	Pre to Construction, Construction, Post-construction	Compliance Report	Prior to Operation or as established by regulatory compliance permits	Authority	Authority	Prior to Operation or as established by regulatory compliance permits	Authority to provide compensatory mitigation for impacts on biological resources impacted by the Contractor Offsite habitat restoration, enhancement, and preservation program will be designed, implementation and monitored consistent with the terms and conditions of regulatory permit requirements they apply to their jurisdiction and resources onsite	BIO#2 BIO#2 BIO#2 BIO#2 BIO#3 BIO#3 BIO#3 BIO#6 BIO#6 BIO#6 BIO#6 BIO#7 BIO#7 BIO#7	Construction of the Preferred Alternative would disturb suitable habitat that has potential to support special-status invertebrate species. Construction of the Preferred Alternative would disturb suitable habitat that has potential to support special status reptiles and amphibians Construction of the Preferred Alternative would disturb suitable habitat that has potential to support special status bird species Construction of the Preferred Alternative would disturb suitable habitat that has potential to support special status mammal species Construction of the Preferred Alternative would disturb special-status plant communities, and riparian areas Construction of the Preferred Alternative would have direct and indirect impacts on jurisdictional waters Construction of the Preferred Alternative would disturb protected trees Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status invertebrate species. Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status reptile and amphibian species. Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status bird species (including raptors). Project impacts from the Preferred Alternative would permanently impact suitable habitat that has the potential to support special-status mammal species. Project impacts from the Preferred Alternative would permanently impact special-status plants communities, and riparian areas. Project impacts from the Preferred Alternative would permanently affect jurisdictional waters. Project impacts from the Preferred Alternative would disturb portions of recovery plans.

**Table 1**  
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		requirements. The Authority, or its designee, will be responsible for the monitoring and tracking of the program, will prepare a memorandum of compliance, and will submit it to the appropriate regulatory agency.								BIO#7	Project impacts from the Preferred Alternative would permanently affect protected trees.
<b>Hydrology and Water Resources</b>											
By complying with design standards regarding stormwater run-off and flood protection, there will be no significant impacts on Hydrology and Water Resources. Please refer to Table 2 for a description of measures that will be implemented to avoid or minimize adverse impacts to Hydrology and Water resources.											
<b>Geology, Soils, and Seismicity</b>											
With implementation of standard engineering design measures and BMPs, impacts for elevated structures, retained cuts, retained fills, and at-grade segments of each alternative would be less than significant.											
<b>Hazardous Materials</b>											
HMW-MM#1	Limit Use of Extremely Hazardous Materials near Schools during Construction	The Contractor shall not handle or store an extremely hazardous substance (as defined in California Public Resources Code Section 21151.4) or a mixture containing extremely hazardous substances in a quantity equal to or greater than the state threshold quantity specified pursuant to subdivision (j) of Section 25532 of the Health and Safety Code within 0.25 mile of a school. Prior to construction activities, signage will be installed to delimit all work areas within 0.25 mile of a school, informing the Contractor not to bring extremely hazardous substances into the area. The Contractor would be required to monitor all use of extremely hazardous substances. The above construction mitigation measure for hazardous materials and wastes is consistent with California Public Resources Code Section 21151.4, and would be effective in reducing the impact to a less-than-significant level.	Construction	Reporting and Monitoring	Weekly	Contractor Hazardous Materials Monitor	Contractor	Construction/Weekly Reporting	Reporting Contract Requirements /Specifications	HMW#4	Temporary Hazardous Material and Waste Activities in the Proximity of Schools Twenty-nine schools are within 0.25 mile of the construction footprint of the Preferred Alternative.
<b>Safety and Security</b>											
S&S-MM #1:	Monitor Response of Local Fire, Rescue, and Emergency Service Providers to Incidents at Stations and Provide a Fair Share Cost of Service	Monitor response of local fire, rescue, and emergency service providers to incidents at stations and provide a fair share of cost of service. Upon approval of the Fresno to Bakersfield Section, the Authority will monitor service levels in the vicinity of the Fresno, Kings/Tulare, and Bakersfield stations to determine baseline service demands. "Service levels" consist of the monthly volume of calls for fire and police protection, as well as city- or fire protection district-funded EMT/ambulance calls that occur in the station site service areas. Prior to operation of the stations for HST service, the Authority will enter into an agreement with the public service providers of fire, police, and emergency services to fund the Authority's fair share of services above the average baseline service demand level for the station and HMF service areas (as established during the monitoring period). The fair share will be based on projected passenger use for the first year of operations, with a growth	Construction /Post-construction/ Operation	Monitor/ Fair Share Agreement	Annually	Authority	Authority	Monitoring of service levels during construction in the vicinity of the Fresno, Kings/Tulare, and Bakersfield stations to determine baseline service demands. Prior to operation of the stations for HST service	Authority to fund through fair share of services agreement.	S&S #10:	Need for Expansion of Existing Fire, Rescue, and Emergency Services Facilities.



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		factor for the first 5 years of operation. This cost-sharing agreement will include provisions for ongoing monitoring and future negotiated amendments as the stations are expanded or passenger use increases. Such amendments will be made on a regular basis for the first 5 years of station operation, as will be provided in the agreement. To make sure that services are made available, impact fees will not constitute the sole funding mechanism, although impact fees may be used to fund capital improvements or fixtures (i.e., police substation, additional fire vehicle, on-site defibrillators, etc.) necessary to service delivery. After the first 5 years of operation, the Authority will enter into a new or revised agreement with the public service providers of fire, police, and emergency services to fund the Authority's fair share of services. The fair share will take into account the volume of ridership, past record and trends in service demand at the stations and HMF site, new local revenues derived from station area development, and any services that the Authority may be providing at the station.									
<b>Socioeconomics</b>											
SO-MM#1:	Implement measures to reduce impacts associated with the division of residential neighborhoods	The Authority will minimize impacts associated with the Preferred Alternative in the rural residential areas around Ponderosa Road/Edna Way east of Hanford, the Newark Avenue vicinity northeast of Corcoran, and Crome as well as in urban residential areas in Fresno, Wasco, Shafter and Bakersfield by conducting special outreach to affected homeowners and residents to fully understand their special relocation needs. The Authority will make every effort to locate suitable replacement properties that are comparable to those currently occupied by these residents, including constructing suitable replacement facilities if necessary.  In cases where residents wish to remain in the immediate vicinity, the Authority will take measures to purchase vacant land or buildings in the area, and consult with local authorities over matters such as zoning, permits, and moving of homes and replacement of services and utilities, as appropriate. Before land acquisition, the Authority will conduct community workshops to obtain input from those homeowners whose property would not be acquired, but whose community would be substantially altered by construction of HST facilities, including the loss of many neighbors, to identify measures that could be taken to mitigate impacts on those who remain (including placement of sound walls and landscaping, and potential uses for remnant	Pre-construction/ Construction / Post-construction	Reporting	Monthly	Authority	Authority	Monthly reporting	The Authority will meet with affected residents and property owners and design appropriate measures to minimize impacts	SO #6  SO #7	Division of existing community Ponderosa Road/Edna Way east of Hanford, the Newark Avenue vicinity northeast of Corcoran, and Crome. Impacts associated with the Preferred Alternative would relocate and displace residents of small, rural residential communities.  Effects to the regional agricultural community and displacement of homes in the unincorporated areas of the region of the four affected counties.

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		parcels that could benefit the community in the long term).									
SO-MM#2:	Implement measures to reduce impacts associated with the division of communities	<p>The Authority will minimize impacts associated with the Preferred Alternative in the existing mixed-use communities in the Bakersfield Northwest, Central, and Northeast districts through a program of additional outreach to homeowners, residents, business owners, and community organizations in affected neighborhoods.</p> <p>As a part of this program, before land acquisition, the Authority will consult with officials and representatives of community facilities affected by significant noise impacts (e.g., churches, schools, and the veterinary hospital if the southern alignment is selected) to identify suitable noise abatement measures or to help affected businesses and organizations find more-suitable locations in the community. Similarly, the Authority will make every effort to locate suitable replacement housing for displaced residents. In cases where affected residents or community facilities wish to remain in their neighborhoods, the purchase and development of infill lots or other real estate, the relocation of existing buildings to vacant lots, and consultation with city staff regarding zoning and permit issues, may be required.</p> <p>The Authority will also conduct community workshops about the future use of the area beneath the rail guideway. These meetings will provide residents the opportunity to identify design and use options that could strengthen community cohesion and be compatible with the character of the impacted community. A minimum of three facilitated workshops will be held, one in each of the distinct neighborhoods, Bakersfield Northwest, Central, and Northeast districts. To maximize attendance and generate awareness of the workshops, the Authority will work with either community organizations, or community leaders within the neighborhoods. A location and time will be selected to increase attendance and be based on the needs of the community.</p> <p>Information will be presented at the workshops that give the community options for the future use of the area beneath the rail guideway, as well as an opportunity for individuals to provide feedback. For example, if safety considerations prohibit such uses as bike paths or community gardens, alternatives, such as sculpture gardens or managed landscaping, could be</p>	Pre-construction/Construction/Post-construction/Operations	Reporting/Monitoring	Monthly	Authority	Authority	Monthly reporting	The Authority will meet with affected residents and property owners and design appropriate measures to minimize impacts. The Authority will hold workshops and create reports based on workshop and design findings.	SO #6  SO #7	<p>Division of existing community Ponderosa Road/Edna Way east of Hanford, the Newark Avenue vicinity northeast of Corcoran, and Crome. Impacts associated with the Preferred Alternative would relocate and displace residents of small, rural residential communities.</p> <p>Effects to the regional agricultural community and displacement of homes in the unincorporated areas of the region of the four affected counties.</p>

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		<p>considered. The comments and feedback will be considered in planning for the future use of the sites.</p> <p>Upon gathering feedback from the community, the Authority will report the findings, either through a fourth public workshop or in written report that would be made available to the public.</p> <p>The Authority will be responsible for implementing the results of the community workshops through project design and through the long-term management of the area beneath the elevated rail guideway. This will involve documenting the desired design concepts, incorporating them into the final design, and facilitating ongoing maintenance. The Authority will identify potential uses that may be developed in the project right-of-way. These uses will be compatible with the character of the adjacent community and sensitive to project needs (as outlined in Section 3.11, Safety and Security). The costs associated with the development of these associated uses and how these costs will be paid will be determined during consultations with the affected city, county, or parks district. Furthermore, the parties or entities (i.e., the Authority, local government, park or recreation district, or nonprofit organization) responsible for some ongoing maintenance of these community areas will be determined.</p>									
SO-MM#3:	Implement measures to reduce impacts associated with the relocation of important facilities	<p>Depending on the alternative selected, the Authority will minimize impacts resulting from the disruption to key community facilities: Bakersfield High School, Mercado Latino Tianguis, Fresno Rescue Mission, Mercy Hospital medical complex facilities, Bakersfield Homeless Shelter, Kern County Mental Health office (1400 L Street), Kern County Health and Human Services Department, community churches, an important livestock rendering facility (Baker Commodities) in the Hanford area, the City of Bakersfield's corporation yard and the fleet services downtown facility, the CityPlace affordable housing complex, and parking associated with Bakersfield's Convention Center and Owens Intermediate School.</p> <p>The Authority will consult with the appropriate respective parties before land acquisition to assess potential opportunities to reconfigure land use and buildings and/or relocate affected facilities, as necessary, to minimize the disruption of facility activities and services, and also to ensure relocation that allows the</p>	Pre-construction/Construction	Reporting/Monitoring	Monthly	Authority	Authority	Monthly reporting	The Authority will meet with affected residents and property owners and design appropriate measures to minimize impacts. The Authority will hold workshops and create reports based on workshop and design findings.	SO #6	<p>Displacement of the Mercado Latino Tianguis.</p> <p>Displacement of the Fresno Rescue Mission, Bakersfield Homeless Shelter and associated facilities and programs.</p> <p>Displacement of the Mercy Medical Plaza building associated with the Mercy Hospital medical complex.</p> <p>Displacement of religious facilities.</p> <p>Displacement of government facilities—Bakersfield public works corporation yard and a Kern Mental Health office—as well as parking associated with the Bakersfield Convention Center.</p>

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		<p>community currently served to continue to access these services.</p> <p>Because many of these community facilities are located in Hispanic communities, the Authority will continue to implement a comprehensive Spanish-language outreach program for these communities as land acquisition begins. This program will facilitate the identification of approaches that would maintain continuity of operation and allow space and access for the types of services currently provided and planned for these facilities. Also, to avoid disruption to these community amenities, the Authority will ensure that all reconfiguring of land uses or buildings, or relocating of community facilities is completed before the demolition of any existing structures..</p> <p>Because the unique services provided by the rendering facility and the CDFA sampling station in Kings County are critical to agricultural operations in the region, relocation of these facilities will occur before the existing facilities are closed or steps will be taken to ensure that sufficient capacity is available at other facilities so there is no interruption to the services provided.</p> <p>To ensure the fair and equitable treatment of the affected residents of the CityPlace affordable apartment complex with special relocation needs (including handicapped), the Authority will consult with the City of Bakersfield to identify suitable housing replacement options and relocation alternatives for all affected households.</p>									
SO-MM#4	Provide access modifications to affected farmlands.	In cases where partial-property acquisitions result in division of agricultural parcels, the Authority will evaluate with property owner input the effectiveness of providing overcrossings or undercrossings of the HST track to allow continued use of agricultural lands and facilities. This would include the design of overcrossings or undercrossings to allow farm equipment passage. (Refer to Section 3.14, Agricultural Lands, for additional information.) This mitigation measure will be effective because it will maintain access to farmlands for farmers whose property is bisected.	Pre-construction/Construction	Reporting/Monitoring	Monthly	Authority	Authority	Monthly reporting	The Authority will meet with affected residents and property owners and design appropriate measures to minimize impacts. The Authority will hold workshops and create reports based on workshop and design findings.	SO #7	Effects to the regional agricultural community and displacement of homes in the unincorporated areas of the region of the four affected counties.
SO-MM#5	Develop measures to minimize the potential for physical deterioration.	The Authority will work with the communities on the design of project features consistent with Technical Memorandum 200.6, Aesthetic Guidelines for Non-Station Structures (Authority 2011a). The guidelines for station and non-station structures allow for contextual design responses to site-specific or unique conditions, or "context sensitive solutions". Context sensitive solutions	Pre-construction/Construction	Reporting/Monitoring	Monthly	Authority	Authority	Monthly reporting	The Authority will meet with affected residents and property owners and design appropriate measures to minimize impacts.	SO#6	Division of existing community Ponderosa Road/Edna Way east of Hanford, the Newark Avenue vicinity northeast of Corcoran, and Crome. Impacts associated with the Preferred Alternative would relocate and displace residents of small, rural residential communities.
										SO #7	Effects to the regional agricultural community and displacement of homes in the unincorporated areas of the region of the four affected counties.

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		mean structural aesthetics must respond to local settings with concern for the human scale, building scale, and the vantage points from which the structures will be viewed. Included in the Authority's design principles is the requirement that the structures enhance local environments and community context. Landscaping will be used to visually integrate project structures into the local context with plantings that recreate the natural setting into which they are placed. The aesthetic design of project structures, in combination with landscape and urban design that serve the local community can create a positive contribution to the surrounding visual context and minimize the potential for physical deterioration.							The Authority will hold workshops and create reports based on workshop and design findings		
SO-MM#6	Continue outreach to disproportionately and negatively impacted environmental justice populations.	The Authority will continue to conduct substantial EJ outreach activities in adversely affected neighborhoods to obtain resident feedback on potential impacts and suggestions for mitigation measures. Input from these communities will be used to refine the alternatives during ongoing design efforts. In addition, to offset any disproportionate effects, the Authority will develop special recruitment, training, and job set-aside programs so that minority and low-income populations are able to benefit from the jobs created by the project. This type of outreach is common for large infrastructure projects with long construction periods and has been found to be effective.	Pre-construction/ Construction / Operations		Monthly	Authority	Authority	Monthly reporting	The Authority will meet with affected residents and property owners and design appropriate measures to minimize impacts. The Authority will hold workshops and create reports based on workshop and design findings	Applies to all environmental justice impacts.	
<b>Station Planning, Land Use, and Development</b>											
Mitigation measures for station planning, land use and development were incorporated in other sections. See Air Quality and Aesthetics, Noise and Vibration, and Agriculture.											
<b>Agricultural Land</b>											
AG-MM #1:	Preserve the Total Amount of Prime Farmland, Farmland of Statewide Importance, Farmland of Local Importance, and Unique Farmland	The Authority will enter into an agreement with the DOC California Farmland Conservancy Program to preserve farmland. The Authority will fund the California Farmland Conservancy Program's work to identify suitable agricultural land for mitigation of impacts and to fund the purchase of agricultural conservation easements from willing sellers. The performance standards for this measure are to preserve Important Farmland in an amount commensurate with the quantity and quality of the converted farmlands, within the same agricultural regions as the impacts occur, at a replacement ratio of not less than 1:1 for lands that are permanently converted to non-agricultural use by the project. In addition, the Authority will provide an additional increment of Important Farmland mitigation acreage, above the 1:1 ratio minimum, at a level consistent with the terms of a settlement agreement the Authority reached with agricultural interests in County of Madera, et	Pre-construction	Reporting	Monthly	Authority & California Farmland Conservancy	Authority	Prior to construction/ Monthly reporting	The Authority will enter into an agreement with the DOC California Farmland Conservancy Program to implement the preservation of farmland. The Authority and California Farmland Conservancy Program will develop selection criteria under this agreement to guide the pursuit and purchase of conservation easements.	AG#4: LU Impact #2: LU Impact #3: LU Impact #5	Permanent Conversion of Agricultural Land to Nonagricultural Use. The Preferred Alternative would affect 3,474 acres of Important Farmland. The Preferred Alternative would cause a substantial change in intensity of land use incompatible with adjacent land uses. The Kings/Tulare Regional Station–East is likely to result in some unplanned changes in the use of existing adjacent land, regardless of the amount of parking provided at the station. Indirect changes to adjacent lands at the Kings/Tulare Regional Station–East site would substantially change the pattern and intensity of land use in a way that would be incompatible with adjacent land uses.

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		<p>al. v. California High-Speed Rail Authority. This approach will provide a consistent approach to calculating the total amount of acres of agricultural conservation easements across the Central Valley.</p> <p>The California Farmland Conservancy Program will work with local, regional, or statewide entities whose purpose includes the acquisition and stewardship of agricultural conservation easements. The Authority and California Farmland Conservancy Program will develop selection criteria under this agreement to guide the pursuit and purchase of conservation easements. These will include, but are not limited to, provisions to ensure that the easements will conform to the requirements of Public Resources Code Section 10252 and to prioritize the acquisition of willing seller easements on lands that are adjacent to other protected agricultural lands or that would support the establishment of greenbelts and urban separators.</p>									
<b>Parks and Recreation</b>											
PP-MM#1	Temporary Restricted Access to Park Facilities During Construction	<p>Prior to temporary restricted access to the multi-use trail and Hoey trail, the contractor will ensure that connections to the unaffected trail portions and nearby roadways are maintained. The contractor will provide alternative pedestrian and bicycle access via a temporary detour of the multi-use trail using existing roadways or other public rights of way. The contractor will provide detour signage and lighting and will ensure that the alternative routes meet all public safety requirements.</p>	Pre-construction/Construction	Reporting/Compensation	Weekly	Contractor	Authority/Contractor	Pre-construction/Construction. Authority to coordinate with local jurisdictions	The Authority and Contractor will work with respective jurisdictions (City of Bakersfield) to develop a staging plan and detour plan for alternative access plan to impacted Trails.	PK#1	Kern River Parkway. Construction activities for the Preferred Alternative would create use restriction of the multi-use trail and Hoey trail within the construction footprint.
		<p>Prior to temporary restricted access to the park facilities, the contractor will ensure that connections to the unaffected park portions or nearby roadways are maintained. If a proposed linear park closure restricts connectivity, the contractor will provide alternative pedestrian and bicycle access via a temporary detour of the pedestrian walkway using existing roadways or other public rights of way. The contractor will provide detour signage and lighting and will ensure that the alternative routes meet all public safety requirements.</p>	Pre-construction/Construction/Post-construction/Operations	Reporting/Compensation	Monthly	Authority	Authority	Prior to construction/monthly reporting	The Authority and Contractor will work with respective jurisdictions (City of Bakersfield) to develop a staging plan and detour plan for alternative access plan to impacted park facilities.	PK#1	Mill Creek Linear Park. Construction activities for the Preferred Alternative would create use restrictions of some areas of park facilities.
PP-MM#3	Collect Additional Maintenance Funds	The Authority will consult with the City of Bakersfield and Amtrak to identify its share of funding to provide additional maintenance, labor, and repairs for the existing Bakersfield Amtrak playground to remedy any potential degradation of existing facilities that may result from increased facility use. Prior to the opening of passenger service, the Authority will enter into an agreement with the city and Amtrak that establishes the funding share and describes the	Pre-construction/Construction/Post-construction/Operations	Compensation	Monthly	Authority	Authority	Prior to construction/Construction/Post construction/Operations. Authority to coordinate with local jurisdictions	The Authority will coordinate with the City of Bakersfield to identify appropriate funding amounts	PK#4	Bakersfield Amtrak Station Playground. The Bakersfield Station would create an increase in use that would result in physical deterioration.



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		relative roles of the Authority, the City of Bakersfield, and Amtrak in providing continuous maintenance of the existing playground.									
<b>Aesthetics and Visual Resources</b>											
AVR-MM#1a	Minimize Visual Disruption from Construction Activities	The project will adhere to local jurisdiction construction requirements (if applicable) regarding construction-related visual/aesthetic disruption. In order to minimize visual disruption, construction will employ the following activities: <ul style="list-style-type: none"> <li>• Minimize Pre-construction clearing to that necessary for construction.</li> <li>• Limit the removal of buildings to those that would obstruct project components.</li> <li>• When possible, preserve existing vegetation, particularly vegetation along the edge of construction areas that may help screen views.</li> <li>• After construction, Regrade areas disturbed by construction, staging, and storage to original contours and revegetate with plant material similar in replacement numbers and types to that which was removed based upon local jurisdictional requirements. If there are no local jurisdictional requirements, replace removed vegetation at a 1:1 replacement ratio for shrubs and small trees, and 2:1 replacement ratio for mature trees. For example, if 10 mature trees in an area are removed, replant 20 younger trees that after 5 to 15 years (depending upon the growth rates of the trees) would provide coverage similar to the coverage provided by the trees that were removed for construction.</li> <li>• To the extent feasible, do not locate construction staging sites within the immediate foreground distance (0 to 500 feet) of existing residential, recreational, or other high-sensitivity receptors. Where such siting is unavoidable, staging sites will be screened from sensitive receptors using appropriate solid screening materials such as temporary fencing and walls. Any graffiti or visual defacement of temporary fencing and walls will be painted over or removed within 5 business days.</li> </ul>	Pre-construction/ Construction / Post-construction	Reporting	Weekly	Contractor	Contractor	Construction/ Weekly Reporting	Contract Requirements/ Specifications	AVR#2	Construction Impacts of Existing Visual Quality. Construction activities would cause visual impacts.
										LU Impact #1	Disruption of access to some properties would temporarily inconvenience nearby residents on some lands along 31 miles of the Preferred Alternative.
										PK#1	Construction activities would cause visual impacts to park, recreation, and open space resources.
										PK#1	Construction activities would cause visual impacts to school district facilities.
AVR-MM#1b	Minimize Light Disturbance during Construction	Where construction lighting will be required during nighttime construction, the Contractor will be required to shield such lighting and direct it downward in such a manner that the light source is not visible offsite, and so that the light does not fall outside the boundaries of the project site to avoid light spill offsite.	Pre-construction/ Construction	Reporting	Weekly	Contractor	Contractor	Construction/ Weekly reporting	Contract Requirements/ Specifications	AVR#3	Nighttime Lighting during construction. Intrusive nighttime lighting could result in adverse impacts in both rural and urban areas.
										LU Impact #1	Disruption of access to some properties would temporarily inconvenience nearby residents on some lands along 31 miles of the Preferred Alternative.
										PK#1	Construction activities would cause visual impacts to park, recreation, and open space resources.
										PK#1	Construction activities would cause visual impacts to school district facilities.

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AVR-MM#2a	Incorporate Design Criteria for Elevated and Station Elements That Can Adapt to Local Context	<p>During final design of the elevated guideways and the Fresno, Kings/Tulare Regional, and Bakersfield stations, the contractor partnering with the Authority will coordinate with local jurisdictions on the design of these facilities so that they are designed appropriately to fit in with the visual context of the areas near them. This will include the following activities:</p> <ul style="list-style-type: none"> <li>• For stations: During the station design process, establish a local consultation process with the Cities of Fresno and Bakersfield, and the cities and communities surrounding the Kings/Tulare Regional Station, as necessary, to identify and integrate local design features into the station design through a collaborative, context-sensitive solutions approach. The process will include activities to solicit community input in their respective station areas. This effort will be coordinated with the station area planning process that will be undertaken by those cities under their station area planning grants.</li> <li>• For elevated guideways in cities or unincorporated communities: During the elevated guideway design process, establish a process with the city or county with jurisdiction over the land along the elevated guideway to advance the final design through a collaborative, context-sensitive solutions approach. Participants in the consultation process will meet on a regular basis to develop a consensus on the urban design elements that are to be incorporated into the final guideway designs. The process will include activities to solicit community input in the affected neighborhoods.</li> </ul> <p>Actions taken to help achieve integration with the local design context during the context-sensitive solutions process will include the following:</p> <ul style="list-style-type: none"> <li>• Design HST stations and associated structures such as elevators, escalators, and walkways to be attractive architectural elements or features that add visual interest to the streetscapes near them.</li> <li>• Design HST station parking structures and adjacent areas to integrate visually into the areas where they would be located. Where the city has adopted applicable downtown design guidelines, the parking structures and adjacent areas will be designed to be compatible with the policies and principles of those guidelines.</li> <li>• For the elevated guideways and columns, incorporate architectural elements, such as graceful curved or tapered sculptural forms and decorative surfaces, to provide visual interest. Include decorative texture treatments on large-scale concrete surfaces such as parapets and other portions of elevated</li> </ul>	Pre-construction/Design	Reporting	Final design	Contractor and Authority	Contractor and Authority	Final design and Construction/Monthly reporting	Established local consultation process with communities along the alignment	AVR#4	Lower visual quality in the Rural Valley/Agricultural Landscape Unit. Impacts on the existing visual character and quality of the site and its surroundings, as seen by nearby rural residents due to at-grade and elevated structures, HSTs, road overcrossings, or other prominent project features.
										AVR#4	Lower visual quality in Wasco, and Shafter Landscape Units. Impacts on the existing visual character and quality of the site and its surroundings due to at-grade and elevated structures, HSTs, road overcrossings, or other prominent project features.
										AVR#4	Lower visual quality in the Rosedale, Kern River, Central Bakersfield, and/or East Bakersfield Landscape Units. Impacts on the existing visual character and quality of the site and its surroundings in Bakersfield due to elevated guideways and sound barriers.
										AVR#4	Sound Barriers would lower visual quality or block views. The Preferred Alternative would require the use of sound barriers along portions of the guideway in urbanized areas, potentially lowering visual quality and/or blocking existing views, depending on the barrier location and materials.
										PK#4	Kern River Parkway. HST operation for the Preferred Alternative would substantially degrade the existing visual character of the site and its surroundings.
										PK#4	Mill Creek Linear Park. HST operation of the Preferred Alternative would substantially degrade the existing visual character of the site and its surroundings.
										PK#4	Bakersfield Amtrak Station Playground. HST operation of the Preferred Alternative would substantially degrade the existing visual character of the site and its surroundings.



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Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact #	Impact Text
		<p>guideways. Include a variety of texture, shadow lines, and other surface articulation to add visual and thematic interest. Closely coordinate the design of guideway columns and parapets with station and platform architecture to promote unity and coherence where guideways lie adjacent to stations.</p> <ul style="list-style-type: none"> <li>Integrate trees and landscaping into the station streetscape and plaza plans where possible to soften and buffer the appearance of guideways, columns, and elevated stations. This will be consistent with the principles of crime prevention through environmental design.</li> <li>For the stations, structures, and related open spaces: incorporate design features that provide interest and reflect the local design context. These features could include landscaping, lighting, and public art. The designs in cities and unincorporated communities will reflect the results of the context-sensitive solutions design process. During the context-sensitive solutions design process, the HST project's obligations and constraints related to planning, mitigation, engineering, performance, funding, and operational requirements will be taken into consideration.</li> </ul>									
AVR-MM#2b	Integrate Elevated Guideway into Affected Cities, Parks, Trail, and Urban Core Designs	During development of the final design, the Authority will work with the affected cities and counties to develop a project site and landscape design plan for the areas disturbed by the project. As a result of following these plans, the design features identified in AVR-MM#2a and the park mitigation measure PK-MM#3 will be implemented.	Pre-construction/Design	Reporting	Monthly	Contractor	Contractor and Authority	Construction/monthly reporting	Contract Requirements/ Specifications Authority will meet with local jurisdictions during development of final design	AVR#4 AVR#4 AVR#4 AVR#4 PK#4 PK#4 PK#4	<p>Lower visual quality in the Rural Valley/Agricultural Landscape Unit. Impacts on the existing visual character and quality of the project area, as seen by nearby rural residents due to at-grade and elevated structures, HSTs, road overcrossings, or other prominent project features.</p> <p>Lower visual quality in Wasco, and Shafter Landscape Units. Impacts on the existing visual character and quality of the site and its surroundings due to at-grade and elevated structures, HSTs, road overcrossings, or other prominent project features.</p> <p>Lower visual quality in the Rosedale, Kern River, Central Bakersfield, and/or East Bakersfield Landscape Units. Impacts on the existing visual character and quality of the site and its surroundings in Bakersfield due to elevated guideways and sound barriers.</p> <p>Sound Barriers would lower visual quality or block views. The Preferred Alternative would require the use of sound barriers along portions of the guideway in urbanized areas, potentially lowering visual quality and/or blocking existing views, depending on the barrier location and materials.</p> <p>Kern River Parkway. HST operation for the Preferred Alternative would substantially degrade the existing visual character of the site and its surroundings.</p> <p>Mill Creek Linear Park. HST operation of the Preferred Alternative would substantially degrade the existing visual character of the site and its surroundings.</p> <p>Bakersfield Amtrak Station Playground. HST operation of the Preferred Alternative would substantially degrade the existing visual character of the site and its surroundings.</p>

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AVR-MM#2c	Screen At-Grade and Elevated Guideways Adjacent to Residential Areas	Consistent with the design features developed under AVR-MM#2a, the contractor will plant trees along the edges of the rights-of-way in locations adjacent to residential areas. This will help reduce the visual contrast between the elevated guideway and the residential area. The species of trees to be installed will be selected on the basis of their mature size and shape, growth rate, hardiness, and drought tolerance. No species that is listed on the Invasive Species Council of California's list of invasive species will be planted. The crowns of trees used should ultimately be tall enough so that upon maturity they will partially, or fully, block or screen views of the elevated guideway from adjacent at-grade areas. Trees should allow ground-level views under the crowns (with pruning if necessary) while not interfering with the 15-foot clearance requirement for the guideway. The trees will be continuously maintained and appropriate irrigation systems will be installed within the tree planting areas.	Construction /Post-construction	Reporting	Monthly	Contractor and Authority	Contractor	Construction/ monthly reporting	Contract Requirements/ Specifications and Landscaping and maintenance will be provided by the Contractor for its scope of work until substantial completion of the work at which time the Authority shall assume responsibility for landscaping or	AVR#4	Lower visual quality in the Rural Valley/Agricultural Landscape Unit. Impacts on the existing visual character and quality of the site and its surroundings, as seen by nearby rural residents due to at-grade and elevated structures, HSTs, road overcrossings, or other prominent project features.
										AVR#4:	Lower visual quality in Wasco, and Shafter Park Landscape Units. Impacts on the existing visual character and quality of the site and its surroundings due to at-grade and elevated structures, HSTs, road overcrossings, or other prominent project features.
										AVR#4	AVR#4: Lower visual quality in the Rosedale, Kern River, Central Bakersfield, and/or East Bakersfield Landscape Units. Impacts on the existing visual character and quality of the site and its surroundings in Bakersfield due to elevated guideways and sound barriers.
										AVR#4:	Sound Barriers would lower visual quality or block views. The Preferred Alternative would require the use of sound barriers along portions of the guideway in urbanized areas, potentially lowering visual quality and/or blocking existing views, depending on the barrier location and materials.
										PK#4	Kern River Parkway. HST operation for the Preferred Alternative would substantially degrade the existing visual character of the site and its surroundings.
										PK#4	Mill Creek Linear Park. HST operation of the Preferred Alternative would substantially degrade the existing visual character of the site and its surroundings.
AVR-MM#2d	Replant Unused Portions of Lands Acquired for the HST	After construction is complete, the Authority will plant vegetation within lands acquired for the project (e.g., shifting roadways) that are not used for the HST or related supporting infrastructure. Plantings will allow adequate space between the vegetation and the HST alignment and catenary lines. All street trees and other visually important vegetation removed in these areas during construction will be replaced with similar vegetation that, upon maturity, will be similar in size and character to the removed vegetation. The Authority will ensure that vegetation will be continuously maintained and appropriate irrigation systems will be installed within the planting areas. No species that is listed on the Invasive Species Council of California's list of invasive species will be planted.	Post-construction/ Operations	Reporting	Monthly	Authority	Authority	Post - Construction/ monthly reporting	Authority to implement appropriate landscape and maintenance plan	AVR#4	Lower visual quality in the Rural Valley/Agricultural Landscape Unit. Impacts on the existing visual character and quality of the site and its surroundings, as seen by nearby rural residents due to at-grade and elevated structures, HSTs, road overcrossings, or other prominent project features.
										AVR#4	Lower visual quality in Corcoran, Wasco, and Shafter Landscape Units. Impacts on the existing visual character and quality of the site and its surroundings due to at-grade and elevated structures, HSTs, road overcrossings, or other prominent project features.
										AVR#4	Lower visual quality in the Rosedale, Kern River, Central Bakersfield, and/or East Bakersfield Landscape Units. Impacts on the existing visual character and quality of the site and its surroundings in Bakersfield due to elevated guideways and sound barriers.
										AVR#4:	Sound Barriers would lower visual quality or block views. The Preferred Alternative would require the use of sound barriers along portions of the guideway in urbanized areas, potentially lowering visual quality and/or blocking existing views, depending on the barrier location and materials.
										PK#4	Kern River Parkway. HST operation of the Preferred Alternative would substantially degrade the existing visual character of the site and its surroundings.
										PK#4	Mill Creek Linear Park. HST operation of the Preferred Alternative would substantially degrade the existing visual character of the site and its surroundings.
PK#4	Bakersfield Amtrak Station Playground. HST operation of the Preferred Alternative would substantially degrade the existing visual character of the site and its surroundings.										

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AVR-MM#2e	Provide Offsite Landscaping Screening Where Appropriate	Where onsite landscape screening measures as described under AVR-MM#2d cannot provide effective screening to significantly affected high-sensitivity receptors such as nearby rural residential areas, provide offsite screening, as appropriate, if desired by affected residential owners.	Post-construction/Operation	Reporting	Monthly	Authority	Contractor/Environmental Compliance Manager/Mitigation Manager/Authority	Post - Construction/ monthly reporting	Contract Requirements/ Specifications and Landscaping and maintenance will be provided by the Contractor for its scope of work until substantial completion of the work at which time the Authority shall assume responsibility for landscaping or assign the responsibility to other third parties.	AVR#4	Lower visual quality in the Rural Valley/Agricultural Landscape Unit. Impacts on the existing visual character and quality of the site and its surroundings, as seen by nearby rural residents due to at-grade and elevated structures, HSTs, road overcrossings, or other prominent project features.
										AVR#4	Lower visual quality in Wasco, and Shafter Landscape Units. Impacts on the existing visual character and quality of the site and its surroundings due to at-grade and elevated structures, HSTs, road overcrossings, or other prominent project features.
										AVR#4	Lower visual quality in the Rosedale, Kern River, Central Bakersfield, and/or East Bakersfield Landscape Units. Impacts on the existing visual character and quality of the site and its surroundings in Bakersfield due to elevated guideways and sound barriers.
										AVR#4	Sound Barriers would lower visual quality or block views. The Preferred Alternative would require the use of sound barriers along portions of the guideway in urbanized areas, potentially lowering visual quality and/or blocking existing views, depending on the barrier location and materials.
										PK#4	Kern River Parkway. HST operation of the Preferred Alternative would substantially degrade the existing visual character of the site and its surroundings.
										PK#4	Mill Creek Linear Park. HST operation of the Preferred Alternative would substantially degrade the existing visual character of the site and its surroundings.
										PK#4	Bakersfield Amtrak Station Playground. HST operation of the Preferred Alternative would substantially degrade the existing visual character of the site and its surroundings.
AVR-MM#2f	Landscape Treatments along the HST Project Overcrossings and Retained Fill Elements of the HST	Upon the completion of construction, the contractor will plant the surface of the ground supporting the overpasses (slope-fill overpasses) and retained fill elements with vegetation consistent with the surrounding landscape in terms of vegetative type, color, texture, and form. During final design, the Authority will consult with the affected cities and counties regarding the landscaping program for planting the slopes of the overcrossings and retained fill. Plant species will be selected on the basis of their mature size and shape, growth rate, and drought tolerance. No species that is listed on the Invasive Species Council of California's list of invasive species will be planted. The landscaping will be continuously maintained and appropriate irrigation systems will be installed if needed. Where wall structures supporting the overpasses or retained fill are proposed, the structure will employ architectural details and low-maintenance trees and other vegetation to screen the structure, minimize graffiti, and reduce the effects of large walls. Surface coatings will be applied on wood and concrete to facilitate cleaning and the removal of graffiti. Any graffiti or visual defacement or damage of fencing and walls will be painted over or repaired within a reasonable time after notification.	Post-construction/Operation	Reporting	Monthly	Authority	Authority	Monthly Reporting	Landscaping and maintenance will be provided by the Contractor for its scope of work until substantial completion of the work at which time the Authority shall assume responsibility for landscaping or assign the responsibility to other third parties.	AVR#4	Lower visual quality in the Rural Valley/Agricultural Landscape Unit. Impacts on the existing visual character and quality of the site and its surroundings, as seen by nearby rural residents due to at-grade and elevated structures, HSTs, road overcrossings, or other prominent project features.
										AVR#4	Lower visual quality in Wasco, and Shafter Landscape Units. Impacts on the existing visual character and quality of the site and its surroundings due to at-grade and elevated structures, HSTs, road overcrossings, or other prominent project features.
										AVR#4	Lower visual quality in the Rosedale, Kern River, Central Bakersfield, and/or East Bakersfield Landscape Units. Impacts on the existing visual character and quality of the site and its surroundings in Bakersfield due to elevated guideways and sound barriers.
										AVR#4	Sound Barriers would lower visual quality or block views. The Preferred Alternative would require the use of sound barriers along portions of the guideway in urbanized areas, potentially lowering visual quality and/or blocking existing views, depending on the barrier location and materials.
										PK#4	Kern River Parkway. HST operation of the Preferred Alternative would substantially degrade the existing visual character of the site and its surroundings.
										PK#4	Mill Creek Linear Park. HST operation of the Preferred Alternative would substantially degrade the existing visual character of the site and its surroundings.
										PK#4	Bakersfield Amtrak Station Playground. HST operation of the Preferred Alternative would substantially degrade the existing visual character of the site and its surroundings.

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AVR-MM#2g	Provide Sound Barrier Treatments	The contractor will design a range of sound barrier treatments for visually sensitive areas, such as those where residential views of open landscaped areas would change or in urban areas where sound barriers would adversely affect the existing character and setting (see the description of sound barriers in Table 3.16-2). The Authority will develop the treatments during final design and integrate them into the final project design. The treatments will include, but are not limited to, the following: • Sound barriers along elevated guideways may incorporate transparent materials where sensitive views would be adversely affected by solid sound barriers. • Sound barriers will use non-reflective materials and will be of a neutral color. • Surface design enhancements and vegetation appropriate to the visual context of the area will be installed with the sound barriers. Vegetation will be installed consistent with the provisions of AVR-MM#2f. Surface enhancements will be consistent with the design features developed under AVR-MM#2a, and will include architectural elements (i.e., stamped pattern, surface articulation, and decorative texture treatment as determined acceptable to the local jurisdiction. Surface coatings will be used on wood and concrete sound barriers to facilitate cleaning and the removal of graffiti.	Pre-construction/Construction	Reporting	Monthly	Contractor	Contractor	Construction/monthly reporting	Contract Requirements/ Specifications	AVR#4	Lower visual quality in the Rural Valley/Agricultural Landscape Unit. Impacts on the existing visual character and quality of the site and its surroundings, as seen by nearby rural residents due to at-grade and elevated structures, HSTs, road overcrossings, or other prominent project features.
										AVR#4	Lower visual quality in Wasco, and Shafter Landscape Units. Impacts on the existing visual character and quality of the site and its surroundings due to at-grade and elevated structures, HSTs, road overcrossings, or other prominent project features.
										AVR#4	Sound Barriers Would Lower Visual Quality or Block Views
										AVR#4	Lower visual quality in the Rosedale, Kern River, Central Bakersfield, and/or East Bakersfield Landscape Units. Impacts on the existing visual character and quality of the site and its surroundings in Bakersfield due to elevated guideways and sound barriers.
AVR-MM#2h	Screen Traction Power Distribution Stations and Radio Communication Towers	Upon completion of station or HMF construction, the contractor will screen the traction power substations (located at approximately 30-mile intervals along any of the HST alternatives), including radio towers where required, and HMF from public view through the use of landscaping or solid walls/fences. This will consist of context-appropriate landscaping of a type and scale that does not draw attention to the station. Plant species will be selected on the basis of their mature size and shape, growth rate, hardiness, and drought tolerance. No species that is listed on the Invasive Species Council of California's list of invasive species will be planted. The landscaping will be continuously maintained and appropriate irrigation systems will be installed within the landscaped areas. Walls will be constructed of cinder-block or similar material and will be painted a neutral color to blend in with the surrounding context. If a chain-link or cyclone fence is used, it will include slats in the fencing. Any graffiti or visual defacement or damage of fencing and walls will be painted over or repaired within a reasonable period as agreed between the Authority and local jurisdiction. Figure 3.16-66 shows a power substation in an urban	Post-construction/Operation	Reporting	Annually	Contractor	Contractor	Post Construction/Operations	Landscaping and maintenance will be provided by the Contractor for its scope of work until substantial completion of the work at which time the Authority shall assume responsibility for landscaping or assign the responsibility to other third parties.	AVR#4	Lower visual quality in the Rural Valley/Agricultural Landscape Unit. Impacts on the existing visual character and quality of the site and its surroundings, as seen by nearby rural residents due to at-grade and elevated structures, HSTs, road overcrossings, or other prominent project features.
										AVR#4	Lower visual quality in Wasco, and Shafter Landscape Units. Impacts on the existing visual character and quality of the site and its surroundings due to at-grade and elevated structures, HSTs, road overcrossings, or other prominent project features.
										AVR#4	Traction Power Stations would alter visual character or block views. The Preferred Alternative would require the placement of Traction Power Distribution Stations of varying sizes at approximately 5-mile intervals along the alignment, which would potentially alter the visual character of adjacent lands and/or block views toward areas beyond the alignment.

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		environment that is partially screened by landscaping and fencing. None of the mitigation measure options are expected to result in secondary effects. The mitigation measures are typical of visual treatments applied on linear transportation facilities; they have been defined to be specific in range and implementable according to context, and designed in coordination with local jurisdictions.									
<b>Cultural Resources</b>											
CUL-MM #1	Complete Inventory for Archaeological Resources and Comply with the Stipulations Regarding the Treatment of Archaeological Resources in the PA and MOA	<p>The contractor will complete the following management steps for currently inaccessible areas once permission to enter has been obtained:</p> <ul style="list-style-type: none"> <li>• The contractor will complete an inventory and evaluation report for archaeological resources.</li> <li>• This work will be led or supervised by cultural resources specialists who meet the SOI's professional qualification standards provided in 36 C.F.R. Part 61.</li> <li>• All newly identified resources will be mapped and described on DPR forms. Mapping will be completed by recording data with GPS hardware through which data can be imported and managed in Geographic Information Systems. Mapping of previously identified resources will be limited to updates of existing records where necessary to describe the current boundaries of the resource and any change in condition that has occurred after the first recordation.</li> <li>• The contractor will evaluate the eligibility of identified archaeological and built environment resources for listing on the CRHR.</li> <li>• Under delegated authority provided in the PA and MOA the contractor will also evaluate identified archaeological resources for the NRHP.</li> <li>• For archaeological resources that are NRHP eligible the contractor will assess the potential for adverse effects within the meaning of 36 C.F.R. Part 800.5(a)(1). For CRHR eligible resources the contractor shall assess the potential for significant impacts by applying the criteria in CEQA Guidelines 15064.5(b).</li> <li>• For CRHR eligible archaeological resources the Authority shall determine if these resources can feasibly be preserved in place, or if data recovery is necessary. The methods of preservation in place shall be considered in the order of priority provided in CEQA Guidelines § 15126.4(b)(3). If data recovery is the only feasible treatment the Authority shall adopt a data recovery plan as required under CEQA Guidelines § 15126.4(b)(3)(C).</li> </ul>	Pre-construction	Reporting	Weekly	Contractor	Contractor	Pre-construction/weekly reporting or as dictated by the Archaeological Treatment Plan (ATP)	PA/ MOA	CUL #1	<p>Potential Adverse Effects on Archaeological Resources due to Construction Activities</p> <p>Construction of the HST would result in possible substantial effects on unknown archaeological deposits or paleontological resources from ground-disturbing construction operations associated with the project, or in areas where PTE has not been granted.</p>



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		<ul style="list-style-type: none"> <li>For archaeological resources the Authority shall also determine if the resource is a unique archaeological site. If the resource is not an historical resource but is an archaeological site the resource shall be treated as required in California Public Resources Code 21083.2.</li> </ul>									
CUL-MM #2	Conduct Archaeological Training	<p>Before the start of ground-disturbing activities within the APE, a qualified professional archaeologist who meets the SOI Standards for Archaeology will develop a training program and printed material to be presented to construction personnel. The purpose of this training and accompanying materials will be to familiarize construction personnel with the relevant legal (Section 106/NEPA/CEQA) context for cultural resources of the project and with the types of cultural sites, features, and artifacts that could be uncovered during construction activities. These training sessions will be conducted before commencing construction within the APE or and will be repeated as needed as construction crews and supervisors change.</p>	Pre-construction	Reporting	Monthly	Contractor	Contractor	Prior to ground-disturbing activities/monthly reporting	<p>Worker Environmental Awareness Program training</p> <p>ATP</p> <p>MOA</p> <p>An Unanticipated Discoveries Plan is a part of the ATP and has been developed, in coordination with the consulting parties, to detail the specific procedures to be followed if archaeological materials are found during construction.</p> <p>Implement an ADRP if the circumstances warrant an ADRP. The Authority will provide the ADRP, as an element of the treatment plan prepared for the section, to the MOA signatories and MOA concurring parties for review and comment.</p>	CUL #1	<p>Potential Adverse Effects on Archaeological Resources due to Construction Activities</p> <p>Construction of the HST would result in possible substantial effects on unknown archaeological deposits or paleontological resources from ground-disturbing construction operations associated with the project, or in areas where PTE has not been granted.</p>
CUL-MM #3	Conduct Archaeological Monitoring in Areas of Sensitivity, Halt Work in the Event of a Discovery	<p>Prior to ground-disturbing construction the Authority will include a cultural resources discovery plan in the contract conditions of the Contractor, identifying the following steps to be taken in the event of the inadvertent discovery of cultural resources.</p> <ul style="list-style-type: none"> <li>An archaeological monitor will be present to observe construction at geographic locations that are sensitive for unidentified cultural resources. Such locations may consist of construction areas near identified cultural resources (within a 200-foot radius around the</li> </ul>	Construction	Reporting	Daily Logs (during active monitoring)	Contractor/Authority	Contractor	Daily logs (during active monitoring)	ATP/MOA	CUL #1	<p>Potential Adverse Effects on Archaeological Resources due to Construction Activities</p> <p>Construction of the HST would result in possible substantial effects on unknown archaeological deposits or paleontological resources from ground-disturbing construction operations associated with the project, or in areas where PTE has not been granted.</p>

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		<p>known boundaries of identified resources) and where ground-disturbing construction will occur within 1,500 feet of major water features, or in other areas of identified sensitivity based on inventory work to be completed when permission to enter is granted.</p> <ul style="list-style-type: none"> <li>In the event of an archaeological resource discovery, work will cease in the immediate vicinity of the find, based on the direction of the archaeological monitor or the apparent location of cultural resources if no monitor is present. A qualified archaeologist will assess the significance of the find and make recommendations for further evaluation and treatment as necessary. These steps shall include evaluation for the CRHR and NRHP and necessary treatment to resolve significant effects if the resource is an historical resource or historic property. If the resource is eligible for the CRHR an archaeological resource methods of preservation in place shall be considered in the order of priority provided in CEQA Guidelines § 15126.4(b)(3). If data recovery is the only feasible mitigation The Authority shall adopt a data recovery plan as required under CEQA Guidelines § 15126.4(b)(3)(C).</li> </ul> <p>The California State Lands Commission (CSLC) will be notified if the find is a cultural resource on or in the submerged lands of California and consequently under the jurisdiction of the CSLC. The Authority will comply with all applicable rules and regulations promulgated by CSLC with respect to cultural resources in submerged lands. The project proponent will also comply with the PA. Performance tracking of this mitigation measure is based upon successful implementation and approval of the documentation by the SHPO and appropriate consulting parties.</p>									
CUL-MM #4	Comply with State and Federal Law for Human Remains	<p>Discoveries of human remains on private and state agency lands in California are governed by California Health and Safety Code Section 7050.5 and Public Resources Code Section 5097.98. Native American remains discovered on federal lands are governed by NAGPRA (25 US Code Section 3001).</p> <p>If human remains are discovered on state-owned or private lands the contractor shall contact the relevant County Coroner to allow the Coroner to determine if an investigation regarding the cause of death is required. If no investigation is required and the remains are of Native American origin the Authority shall contact the Native American Heritage Commission to identify an MLD. The MLD shall</p>	Pre-construction/Construction/Post-construction	Monitoring and reporting	No reporting necessary unless remains are identified	Qualified Professional Archaeologist	Qualified Professional Archaeologist, in coordination with the Authority, SHPO and appropriate consulting agencies	If remains are identified during construction, Weekly reporting	ATP/MOA	CUL #1	<p>Potential Adverse Effects on Archaeological Resources due to Construction Activities</p> <p>Construction of the HST would result in possible substantial effects on unknown archaeological deposits or paleontological resources from ground-disturbing construction operations associated with the project, or in areas where PTE has not been granted.</p>

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		<p>be empowered to reinter the remains with appropriate dignity. If the MLD fails to make a recommendation the remains shall be reinterred in a location not subject to further disturbance and the location shall be recorded with the Native American Heritage Commission and relevant information center of the California Historical Resources Information System.</p> <p>If human remains are part of an archaeological site the Authority and contractor shall, in consultation with the MLD and other stakeholders, consider preservation in place as the first option, in the order of priority called for in CEQA Guidelines Section 15126.4(b)(3). In consultation with the relevant Native American stakeholders the Authority may conduct scientific analysis on the human remains if called for under a data recovery plan and amenable to all stakeholders. California and the Authority will work with the most likely descendant, to satisfy the requirements of California Public Resources Code Section 5097.98. Performance tracking of this mitigation measure will be based on successful implementation and approval of the documentation by the SHPO and appropriate consulting parties.</p>									
CUL-MM#5	Conduct Additional Testing and Data Recovery	When access is obtained, conduct surveys, testing, and evaluation pursuant to the ATP. Follow treatments and data recovery, as required.	Pre-construction/Construction	Reporting	Weekly	Contractor	Contractor	Pre-construction surveys and Construction/weekly reporting or as dictated by the ATP and the MOA	PA	Cul#1	Potential Adverse Effects on Archaeological Resources due to Construction Activities Construction of the HST would result in possible substantial effects on unknown archaeological deposits or paleontological resources from ground-disturbing construction operations associated with the project, or in areas where PTE has not been granted.



Historic Architectural Resources											
CUL-MM#6	Complete Inventories for Historic Architectural Resources	Because design of the project is currently only at 15%, it may be necessary to conduct additional inventories for historic architectural resources as the design is finalized. The Authority, under delegated responsibility under the PA and MOA, shall complete inventory and evaluate historic architectural properties for the NRHP. The Authority will also evaluate historic architectural resources to determine if they are historical resources (CRHR-eligible). For identified NRHP historic properties the Authority will assess the potential for adverse effects by applying the effects criteria in 36 C.F.R. Part 800.5(a)(1). For CRHR historic resources the Authority shall assess the potential for significant impacts by applying the criteria in CEQA Guidelines 15064.5(b).	Pre-construction/Construction	Reporting	Weekly	Contractor	Contractor	Pre-construction surveys and Construction/weekly reporting or as dictated by the BETP and the MOA	PA / Historic Structure Report (HSR) and the relocation plan	Cul#2	Potential Adverse Effects on Historic Architectural Resources due to Construction Activities Construction activities that may cause impacts on historic architectural resources can include excavation, staging, heavy-equipment usage and movement, drilling,
CUL-MM #7	Avoid and/or Monitor Adverse Construction Vibration Effects	The BETP will describe the methodology for the avoidance of adverse vibration effects and how such avoidance will be monitored and implemented during construction of the project. Implementation of avoidance measures will be monitored to ensure that damaging vibration levels are avoided during construction adjacent to the historic properties identified as requiring this treatment.	Pre-construction/Construction	Reporting	Weekly	Contractor	Contractor	Pre-construction surveys and Construction/weekly reporting or as dictated by the BETP and the MOA	PA / Historic Structure Report (HSR) and the relocation plan	Cul#2	Potential Adverse Effects on Historic Architectural Resources due to Construction Activities Construction activities that may cause impacts on historic architectural resources can include excavation, staging, heavy-equipment usage and movement, drilling, demolition, or the need for relocation, as well as increases in vibration levels or introduction of new visual elements.
CUL-MM #8	Implement Protection and/or Stabilization Measures	The BETP will identify historic properties/historical resources that may require treatment, protection and/or stabilization before the start of construction of the project. Treatment will be developed in consultation with the landowner or land-owning agencies as well as the SHPO and the MOA signatories, as required by the PA. Such 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. For buildings that would be moved, treatment will include stabilization before, during, and after relocation; protection during temporary storage; and relocation at a new site and during subsequent rehabilitation.	Pre-construction/Construction	Reporting	Weekly	Contractor	Contractor	Pre-construction surveys and Construction/weekly reporting or as dictated by the BETP and the MOA	BETP PA Historic Structure Report (HSR) and the relocation plan	Cul#2	Potential Adverse Effects on Historic Architectural Resources due to Construction Activities Construction activities that may cause impacts on historic architectural resources can include excavation, staging, heavy-equipment usage and movement, drilling, demolition, or the need for relocation, as well as increases in vibration levels or introduction of new visual elements.
CUL-MM #10	Minimize Adverse Effects through Relocation of Historic Structures	A BETP will identify historic properties/historical resources that could be relocated to help avoid their destruction and minimize the direct adverse effect of their physical damage or alteration. The development of the plan for relocation and the implementation of relocation will take place before construction. The relocation of the historic properties/historical resources will take into account the historic site and layout (i.e., the orientation of the buildings to the cardinal directions) and their potential re-use. The properties subject to relocation will be documented in detailed recordation that includes photography. This documentation may consist of preparation of updated recordation forms (DPR 523), or may be consistent with	Pre-construction/Construction/Post-Construction	Reporting	Weekly (during physical relocation)	Contractor	Contractor	Pre-construction surveys and Construction/weekly reporting or as dictated by the BETP and the MOA	BETP/Relocation Plan, PA HABS/HAER/HALS/ MOA	Cul#2	Potential Adverse Effects on Historic Architectural Resources due to Construction Activities Construction activities that may cause impacts on historic architectural resources can include excavation, staging, heavy-equipment usage and movement, drilling, demolition, or the need for relocation, as well as increases in vibration levels or introduction of new visual elements.

		the HABS, the Historic American Engineering Record (HAER), or the Historic American Landscape Survey (HALS) programs; or other recordation methods stipulated in the MOA and described in the BETP. The relocation plan will provide for stabilization of the structures before, during, and after the move, as well as inadvertent damage.									
CUL-MM #11	Minimize Adverse Operational Noise Effects	A BETP will identify the historic properties/historical resources that will be subject to treatment to minimize the indirect adverse effects caused by the operational noise of the HST project. Properties subject to this mitigation will be treated in consultation with the landowner or land-owning agencies and the CEQA lead agency (i.e., the Authority). Preliminary project design options, such as noise walls, have been developed to help reduce noise impacts and follow FRA methodologies for noise abatement.	Pre-construction/Construction/Post-Construction	Reporting	Ongoing	Contractor	Contractor	Pre-construction and Construction	BETP PA Historic American Building Survey (HABS)/Historic American Engineering Record (HAER)/Historic American Landscape Survey (HALS) programs, MOA	Cul#2	Potential Adverse Effects on Historic Architectural Resources due to Construction Activities Construction activities that may cause impacts on historic architectural resources can include excavation, staging, heavy-equipment usage and movement, drilling, demolition, or the need for relocation, as well as increases in vibration levels or introduction of new visual elements.
CUL-MM #12	Prepare and Submit Additional Recordation and Documentation	A BETP will identify specific historical resources that would be physically altered, damaged, relocated, or destroyed by the project that will be documented in detailed recordation that includes photography. This documentation may consist of preparation of updated recordation forms (DPR 523), or may be consistent with the HABS, the Historic American Engineering Record (HAER), or the Historic American Landscape Survey (HALS) programs; a Historic Structure Report; or other recordation methods stipulated in the MOA and described in the BETP. The recordation undertaken by this treatment would focus on the aspect of integrity that would be affected by the project for each historic property subject to this treatment. For example, historic properties in an urban setting that would experience an adverse visual effect would be photographed to capture exterior and contextual views; interior spaces would not be subject to recordation if they would not be affected. Consultation with the SHPO and the consulting parties will be conducted for the historic architectural resources to be documented. Recordation documents will follow the appropriate guidance for the recordation format and program selected. Copies of the documentation will be provided to the consulting parties and offered to the appropriate local governments, historical societies and agencies, or other public repositories, such as libraries. The documentation will also be offered in printed and electronic form to any repository or organization to which the SHPO, the Authority, and the local agency with jurisdiction over the property, through consultation, may agree. The electronic copy of the documentation may also be placed on an agency or organization's website.	Pre-construction/Construction	Reporting	Monthly	Contractor, Authority to coordinate with SHPO	Contractor	Prior to construction/ monthly reporting	BETP/ Photographs and nomination document, HABS/HAER/HALS/ MOA	Cul#2	Potential Adverse Effects on Historic Architectural Resources due to Construction Activities Construction activities that may cause impacts on historic architectural resources can include excavation, staging, heavy-equipment usage and movement, drilling, demolition, or the need for relocation, as well as increases in vibration levels or introduction of new visual elements.

CUL-MM #13	Prepare Interpretive or Educational Materials	<p>Based on the finalization of design and the completed inventory, the BETP will identify historic properties and historical resources that will be subject to historic interpretation or preparation of educational materials. Interpretive and educational materials will provide information regarding specific historic properties or historical resources and will address the aspect of the significance of the properties that would be affected by the project. Interpretive or educational materials could include, but are not limited to: brochures, videos, websites, study guides, teaching guides, articles or reports for general publication, commemorative plaques, or exhibits.</p> <p>Historic properties and historical resources subject to demolition by the project will be the subject of informative permanent metal plaques that will be installed at the site of the demolished historic property or at nearby public locations. Each plaque will provide a brief history of the subject property, its engineering/architectural features and characteristics, and the reasons for and the date of its demolition.</p> <p>The interpretive or educational materials will utilize images, narrative history, drawings, or other material produced for the mitigation described above, including the additional recordation prepared, or other archival sources. The interpretive or educational materials should be advertised, and made available to, and/or disseminated to the public. The interpretive materials may be made available in physical or digital formats, at local libraries, historical societies, or public buildings.</p>	Post-construction	Reporting	Annual	Authority	Authority, in consultation with the SHPO and appropriate consulting parties	Post-construction/annual reporting	<p>BETP</p> <p>Photographic documentation</p> <p>Plan for repairs to historic properties</p>	Cul#2	<p>Potential Adverse Effects on Historic Architectural Resources due to Construction Activities</p> <p>Construction activities that may cause impacts on historic architectural resources can include excavation, staging, heavy-equipment usage and movement, drilling, demolition, or the need for relocation, as well as increases in vibration levels or introduction of new visual elements.</p>
CUL-MM #14	Plan Repair of Inadvertent Damage	<p>Based on the completed inventory, the BETP will provide a plan for the repair of inadvertent damage to historic properties or historical resources be developed before project construction. The plan will consist of a general protocol for inadvertent damage to historic architectural resources and a listing of specific properties that should be the subject of an individual plan because of their immediate proximity to the project. Inadvertent damage from the project to any of the historic properties or historical resources near construction activities will be repaired in accordance with the SOI's Standards for Rehabilitation. Inadvertent damage will consist of any damage that results in a significant impact to a historical within the meaning of CEQA Guidelines Section 15064.5(b)(2) or adverse effects to historic properties within the meaning of 36 C.F.R. Part 800.5(a)(1).</p> <p>The plan may utilize photographic documentation prepared for the other mitigation measures (such as the additional recordation) as the baseline condition for assessing damage. The plan will include the</p>	Pre-construction/Construction/Post-construction	Reporting	Monthly	Authority	Authority, in consultation with the SHPO and appropriate consulting parties	Monthly reporting	<p>BETP, Historic American Building Survey (HABS)/Historic American Engineering Record (HAER)/Conformance with SOI's Standards of Rehabilitation, Plans for repairs to historic properties</p>	Cul #2	<p>Potential Adverse Effects on Historic Architectural Resources due to Construction Activities</p> <p>Construction activities that may cause impacts on historic architectural resources can include excavation, staging, heavy-equipment usage and movement, drilling, demolition, or the need for relocation, as well as increases in vibration levels or introduction of new visual elements.</p>

		<p>protocols for notification, coordination, and reporting to the SHPO and the landowner or land-owning agencies. Before it can be implemented, the repair plan will be submitted for review and comment to the SHPO to verify conformance with the SOI's Standards for Rehabilitation.</p> <p>This mitigation measure is consistent with best practices within the professional historic preservation community and is commensurate with treatment of historic properties in similar-scale transportation projects. This type of mitigation measure has proven to be effective in achieving the stewardship goals of Section 106 and CEQA review. Performance tracking of this treatment is described in the BETP.</p>									
CUL-MM #15	Visual Screening	<p>Based on the finalization of design and the completed inventory, the BETP will identify historic properties and historical resources that will be subject to visual screening planting. Visual screening will consist of plant material that will minimize the view of the project from the property subject to mitigation. This treatment will minimize adverse effects on historic properties/historical resources to the extent possible. Plant species will be selected on the basis of their mature size and shape, growth rate, and drought tolerance. No species that is listed on the Invasive Species Council of California's list of invasive species will be planted. The landscaping will be continuously maintained and appropriate irrigation systems will be installed if needed. Visual screen planting may be undertaken in the form of boundary planting on the affected property, planting at affected viewpoints, and/or planting on project property as appropriate. This treatment will be developed in consultation with the landowner or land-owning agencies, as well as the SHPO and the MOA signatories, as required by the PA. The visual screen planting treatment will include preparation of a planting plan that utilizes evergreen tree or shrub species and will take into account both the growth rate and ultimate height and density for the selected species to ensure that the visual screen can be accomplished effectively.</p>	Construction /Post-construction	Reporting	Annual	Authority	Authority	Post-construction/annual reporting	BETP Photographic documentation Visual Screening Plan	Cul#2	<p>Potential Adverse Effects on Historic Architectural Resources due to Construction Activities Construction activities that may cause impacts on historic architectural resources can include excavation, staging, heavy-equipment usage and movement, drilling, demolition, or the need for relocation, as well as increases in vibration levels or introduction of new visual elements.</p>

Paleontological Resources											
CUL-MM #16	Engage a Paleontological Resources Specialist to Direct Monitoring during Construction	A paleontological resources specialist (PRS) will be designated for the project who will be responsible for determining where and when paleontological resources monitoring should be conducted. Paleontological resources monitors (PRMs) will be selected by the PRS based on their qualifications, and the scope and nature of their monitoring will be determined and directed based on the Paleontological Resource Monitoring and Mitigation Plan (PRMMP). The PRS will be responsible for developing Worker Environmental Awareness Program training. 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 and will be provided with the necessary resources for responding in case paleontological resources are found during construction. The PRS will document any discoveries, as needed, evaluate the potential resource, and assess the significance of the find under the criteria set forth in CEQA Guidelines Section 15064.5.	Pre-construction/ Construction	Reporting	Daily Logs (during active monitoring)	Contractor	Contractor	Identify PRS at least 120 days prior to construction. The PRS will document any discoveries, as needed, evaluate the potential resource, and assess the significance of the find.	Paleontological Resource Monitoring and Mitigation Plan (PRMMP)	Cul#3	Potential Adverse Effects on Paleontological Resources due to Construction Activities Like archaeological resources, construction activities that may impact paleontological resources include ground-disturbing activities. Surficial activities such as staging and clearing usually do not affect paleontological resources because the associated disturbance does not extend deep enough to affect paleontologically sensitive deposits.
CUL-MM #17	Prepare and Implement a Paleontological Resource Monitoring and Mitigation Plan	Paleontological monitoring and mitigation measures are restricted to those construction-related activities that will result in the disturbance of paleontologically sensitive sediments. The PRMMP will include a description of when and where construction monitoring will be required; emergency discovery procedures; sampling and data recovery procedures; procedures for the preparation, identification, analysis, and curation of fossil specimens and data recovered; and procedures for reporting the results of the monitoring and mitigation program. The monitoring program will be designed to accommodate site-specific construction of the selected option. The PRMMP will be consistent with Society of Vertebrate Paleontology (SVP 1995) guidelines for the mitigation of construction impacts on paleontological resources. The PRMMP will also be consistent with the SVP (1996) conditions for receivership of paleontological collections and any specific requirements of the designated repository for any fossils collected.	Construction	Reporting	Monthly	Contractor	Contractor	Construction/ Monthly Reporting	PRMMP Worker Environmental Awareness Program training	Cul#3	Potential Adverse Effects on Paleontological Resources due to Construction Activities Like archaeological resources, construction activities that may impact paleontological resources include ground-disturbing activities. Surficial activities such as staging and clearing usually do not affect paleontological resources because the associated disturbance does not extend deep enough to affect paleontologically sensitive deposits.
CUL-MM #18	Halt Construction When Paleontological Resources Are Found	If fossil or fossil-bearing deposits are discovered during construction, regardless of the individual making a paleontological discovery, construction activity in the immediate vicinity of the discovery will cease. This requirement will be spelled out in both the PRMMP and the WEAP. Construction activity may continue elsewhere provided that it continues to be monitored as appropriate. If the discovery is made by someone other than a PRM or the PRS, a PRM or the PRS will immediately be notified.	Construction	Reporting	Daily logs during active monitoring	Contractor	Contractor	Construction/ Weekly reporting (if resource is identified during construction)	PRMMP, WEAP	Cul#3	Potential Adverse Effects on Paleontological Resources due to Construction Activities Like archaeological resources, construction activities that may impact paleontological resources include ground-disturbing activities. Surficial activities such as staging and clearing usually do not affect paleontological resources because the associated disturbance does not extend deep enough to affect paleontologically sensitive deposits.

Regional Growth											
No significant impacts on Regional Growth have been identified.											
Cumulative Impacts											
CUM-N&V-MM#1	Consult with agencies regarding construction activities.	To minimize the potential overlapping noise-generating construction activities within the same area, the Authority would consult with local city and county planning departments and other agencies as determined necessary. Consultation would entail notifying the departments/agencies regarding the anticipated HST construction schedule and would allow for adjustment of construction schedules for adjacent projects or projects in close proximity to the HST alignment, to the extent feasible.	Pre-Construction / Construction	Notify and consult with departments/agencies	Monthly	Contractor/Authority	Contractor	Monthly, record keeping, and reporting	Meetings with departments/agencies	CUM-N&V	Cumulative noise and vibration impacts of the HST alternatives and other past, present, and reasonably foreseeable projects during construction
CUM-SO-MM#1	Consult with agencies regarding construction activities.	To minimize the potential cumulative effects of overlapping construction activities within the same area, the Authority would consult with the local city and county planning departments and other agencies as determined necessary, to notify the departments/agencies regarding the anticipated HST construction schedule and allow for adjustment of construction schedules for adjacent projects or projects in close proximity to the HST alignment, to the extent feasible, in order to limit the overlap of community disruption.	Pre-Construction / Construction	Notify and consult with departments/agencies	Monthly	Contractor/Authority	Contractor	Monthly, record keeping, and reporting	Meetings with departments/agencies	CUM-SO	Construction and operation of the HST project and other past, present, and reasonably foreseeable projects would result in division and/or disruption of communities in the cities of Fresno, Hanford, Corcoran, Wasco, Shafter, and Bakersfield, as well as unincorporated communities in Kings and Kern counties.
CUM-SO-MM#2	Public outreach.	For areas with potentially overlapping construction schedules for the HST and other projects, the Authority would continue to undertake environmental justice outreach prior to construction, as described in Mitigation Measure SO-6: Continue outreach to disproportionately and negatively impacted environmental justice communities of concern. The Authority would obtain feedback from the affected neighborhoods regarding these project construction schedules to address community concerns.	Pre-Construction / Construction	Public outreach activities	Monthly	Contractor/Authority	Contractor	Monthly, record keeping, and reporting	Meetings with departments/agencies	CUM-SO	Construction and operation of the HST project and other past, present, and reasonably foreseeable projects would result in division and/or disruption of communities in the cities of Fresno, Hanford, Corcoran, Wasco, Shafter, and Bakersfield, as well as unincorporated communities in Kings and Kern counties.
CUM-VQ-MM#1	Consult with agencies on HST project design.	Prior to construction, the Authority would consult with local city and county planning departments to provide information about the HST project design. This would allow for local plans and proposed development projects that could be adversely affected by the HST project to be modified and potential visual impacts to high-sensitivity viewers to be reduced, as determined feasible by project applicants/planning departments.	Pre-Construction / Construction	Notify and consult with departments/agencies	Monthly	Contractor/Authority	Contractor	Monthly, record keeping, and reporting	Meetings with departments/agencies	CUM-VQ	Cumulative visual effect of the HST in combination with other past, present, and reasonably foreseeable future projects

**Table 2**  
**Fresno to Bakersfield Avoidance and Minimization Measures**





**Table 2**  
Fresno to Bakersfield Avoidance and Minimization Measures

Avoidance and Mitigation Measure	Title	Mitigation Text	Phase	Implementation Action	Reporting Schedule	Implementation Party	Reporting Party	Implementation Text	Implementation Mechanism	Impact #	Impact Text
<b>Air Quality</b>											
AQ-AM #1	Truck Equipment	<ul style="list-style-type: none"> <li>Trucks will be covered to reduce significant fugitive dust emissions while hauling soil and other similar material.</li> <li>All trucks and equipment will be washed before exiting the construction site.</li> </ul>	Construction	Reporting	Daily	Contractor	Contractor	Daily Reporting	Condition of Design Build Contract	AQ #1	Common Regional Air Quality Impacts During Construction
										AQ #2	Compliance with Air Quality Plans
										AQ #7	Localized Air Quality Impacts to Schools during Construction
AQ-AM #2	Fugitive Dust Emissions	<ul style="list-style-type: none"> <li>Exposed surfaces and unpaved roads will be watered three times daily.</li> <li>Vehicle travel speed on unpaved roads will be reduced to 15 miles per hour.</li> <li>Any dust-generating activities will be suspended when wind speed exceeds 25 mph.</li> <li>All disturbed areas, including storage piles that are not being actively used for construction purposes, will be effectively stabilized for dust emissions using water or a chemical stabilizer/suppressant, or covered with a tarp or other suitable cover or vegetative ground cover. In areas adjacent to organic farms, the Authority will use non-chemical means of dust suppression.</li> <li>All onsite unpaved roads and offsite unpaved access roads will be effectively stabilized for dust emissions using water or a chemical stabilizer/suppressant. In areas adjacent to organic farms, the Authority will use non-chemical means of dust suppression.</li> <li>All land clearing, grubbing, scraping, excavation, land leveling, grading, cut and fill, and demolition activities will be effectively controlled for fugitive dust emissions by an application of water or by presoaking. With the demolition of buildings up to six stories in height, all exterior surfaces of the buildings will be wetted during demolition.</li> <li>All materials transported offsite will be covered or effectively wetted to limit visible dust emissions, and at least 6 inches of freeboard space from the top of the container will be maintained.</li> <li>All operations will limit or expeditiously remove the accumulation of mud or dirt from adjacent public streets at the end of each workday. The use of dry rotary brushes is expressly prohibited except where preceded or accompanied by sufficient wetting to limit the visible dust emissions. Use of blower devices is expressly forbidden.</li> <li>Following the addition of materials to, or the removal of materials from, the surface of outdoor storage piles, piles will be effectively stabilized for fugitive dust emissions using sufficient water or a chemical stabilizer/suppressant. In areas adjacent to organic farms, the Authority will use non-chemical means of dust suppression.</li> </ul> <p>For additional valley fever avoidance and mitigation measures and recommendations, see S&amp;S – AM #4b and #4c</p>	Construction	Reporting	Weekly	Contractor	Contractor	Weekly Reporting	Condition of Design Build Contract	AQ #1	Common Regional Air Quality Impacts During Construction
										AQ #2	Compliance with Air Quality Plans
										AQ #7	Localized Air Quality Impacts to Schools during Construction

AQ-AM #3	Trackouts	<ul style="list-style-type: none"> <li>• Within urban areas, trackout will be immediately removed when it extends 50, or more, feet from the site and at the end of each workday.</li> <li>• Any site with 150, or more, vehicle trips per day will take actions specified in SJVAPCD's Rule 8041 to prevent carryout and trackout.</li> </ul>	Construction	Contractor	Daily	Contractor	Contractor	Daily Reporting	Condition of Design Build Contract	AQ #1	Common Regional Air Quality Impacts During Construction
										AQ #2	Compliance with Air Quality Plans
AQ-AM #4	Material Selection	<ul style="list-style-type: none"> <li>• Low- or super-compliant VOC (Clean Air) paints, coatings, and industrial coatings that meet the regulatory limits in the SCAQMD Rule 1113 will be used.</li> </ul>	Design/Construction	Contractor	Monthly	Contractor	Contractor	At incorporation or completion of design/ During construction report monthly	Condition of Design Build Contract	AQ #7	Localized Air Quality Impacts to Schools during Construction
<b>Noise and Vibration</b>											
NV-AM #1	General Construction Guidelines-Noise and Vibration	FTA and FRA have guidelines for minimizing noise and vibration impacts at sensitive receptors that will be followed during construction.	Construction	Contractor	Monthly	Contractor	Contractor	At incorporation or completion of design/ During construction report monthly	Condition of Design Build Contract	N&V #1	Construction noise mitigation measures
										N&V #2	Construction vibration mitigation measures
<b>EMI/EMF standards</b>											
EMI/EMF -AM #1	EMCPP Design Features	<p>The HST project would adhere to international guidelines and comply with applicable federal and state laws and regulations. Similarly, project design will follow the EMCPP to avoid EMI and to ensure HST operational safety. Some features of the EMCPP include:</p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• Pipelines and other linear metallic objects that are not sufficiently grounded through the direct contact with earth would 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 would be implemented.</li> <li>• HST standard corrosion protection measures would be implemented to eliminate risk of substantial corrosion of nearby metal objects.</li> <li>• The Authority will work with the engineering departments of BNSF Railway, UPRR, and SJVR where these railways parallel the HST to apply the standard design practices to prevent interference with the electronic equipment operated by these railroads. Design provisions to prevent interference would be put in place and determined to be adequately effective prior to the activation of potentially interfering systems of the HST. Applicable design standards for EMI/EMF that would be used for the project are provided in Appendix 2-D, such as IEEE Standard C95.6-2002 – IEEE Standard for Safety Levels with Respect to Human Exposure to Electromagnetic Fields, 0-3 kHz</li> </ul>	Design/Construction	Reporting	Monthly	Contractor	Contractor/ Authority	At incorporation or completion of design/ During construction report monthly	Reporting Contractor	EMF/EMI Impact #5	Impacts to Sensitive Equipment from EMI
<b>Public Utilities/ Energy Design Features</b>											
PUB-AM #1	Minimization of Utility interruption	Project design and phasing of construction activities would be coordinated with service providers to minimize or avoid interruptions, including for upgrades of existing power lines to connect the HST System to existing PG&E substations. Where relocating an irrigation facility is necessary, the Authority shall ensure that where feasible the new facility is operational prior to disconnecting the original facility. Prior to construction in areas where utility	Design/Construction	Reporting	Monthly	Contractor	Contractor	At incorporation or completion of design/ During construction report monthly	Condition of Design Build Contract	PU&E#8	Potential Conflicts with Fixed Electrical Facilities

		service interruptions are unavoidable, the contractor would 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 would specify the estimated duration of the planned outage and would be published no fewer than 7 days prior to the outage. Construction would be coordinated to avoid interruptions of utility service to hospitals and other critical users.									
<b>Biological Resources</b>											
BIO-AM #1	Environmental Design	In addition to the mitigation measures described below in Section 3.7.7, multiple project design features have been developed for the Fresno to Bakersfield Section to avoid and minimize potential impacts and effects on biological resources. At multiple locations, the route of the alternative alignments was altered to avoid impacts and effects to biological resources. During project design and construction, the Authority and FRA would implement measures to reduce impacts on air quality and hydrology based on applicable design standards. Implementation of these measures would also reduce impacts to biological resources. The design standards applicable to the project are listed in Appendix 2-D and the measures to be applied are summarized in Section 3.3, Air Quality and Global Climate Change and Section 3.8, Hydrology and Water Resources.	Design/Construction	Contractor	Monthly	Contractor	Contractor	At incorporation or completion of design/ During construction report monthly	Condition of Design Build Contract	N/A	N/A
BIO-AM #2	Wildlife Crossings	Wildlife crossing opportunities will be available through a variety of engineered structures, including dedicated wildlife crossing structures, elevated structures, bridges over riparian corridors, road overcrossings and undercrossings, and drainage facilities (i.e., large-diameter [60- to 120-inch] culverts and paired 30-inch culverts). For a more detailed discussion of the crossing structures, including figures depicting the frequency and locations of these structures, refer to Figures 3-3a through 3-3d and Section 5.6 of the Fresno to Bakersfield Section: Biological Resources and Wetlands Technical Report (Authority and FRA 2012a).	Design/Construction	Contractor	Monthly	Contractor	Contractor	At incorporation or completion of design/ During construction report monthly	Condition of Design Build Contract	BIO#8	Project impacts from the HST alternatives would permanently reduce the functionality of wildlife movement corridors and habitat linkages.
<b>Hydrology and Water Quality</b>											
HYD- AM #1	Storm Water Management and Treatment	During the detailed design phase, each receiving stormwater system's capacity will be evaluated to accommodate project runoff for the design storm event. As necessary, onsite 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 Appendix 2-D and the latest version of <i>Technical Memorandum 2.6.5 Hydraulics and Hydrology Guidelines</i> (Authority 2011). Onsite 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 (LID) techniques will be used to detain runoff onsite and to reduce offsite runoff. Constructed wetland systems, biofiltration and bioretention systems, wet ponds, organic mulch layers, planting soil beds, and vegetated systems (biofilters) such as vegetated swales and grass filter strips will be used, where appropriate.	Design/Construction	Contractor	Monthly	Contractor	Contractor	At incorporation or completion of design/ During construction report monthly	Condition of Design Build Contract	Impact HWR #6	Permanent Impact on Surface Water Quality

		Stormwater infiltration or detention facilities are to be built in compliance with the design standards indicated in Appendix 2-D. Vegetated set-backs from streams will be used.									
HYD- AM #2	Flood Protection	<p>The project will be designed to both remain operational during flood events and to minimize increases in 100-year flood elevations. Design standards will include the following:</p> <ul style="list-style-type: none"> <li>• Establish track elevation to prevent saturation and infiltration of stormwater into the sub-ballast.</li> <li>• Minimize development within the floodplain, to such an extent that water surface elevation in the floodplain would not increase by more than 1 foot, or as required by state or local agencies, during the 100-year flood flow. Avoid placement of facilities in the floodplain (e.g., at the Shafter East and Shafter West HMF sites) or raise the ground with fill above the base-flood elevation. The floodplain crossings will be designed 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 will not increase existing 100-year floodwater surface elevations in FEMA-designated floodways.</li> </ul> <p>The following design standards would minimize the effects of pier placement on floodplains and floodways:</p> <ul style="list-style-type: none"> <li>• Design site crossings to be as nearly perpendicular to the channel as feasible to minimize bridge length.</li> <li>• Orient piers to be parallel to the expected high-water flow direction to minimize flow disturbance.</li> <li>• 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. (The Central Valley Flood Protection Board [CVFPB] requires that the bottom members [soffit] of a proposed bridge be at least 3 feet above the design floodplain. The required clearance may be reduced to 2 feet on minor streams at sites where significant amounts of stream debris are unlikely.)</li> <li>• 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.</li> <li>• Use quarry stone, cobblestone, or their equivalent for erosion control along rivers and streams, complemented with native riparian plantings or other natural stabilization alternatives that would restore and maintain a natural riparian corridor.</li> <li>• Place bedding materials under the stone protection at locations where the underlying soils require stabilization as a result of stream-flow velocity.</li> </ul>	Design/ Construction	Authority/Contractor	Monthly	Contractor	Contractor	At incorporation or completion of design/ During construction report monthly	Condition of Design Build Contract	Impact HWR #8	Permanent Impact on Floodplains
HYD- AM #3	Construction Stormwater Pollution Prevention Plan.	<p>The SWRCB Construction General Permit (Order No. 2009-0009 DWQ, NPDES No. CAS000002) establishes three project risk levels that are based on site erosion and receiving-water risk factors. Risk Levels 1, 2, and 3 correspond to low-, medium-, and high-risk levels for a project. A preliminary analysis indicates that most of the project would fall under Risk Level 1, the lowest risk level. However, sections of the project may be more appropriately categorized as Risk Level 2 due to the combination of local rainfall, soil erodibility, and the lengths of the constructed slopes. For example, the portion of the project draining to Kings River would fall under Risk Level 2. Risk Level 2 measures also would be carried out anywhere in the project vicinity where construction activities are conducted within or immediately</p>	Design/Construction	Reporting	Monthly	Contractor	Contractor	At incorporation or completion of design/ During construction report monthly	Condition of Design Build Contract	Impact HWR #2	Temporary Water Quality Impact

		<p>adjacent to sensitive environmental areas such as streams, wetlands, and vernal pools. The Construction General Permit requires preparation and implementation of a Stormwater Pollution Prevention Plan (SWPPP), which would provide 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 provide permeable surfaces where feasible and to retain or detain and treat stormwater onsite. Other BMPs include strategies to manage the overall amount and quality of stormwater runoff. The Construction SWPPP will include measures to address, but are not limited to, the following:</p> <ul style="list-style-type: none"> <li>• Hydromodification management to ensure maintenance of pre-project hydrology by emphasizing onsite 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.</li> <li>• Implementing practices to minimize the contact of construction materials, equipment, and maintenance supplies with stormwater.</li> <li>• 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.</li> <li>• Implementing practices to reduce erosion of exposed soil, including soil stabilization, watering for dust control, perimeter silt fences, and sediment basins.</li> <li>• Implementing practices to maintain current water quality including silt fences, stabilized construction entrances, grass buffer strips, ponding areas, organic mulch layers, inlet protection, and Baker tanks and sediment traps to settle sediment.</li> <li>• Implementing practices to capture and provide proper offsite disposal of concrete washwater, including isolation of runoff from fresh concrete during curing to prevent it from reaching the local drainage system, and possible treatment with dry ice or other acceptable means to reduce the alkaline character of the runoff (high pH) that typically results from new concrete.</li> <li>• Developing and implementing a spill prevention and emergency response plan to handle potential fuel or other spills.</li> <li>• Using diversion ditches to intercept offsite surface runoff.</li> <li>• Where feasible, avoiding areas that may have substantial erosion risk, including areas with erosive soils and steep slopes.</li> <li>• Where feasible, limiting construction to dry periods when flows in water bodies are low or absent.</li> </ul> <p>Implementation of a SWPPP is the responsibility of the construction contractor's Qualified SWPPP Practitioner (QSP) or designee. As part of that responsibility, the effectiveness of construction BMPs must be monitored before and after storm events. Records of these inspections and monitoring results are submitted to the SWRCB/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 have the opportunity to review these documents.</p>									
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HYD- AM #4	Regional Dewatering Permit	The Central Valley RWQCB, Order No. R5-2008-0081, Waste Discharge Requirements General Order for Dewatering and Other Low Threat Discharges to Surface Waters, is a permit that covers construction dewatering discharges and some other listed discharges that do not contain significant quantities of pollutants, and that either (1) are 4 months, or less, in duration, or (2) have an average dry-weather discharge that does not exceed 0.25 million gallons per day.	Design	Permit	As requested by Permit Conditions	Authority	Authority	Permit Application and Reporting	Reporting per Permit Requirements	Impact HWR #3	Temporary Impacts on Groundwater Quality and Volume
HYD- AM #5	Flood Protection	The CVFPB regulates specific river, creek, and slough crossings for flood protection. These crossings must meet the provisions of Title 23 of the CCR. Title 23 requires that new crossings maintain hydraulic capacity through such measures as in-line piers, adequate streambank height (freeboard), and measures to protect against streambank and channel erosion. Section 208.10 requires that improvements, including crossings, be constructed in a manner that does not reduce the channel's capacity or functionality, or that of any federal flood control project. The CVFPB reviews applications for encroachment permits for approval of a new channel crossing or other channel modification. For a proposed crossing or placement of a structure near a federal flood control project, the CVFPB coordinates review of the encroachment permit application with USACE pursuant to assurance agreements with USACE and the USACE Operation and Maintenance Manuals under Title 33 CFR, Section 208.10 and Title 33 U.S.C., Section 408. Under Section 408 of the Rivers and Harbors Act, the USACE must approve any proposed modification that involves a federal flood control project. A Section 408 permit would be required if construction modifies a federal levee. A Section 208.10 permit would be required where the project encroaches on a federal facility but does not modify it.	Design	Permit	As requested by Permit Conditions	Authority	Authority	Permit Application and Reporting	Reporting per Permit Requirements	Impact HWR #8	Permanent Impact on Floodplains
HYD- AM #6	Industrial Stormwater Pollution Prevention Plan	The stormwater general permit (Order No. 97-03-DWQ, NPDES No. CAS000001) requires preparation of a SWPPP and a monitoring plan for industrial facilities that discharge stormwater from the site, including vehicle maintenance facilities associated with transportation operations. The permit includes performance standards for pollution control.	Design	Permit	As requested by Permit Conditions	Authority	Authority	Permit Application and Reporting	Reporting per Permit Requirements	Impact HWR #6	Permanent Impact on Surface Water Quality
<b>Geology and Soils</b>											
GEO- AM #1	General Guidelines to be followed	<ul style="list-style-type: none"> <li>• 2010 American Association of State Highway and Transportation Officials (AASHTO) Load and Resistance Factor Design Bridge Design Specifications and the 2009 AASHTO Guide Specifications for Load and Resistance Factor Design Seismic Bridge Design: 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.</li> <li>• Federal Highway Administration (FHWA) Circulars and Reference Manuals: These documents provide detailed guidance on the characterization of geotechnical conditions at sites, methods for performing foundation design, and recommendations on foundation construction. These guidance documents include methods for designing retaining walls used for retained cuts and retained fills, foundations for elevated structures, and at-grade segments. Some of the documents include guidance on</li> </ul>	Design/Construction/ Operation	Design/ Reporting	Yearly	Contractor	Contractor	At incorporation or completion of design/ During construction report monthly	Implementation of guidelines during Design/ construction and operation phases	Impact GSS #1 through #11	



		<p>methods of mitigating geologic hazards that are encountered during design.</p> <ul style="list-style-type: none"> <li>American Railway Engineering and Maintenance-of-Way Association (AREMA) Manual: These guidelines deal with rail systems. Although they cover many of the same general topics as AASHTO, they are more focused on best practices for rail systems. The manual includes principles, data, specifications, plans, and economics pertaining to the engineering, design, and construction of railways.</li> <li>California Building Code: The code is based on 2009 International Building Code (IBC). This code contains general building design and construction requirements relating to fire and life safety, structural safety, and access compliance.</li> <li>IBC and American Society of Civil Engineers (ASCE)-7: These codes and standards provide minimum design loads for buildings and other structures. They would 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.</li> <li>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 (MSE) walls used for retained fills, and for design of various types of cantilever (e.g., soldier pile, secant pile, and tangent pile) and tie-back walls used for retained cuts.</li> <li>Caltrans Construction Manuals: Caltrans has a number of manuals including Field Guide to Construction Dewatering, Caltrans Construction Site Best Management Practices (BMPs) Manual and Construction Site Best Management Practice (BMP) Field Manual and Troubleshooting Guide that provide guidance and Best Management Practices for dewatering options and management, erosion control and soil stabilization, non-storm water management, and waste management at construction sites.</li> <li>American Society for Testing and Materials (ASTM): ASTM has developed standards and guidelines for all types of material testing- from soil compaction testing to concrete-strength testing. The ASTM standards also include minimum performance requirements for materials. Most of the guidelines and standards cited above use ASTM or a corresponding series of standards from AASHTO to assure that quality is achieved in the constructed project.</li> </ul>									
GEO-AM #2	Groundwater Withdrawal	Control the amount of groundwater withdrawal from the project, 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.	Construction/Operation	Contractor	Yearly	Contractor	Contractor	Monthly Record Keeping and Yearly Reporting	Condition of Design Build Contract	N/A	N/A
GEO-AM #3	Monitor Slopes	Incorporate slope monitoring into final design where a potential for long-term instability exists from gravity or seismic loading. This practice is important near 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.	Design/Construction	Contractor	Monthly	Contractor	Contractor	At incorporation or completion of design	Condition of Design Build Contract	Impact GSS #1	Encountering Unstable Soils During Construction
										Impact GSS #6	Effects of Unstable Soils on Operations

GEO-AM #4	Geotechnical Inspections	Prior to and throughout construction, conduct geotechnical inspections to verify that no new, unanticipated conditions are encountered, and to determine the locations of unstable soils in need of improvement.	Design/Construction	Authority/Contractor	Monthly	Authority/Contractor	Authority/Contractor	At incorporation or completion of design	Condition of Design Build Contract	N/A	N/A
GEO-AM #5	Improve Unstable Soils	Employ various methods to mitigate for the risk of ground failure from unstable soils. If the soft or loose soils are shallow, they can be excavated and replaced with competent soils. To limit the excavation depth, replacement materials can also be strengthened using geosynthetics. Where unsuitable soils are deeper, ground improvement methods, such as stone columns, cement deep-soil-mixing (CDSM), or jet-grouting, can be used. Alternatively, if sufficient construction time is available, preloading—in combination with prefabricated vertical drains (wicks) and staged construction—can be used to gradually improve the strength of the soil without causing bearing-capacity failures. Both over-excavation and ground improvement methods have been successfully used to improve similar soft or loose soils. Lime treatment of heavy rail subgrades over soft soils has also been used successfully in the San Joaquin Valley. The application of these methods is most likely at stream and river crossings, where soft soils could occur; however, localized deposits could occur at other locations along the alignment. The ground improvement or over-excavation methods may also be necessary at the start of approach fills for elevated track sections or retained-earth segments of the alignment if the earth loads exceed the bearing capacity of the soil. Alternatively, at these locations, earth fills might be replaced by lightweight fill, such as lightweight concrete, extruded polystyrene (geofoam), or short columns, and cast-in-drilled hole (CIDH) piles might be used to support the transition from the elevated track to the at-grade alignment.	Design/Construction	Contractor	Monthly	Contractor	Contractor	At incorporation or completion of design	Condition of Design Build Contract	Impact GSS #1	Encountering Unstable Soils During Construction
										Impact GSS #6	Effects of Unstable Soils on Operations
GEO-AM #6	Improve Settlement-Prone Soils	Settlement-prone soils are improved prior to facility construction. Ground improvement is used to transfer new earth loads to deeper, more competent soils. Another alternative is to use preloads and surcharges with wick drains to accelerate settlement in areas that are predicted to undergo excessive settlement. By using the preload and surcharge with wick drains, settlement would be forced to occur. The application of these methods is most likely at stream and river crossings, where soft soils are more likely to occur. Where groundwater is potentially within 50 feet of the ground surface, any below-ground excavations use well points in combination with sheet pile walls to limit the amount of settlement of adjacent properties from temporary water drawdown. Alternately, water can be re-injected to make up for localized water withdrawal.	Design/Construction	Contractor	Monthly	Contractor	Contractor	Monthly Record Keeping	Condition of Design Build Contract	Impact GSS #2	Soil Settlement at Structures or along Trackway During Construction
										Impact GSS #7	Effects of Soil Settlement on Operations
GEO-AM #7	Prevent Water and Wind Erosion	Many mitigation methods exist for controlling water and wind erosion of soils. These include the use of straw bales and mulches, revegetation, and covering areas with geotextiles. Where the rate of water runoff could be high, riprap and riprap check dams could be used to slow the rate of water runoffs. Other BMPs for water are discussed in Section 3.8, Hydrology and Water Resources. Implementation of these methods is important where large sections of earth are exposed during construction, such as for retained-cut design segments.	Construction	Contractor	Monthly	Contractor	Contractor	Monthly Record Keeping	Contract Requirements/ Specifications	Impact GSS #3	Soil Erosion During Construction
GEO-AM #8a	Modify or Remove and Replace Soils with Shrink-Swell Potential	One option is to excavate and replace soils that represent the highest risk. In locations where shrink-swell potential is marginally unacceptable, soil additives will be mixed with existing soil to reduce the shrink-swell potential. The decision whether to remove or treat the soil is made on the basis of specific shrink-swell characteristics of the soil,	Construction	Contractor	Monthly	Contractor	Contractor	Monthly Record Keeping	Condition of Design Build Contract	Impact GSS #8	Effects of Moderate to High Shrink-Swell Potential on Operations



		the additional costs for treatment versus excavation and replacement, as well as the long-term performance characteristics of the treated soil.									
GEO-AM #8b	Modify or Remove and Replace Soils Corrosion Characteristics	One option is to excavate and replace soils that represent the highest risk. In locations where corrosivity potential is marginally unacceptable, soil additives will be mixed with existing soil to reduce the corrosive potential. The decision whether to remove or treat the soil is made on the basis of specific corrosivity characteristics of the soil, the additional costs for treatment versus excavation and replacement, as well as the long-term performance characteristics of the treated soil.	Construction	Contractor	Monthly	Contractor	Contractor	Monthly Record Keeping	Condition of Design Build Contract	Impact GSS #9	Effects of Moderately to Highly Corrosive Soils on Operations
GEO-AM #9	Evaluate and Design for Large Seismic Ground Shaking	Prior to final design, additional seismic studies will be conducted to establish the most up-to-date estimation of levels of ground motion. Updated Caltrans seismic design criteria will be used in the design of any structures supported in or on the ground. These design procedures and features reduce the potential that moments, shear forces, and displacements that result from inertial response of the structure will lead to collapse of the structure. In critical locations, pendulum base isolators can reduce the levels of inertial forces. New composite materials can enhance seismic performance.	Design/Construction	Authority/Contractor	Monthly	Authority/Contractor	Authority/Contractor	Monthly Record Keeping	Condition of Design Build Contract	Impact GSS #11	Effects of Seismicity on Operations
GEO-AM #10	Secondary Seismic Hazards	As discussed above, various ground improvement methods can be implemented to mitigate the potential for liquefaction, liquefaction-induced lateral spreading or flow of slopes, or post-earthquake settlement. Ground improvement around CIDH piles improves the lateral capacity of the CIDH during seismic loading. CDSM, stone columns, EQ drains or jet-grouting develop resistance to lateral flow or spreading of liquefied soils.	Construction	Contractor	Monthly	Contractor	Contractor	Monthly Record Keeping	Condition of Design Build Contract	Impact GSS #11	Effects of Seismicity on Operations
GEO-AM #11	Suspend Operations During or After an Earthquake	Install motion-sensing instruments to provide ground-motion data; install a control system to shut down HST operations temporarily during or after a potentially damaging earthquake to reduce risks. Monitors will be installed at select locations where high ground motions could damage the HST track system. Candidate locations would include, but are not limited to, elevated guideways and retained-earth, retained-cut, and at-grade segments.	Design/Construction/Operation	Reporting	As Needed	Contractor/Authority	Contractor/Authority	At incorporation or completion of design/ During construction report monthly	As needed based on an Earthquake Event	Impact GSS #11	Effects of Seismicity on Operations
<b>Hazardous Materials and Waste</b>											
HMW-AM #1	Transportation of Materials	Materials and wastes would be handled, transported, and disposed of in accordance with applicable state and federal regulations, such as Resource Conservation and Recovery Act (RCRA), Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the Hazardous Materials Release Response Plans and Inventory Law, and the Hazardous Waste Control Act (see Section 3.3, Air Quality, for regulations applying to hazardous air pollutants).	Construction/Operation	Reporting	Monthly	Contractor	Contractor	Weekly Record Keeping and Monthly Reporting	Condition of Design Build Contract	Impact HMW #1	Temporary Transport, Use, Storage, and Disposal of Hazardous Materials and Wastes
										Impact HMW #6	Transport, Use, Storage, and Disposal of Hazardous Materials and Wastes
HMW-AM #2	Property Acquisition	During the property acquisition process, analysis of properties acquired for construction of the HST will be conducted, as needed, including title searches and determination of which properties require further assessment for hazardous material contamination. Prior to acquisition of properties, the Authority will conduct Phase 1 environmental site assessments in accordance with standard ASTM methodologies to characterize each site. The determination of what parcels require soil testing and where testing should occur would be informed by the Phase 1 environmental site assessment and made in conjunction with state and local agency officials. Testing and appropriate remediation would be conducted prior to	Design/Construction	Reporting	Monthly	Contractor	Contractor	Phase 1 Report	Condition of Design Build Contract	Impact HMW #2	Inadvertent Disturbance of Hazardous Materials or Waste
										Impact HMW #3	Construction on or in Proximity to PEC Sites

		acquisition Remediation activities may include removal of contamination, in-situ treatment, or soil capping										
HMW-AM #3	Landfill	All work within 1,000 feet of a landfill would require methane protection measures, including gas detection systems and personnel training, pursuant to Title 27, the hazardous materials contingency plan, and BMPs.	Construction	Reporting	Monthly	Contractor	Contractor	Monthly Record Keeping	Condition of Design Build Contract	N/A	N/A	
HMW-AM #4	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	Design/Construction	Reporting	Monthly	Contractor	Contractor	Monthly Record Keeping	Condition of Design Build Contract	Impact HMW #2	Inadvertent Disturbance of Hazardous Materials or Waste	
										Impact HMW #3	Construction on or in Proximity to PEC Sites	
HMW-AM #5	Undocumented Contamination	The Authority is aware that undocumented contamination could be encountered during construction activities and is committed to work closely with local agencies to resolve any such encounters. A construction management plan will be developed that will include provisions for the disturbance of undocumented contamination.	Construction	Reporting	As Needed	Contractor	Contractor	Reporting as needed	Condition of Design Build Contract	Impact HMW #2	Inadvertent Disturbance of Hazardous Materials or Waste	
										Impact HMW #4	Temporary Hazardous Material and Waste Activities in the Proximity of Schools	
HMW-AM #6	Demolition Plans	Demolition plans will be prepared for the safe dismantling and removal of building components and debris. The demolition plans will include a plan for lead and asbestos abatement.	Construction	Reporting	As Needed	Contractor	Contractor	Reporting as needed	Condition of Design Build Contract	Impact HMW #2	Inadvertent Disturbance of Hazardous Materials or Waste	
										Impact HMW #4	Temporary Hazardous Material and Waste Activities in the Proximity of Schools	
HMW-AM #7	Spill Prevention	An SPCC plan or, for smaller quantities, a spill prevention and response plan, will be implemented that prescribes BMPs to follow to clean up any hazardous material release. During operation of the HST, hazardous materials monitoring plans, such as a hazardous materials business plan and an SPCC plan, will be implemented.	Construction	Reporting	As Needed	Contractor/Authority	Contractor/Authority	Reporting as needed	Condition of Design Build Contract	Impact HMW #2	Inadvertent Disturbance of Hazardous Materials or Waste	
										Impact HMW #4	Temporary Hazardous Material and Waste Activities in the Proximity of Schools	
HMW-AM #8	Storage of Hazardous Materials	Storage of hazardous materials during construction and operation will meet requirements for transport, labeling, containment, cover, and other BMPs to comply with the State Water Resources Control Board Construction General Permit conditions.	Construction/Operation	Reporting	Monthly	Contractor/Authority	Contractor	Weekly Record Keeping and Monthly Reporting	Condition of Design Build Contract	Impact HMW #1	Temporary Transport, Use, Storage, and Disposal of Hazardous Materials and Wastes	
										Impact HMW #6	Transport, Use, Storage, and Disposal of Hazardous Materials and Wastes	
HMW-AM #9	Material Selection	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 HST system. Moreover, using an Environmental Management System, the Authority will evaluate the full inventory of hazardous materials employed on an annual basis and will replace hazardous substances with nonhazardous materials to the extent possible. These standards and material specifications would aid in promoting safety for passengers and employees.	Design/Construction/Operation	Reporting	Yearly	Contractor/Authority	Contractor/Authority	At incorporation or completion of design/Yearly Reporting and Inventory	Condition of Design Build Contract	Impact HMW #1	Temporary Transport, Use, Storage, and Disposal of Hazardous Materials and Wastes	
										Impact HMW #6	Transport, Use, Storage, and Disposal of Hazardous Materials and Wastes	
<b>Safety and Security</b>												
S&S - AM #1	Emergency Vehicle Access	Final design includes development of a detailed construction transportation plan that would include coordination with local jurisdictions on emergency vehicle access. The plan would establish procedures for temporary road closures including: access to residences and businesses during construction, lane closure, signage and flag persons, temporary detour provisions, alternative bus and delivery routes, emergency vehicle access, and alternative access locations.	Design/Construction	Design/Reporting	Monthly or as Needed During Construction	Contractor	Contractor	At incorporation or completion of design/As needed during construction	Condition of Design Build Contract	Impact S&S #1	Accidents at Construction Sites	

S&S - AM #2	Operation and Transportation Hazards	<p>Engineering design and construction phases include preliminary hazard analysis (PHA), collision hazard analysis (CHA), and threat and vulnerability assessment (TVA) methods.</p> <ul style="list-style-type: none"> <li>• PHAs follow the U.S. Department of Defense's System Safety Program Plan Requirements (MIL-STD-882) to identify and determine the facility hazards and vulnerabilities so that they can be addressed—and either eliminated or minimized by—the design.</li> <li>• CHAs follow the Federal Railroad Administration's Collision Hazard Analysis Guide: Commuter and Intercity Passenger Service (FRA 2007) which provides a step-by-step procedure on how to perform a hazard analysis and how to develop effective mitigation strategies that will improve passenger rail safety.</li> </ul>	Design/Construction	Design/Reporting	Monthly or as needed during construction	Contractor	Contractor	At incorporation or completion of design/As needed during construction	Condition of Design Build Contract	Impact S&S #4	Train Accidents
S&S - AM #3	Criminal and Terrorist Acts	<p>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 HST operations to avoid collisions.</p>	Design/Construction	Design/Reporting	Monthly or as needed during construction	Contractor	Contractor	At incorporation or completion of design/As needed during construction	Condition of Design Build Contract	Impact S&S #16	Criminal Activity Aboard Trains and at Stations
S&S - AM #4a	Construction Safety Plan	<p>Construction Safety and Health Plans (CSHPs) shall include the following:</p> <ol style="list-style-type: none"> <li>1. Train workers and supervisors to recognize symptoms of illness, and ways to minimize exposure, such as washing hands at the end of shifts.</li> <li>2. Provide washing facilities nearby for use at the end of shifts.</li> <li>3. Provide vehicles with enclosed, air-conditioned cabs and ensure workers keep windows closed. Equip heavy equipment cabs with high efficiency particulate air (EPA) filters.</li> <li>4. Make National Institute for Occupational Safety and Health (NIOSH) -approved respiratory protection with particulate filters as recommended by the California Department of Public Health available to workers who request them.</li> </ol>	Design/Construction	Design/Reporting	Monthly or as needed during construction	Contractor	Contractor	At incorporation or completion of design/As needed during construction	Condition of Design Build Contract	Impact S&S #1	Accidents at Construction Sites

S&S - AM #4b	Valley Fever	<p>The following recommendations were provided by the Environmental Protection Agency and refined through discussion with the California Department of Public Health (CDPH).</p> <ul style="list-style-type: none"> <li>• Prior to construction , provide 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);</li> <li>• Continue outreach and coordination with the California Department of Public Health. In addition, reach out to 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,</li> </ul> <p>Provide a qualified person dedicated to overseeing implementation of Valley Fever prevention measures to encourage a culture of safety of the contractors and subcontractors. The individual should have the authority to adaptively manage the implementation of Valley Fever prevention and effect change in coordination with the county Public Health Officer. This medical information will be maintained following applicable and appropriate confidentiality protections.</p>	Design/Construction/ Operation	Design/Reporting	Monthly or as needed during construction and operation	Authority/Contractor	Authority/ Contractor	At incorporation or completion of design/As needed during construction and operation	At incorporation or completion of design/As needed during construction and operation	Impact S&S #1	Accidents at Construction Sites
										Impact AQ #1	Common Regional Air Quality Impacts During Construction
										Impact AQ #6	Localized Air Quality Impacts During Guideway/Alignment Construction
										Impact AQ #7	Localized Air Quality Impacts to Schools during Construction
										Impact AQ #9	Localized Air Quality Impacts from HMF and MOWF Construction
S&S - AM #4c	Valley Fever	<p>The following measures have been added to the requirements for the Construction Safety and Health Plans (CSHPs) regarding preventive measures to avoid Valley Fever exposure (Ch. 3.11, Design Features, 3.11.6). The following shall be included in the existing design feature for Ch. 3.11, "Safety and Security."</p> <p>The Construction Safety and Health Plan shall include the following:</p> <ol style="list-style-type: none"> <li>1. 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;</li> <li>2. Provide washing facilities nearby for washing at the end of shifts;</li> <li>3. Provide vehicles with enclosed, air conditioned cabs and make sure workers keep the windows closed. Equip heavy equipment cabs with high efficiency particulate air (HEPA) filters; and,</li> <li>4. Make NIOSH approved respiratory protection with particulate filters as recommended by the CDPH available to workers who request them.</li> </ol>	Design/Construction/ Operation	Design/Reporting	Monthly or as needed during construction and operation	Authority/Contractor	Authority/ Contractor	At incorporation or completion of design/As needed during construction and operation	At incorporation or completion of design/As needed during construction and operation	Impact S&S #1	Accidents at Construction Sites
										Impact AQ #1	Common Regional Air Quality Impacts During Construction
										Impact AQ #6	Localized Air Quality Impacts During Guideway/Alignment Construction
										Impact AQ #7	Localized Air Quality Impacts to Schools during Construction
										Impact AQ #9	Localized Air Quality Impacts from HMF and MOWF Construction

S&S - AM #5	Fire/Life Safety Programs	Fire/Life Safety Programs (FLSPs) implement the requirements set forth in the Federal Rail Safety Act. FLSPs address the safety of passengers and employees during emergency response. The FLSP also would address the needs of disabled persons. A FLSP 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.	Design/Construction/Operation	Design/Reporting	Monthly or as needed during construction/operation	Authority/Contractor	Authority/Contractor	At incorporation or completion of design/As needed during construction	Condition of Design Build Contract	Impact S&S #4	Train Accidents
S&S - AM #6	System Security Plans	System Security Plans address design features intended to maintain security at the stations within the track right-of-way, at stations, and onboard trains. The design standards and guidelines require emergency walkways on both sides of the tracks for both elevated and at-grade sections. Adequate space would be present along at-grade sections of the alignment to allow emergency response access. Ground access would be available from elevated tracks where access to ground equipment is required. This ground access could be used in the event of an emergency. Additional ground access would be considered, consistent with fire and rescue procedures and where practical operational standards include a system-specific police force.	Design/Construction/Operation	Design/Reporting	Monthly or as needed during construction/operation	Authority/Contractor	Authority/Contractor	At incorporation or completion of design/As needed during construction	Condition of Design Build Contract	Impact S&S #4	Train Accidents
										Impact S&S #6	HST Accidents Associated with Seismic Events
										Impact S&S #7	Risk of Fire
										Impact S&S #9	Increased Response Times for Fire, Rescue, and Emergency Services Associated with Access to Elevated Track
S&S - AM #7	Operating Procedure	Standard operating procedures and emergency operating procedures include industry best practices, such as the FRA-mandated Roadway Worker Protection Program. They address the day-to-day operation and emergency situations to maintain the safety of employees, passengers, and the public.	Operation	Design/Reporting	Monthly or as needed during operation	Authority	Authority	As needed during operation	Reporting	Impact S&S #16	Criminal Activity Aboard Trains and at Stations
S&S - AM #8	FRA Requirements	<ul style="list-style-type: none"> <li>System Safety Program Plans (SSPPs) incorporate FRA requirements and are implemented upon FRA approval. These plans are based on the principles outlined in The Manual for Development of System Safety Program Plans for Commuter Railroads (American Public Transportation Association 2006) and address project design, construction, testing, and operation.</li> <li>Rail systems must comply with FRA requirements for tracks, equipment, railroad operating rules, and practices, including the Passenger Equipment Safety Standards (49 CFR Part 238), Highway-Rail Grade Crossing Guideline for the High-Speed Passenger Rail (FRA 2009), and track safety standards (49 CFR Part 213). Requirements include warning systems and barrier systems to enhance track safety.</li> </ul>	Design/Construction/Operation	Design/Reporting	Monthly or as needed during construction/operation	Authority/Contractor	Authority/Contractor	At incorporation or completion of design/As needed during construction and operation	Condition of Design Build Contract	Impact S&S #4	Train Accidents
										Impact S&S #6	HST Accidents Associated with Seismic Events
										Impact S&S #7	Risk of Fire
										Impact S&S #9	Increased Response Times for Fire, Rescue, and Emergency Services Associated with Access to Elevated Track
S&S - AM #9	Worker Safety	<ul style="list-style-type: none"> <li>Worker safety in the workplace is generally governed by the Occupational Health and Safety Act of 1970, which established the Occupational Safety and Health Administration (OSHA). OSHA establishes standards and oversees compliance with workplace safety and reporting of injuries and illnesses of employed workers. In California, OSHA enforcement of workplace requirements is performed by Cal OSHA. Under Cal OSHA regulations, as of July 1, 1991, every employer must establish, implement, and maintain an injury and illness prevention program.</li> </ul>	Design/Construction/Operation	Design/Reporting	Monthly or as needed during construction and operation	Authority/Contractor	Authority/Contractor	At incorporation or completion of design/As needed during construction and operation	Condition of Design Build Contract	Impact S&S #4	Train Accidents
										Impact S&S #15	Hazards to HST Passengers and Employees from Flooding
										Impact S&S #16	Criminal Activity Aboard Trains and at Stations



S&S - AM #10	Environmental Design	HST urban design guidelines (Authority 2011b) require implementing the principles of Crime Prevention through Environmental Design. This is a design method that focuses on reducing opportunities for crime through the design and management of the physical environment. Four basic principles of Crime Prevention through Environmental Design should be considered during station and site planning: territoriality (designing physical elements that express ownership of the station or site); natural surveillance (arranging physical features to maximize visibility); improve sightlines (provide clear views of surrounding areas); and access control (physical guidance of people coming and going from a space).	Design/Construction/Operation	Design/Reporting	Yearly	Authority/Contractor	Authority/Contractor	At incorporation or completion of design/AS needed during construction and operation	Design process and reporting	Impact S&S #16	Criminal Activity Aboard Trains and at Stations
<b>Socioeconomics, Communities and Environmental Justice</b>											
SO-AM #1	Construction Management Plan	The Authority will require that the design-build contractor will develop and implement a construction management plan to address communications, community impacts, visual protection, air quality, safety controls, noise controls, and traffic controls to minimize impacts on low-income households and minority populations. The plan will assure 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. Construction Management Plans are standard for large infrastructure projects such as this one, and are considered effective in minimizing community impacts.	Design/Construction	Reporting	Monthly	Contractor	Contractor	At incorporation or completion of design/Monthly Reporting during Construction	Condition of Design Build Contract	N/A	N/A
SO-AM #2	Uniform Act and California Relocation Assistance Act Compliance	<p>The Authority has considered avoidance and minimization measures that are consistent with the Statewide Program EIR/EIS (Authority and FRA 2005) and Bay Area to Central Valley Program EIR/EIS commitments (Authority and FRA [2008] 2010). 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, would apply to all acquisitions of real property or displacements of persons resulting from this federally assisted project. It was created to provide for and ensure fair and equitable treatment of all affected persons. Additionally, the Fifth Amendment of the United States Constitution provides that private property may not be taken for a public use without payment of "just compensation."</p> <p>The Uniform Act requires that the owning agency provide notification to all affected property owners of the agency's intent to acquire an interest in their property. This notification includes a written offer letter of just compensation. A right-of-way specialist is assigned to each property owner to assist him or her through the acquisition process. The Uniform Act also provides benefits to displaced individuals to assist them financially and with advisory services related to relocating their residence or business operation. Benefits are available to both owner occupants and tenants of either residential or business properties.</p> <p>The Uniform Act requires provision of relocation benefits to all eligible persons regardless of race, color, religion, sex, or national origin. Benefits to which eligible owners or</p>	Design/Construction/Operations	Reporting and meeting with interested parties	Monthly	Authority	Authority	Monthly Reporting and Record Keeping	Compliance with Acts, Creation of Ombudsmen Office and Reporting	N/A	N/A

		<p>tenants may be entitled are determined on an individual basis and explained in detail by an assigned right-of-way specialist.</p> <p>Similarly, the project must adhere to California Relocation Assistance Act requirements. Owners of private property have federal and state constitutional guarantees that their property will not be acquired or damaged for public use unless owners first receive just compensation. Just compensation is measured by the "fair market value," where the property value is considered to be the highest price that would be negotiated on the date of valuation. The value must be agreed upon by a seller who is willing, not obliged to sell, but under no particular or urgent necessity and by a buyer who is ready, willing, and able to buy but under no particular necessity. Both the owner and the buyer must deal with the other with the full knowledge of all the uses and purposes for which the property is reasonably adaptable and available (Code of Civil Procedure Section 1263.320a).</p> <p>The Authority has developed more detailed information about how it plans to comply with the Uniform Act and the California Relocation Assistance Act. The Authority has developed three detailed relocation assistance documents modeled after Caltrans versions. The documents are listed below and included in Appendix 3.12-A:</p> <ul style="list-style-type: none"> <li>• Your Rights and Benefits as a Displacee under the Uniform Relocation Assistance Program (Residential).</li> <li>• Your Rights and Benefits as a Displacee under the Uniform Relocation Assistance Program (Mobile Home).</li> <li>• Your Rights and Benefits as a Displaced Business, Farm, or Nonprofit Organization under the Uniform Relocation Assistance Program.</li> </ul> <p>Before any acquisitions occur, the Authority will develop a relocation mitigation plan, in consultation with affected cities and counties. 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.</p> <p>The plan will be designed to meet the following objectives:</p> <ul style="list-style-type: none"> <li>• Provide affected property and business owners and tenants a high level of individualized assistance in situations when relocation is necessary.</li> <li>• Coordinate relocation activities with other agencies causing displacements in the study area to ensure that all displaced persons receive fair and consistent relocation benefits</li> <li>• Make a best effort to minimize the permanent closure of displaced businesses and non-profit agencies as a result of relocations.</li> <li>• Within the limits established by law and regulation, minimize the economic disruption caused to tenants and residents by relocation.</li> <li>• 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.</li> <li>• Provide those business owners who require complex permitting (such as dairies) with regulatory compliance assistance.</li> </ul>									
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		<p>The relocation mitigation plan will include the following components:</p> <ul style="list-style-type: none"> <li>• A description of the appraisal, acquisition, and relocation process that describes the activities of the appraisal and relocation specialists, for the benefit of the reader.</li> <li>• A means of assigning appraisal and relocation staff to affected property owners, tenants, or other residents on an individual basis.</li> <li>• 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 of demographically similar areas for relocation.</li> <li>• 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 would also act to address concerns about the relocation process as it applies to the individual situations of property owners, tenants, and other residents.</li> </ul> <p>Relocation Mitigation Plans are commonly used for large infrastructure projects that displace a large number of residences and businesses, such as this project, and are considered successful in minimizing the impact to individual property owners.</p>									
<b>Station Planning, Land Use and Development</b>											
LU-AM#1	Zone of Responsibility	<p>Although not strictly part of the project design, the Authority has established a certain "zone of responsibility" around the proposed stations. To that end, the Authority prepared and distributed Urban Design Guidelines (Authority [2010] 2011b) available on the Authority's website to provide assistance in urban planning for the stations to help achieve great placemaking. The guidelines are based on international examples where cities and transit agencies have incorporated sound urban design principles as integrated elements of large-scale transportation systems. The application of sound urban design principles to the HST System will help to maximize the performance of the transportation investment, enhance the livability of the communities it serves, create long-term value, and sensitively integrate the project into the communities along the HST System corridor. The Authority and FRA have also provided planning grants for cities that could have an HST station to assist them in land use planning in the areas surrounding the stations.</p>	Design/Construction/Operation	Reporting	As needed during construction	Contractor/Authority	Contractor/Authority	At incorporation or completion of design/Yearly Reporting during Construction	Meetings with local authority and contract specifications	LU Impact #3	The Kings/Tulare Regional Station alternatives are likely to result in some unplanned changes in the use of existing adjacent land, regardless of the amount of parking provided at the station.
										LU Impact #5	Indirect changes to adjacent lands at the Kings/Tulare Regional Station sites would substantially change the pattern and intensity of land use in a way that would be incompatible with adjacent land uses.
LU-AM#2	Construction Management Plan	<p>Project design features would reduce some of the temporary land use impacts from project construction. These features are described in Section 3.12.6, Socioeconomics, Communities, and Environmental Justice, and in Section 3.3.8, Air Quality and Global Climate Change. They include implementation of a construction management plan to minimize temporary impacts on adjacent land uses and implementation of dust control measures during project construction.</p>	Design/Construction	Reporting	Monthly	Contractor	Contractor	At incorporation or completion of design/Monthly Reporting during Construction	Condition of Design Build Contract	LU Impact #1:	Temporary and intermittent disruption of access to some properties, temporarily inconvenience nearby residents, and temporarily change the intensity of agricultural operations on some lands along 31 miles of the BNSF Alternative, along the Corcoran Bypass, and Allensworth Bypass
<b>Agricultural Land</b>											
AG-AM #1	Restoration of Land Used for Temporary Staging Areas	<p>All staging areas on Important Farmlands will be returned to as close to their Design staging condition as possible with the goal of ensuring these parcels remain available for long-term agricultural use</p>	Construction	Reporting	Monthly	Contractor	Contractor	Reporting	Condition of Design Build Contract	N/A	N/A
AG-AM #2	Farmland Consolidation Program	<p>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, on request, the program</p>	Design/Construction	Reporting	Monthly	Authority	Authority	At incorporation or completion of design/Monthly Reporting during Construction	Weekly record keeping and monthly reporting	AG#4	Permanent Conversion of Agricultural Land to Nonagricultural Use



		<p>will assist the owners of remnant parcels in selling those remnants to adjacent landowners. The goal of the program is to provide 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 general plan. The program will operate for no less than 5 years after construction of the Fresno to Bakersfield Section is completed.</p> <p>The Authority and FRA expect that productive farmland would be farmed in some manner, and not left idle in perpetuity. However, the Authority and FRA recognize that constructing the Fresno to Bakersfield HST project will have a disruptive effect on farm ownership that would temporarily idle some remainder parcels. The intent of the Farmland Consolidation Program is to take responsibility for the disruptive effects and proactively work to restore remainder parcels to productive agricultural use (and not rely on market forces to accomplish the same result). This process would be a series of real estate transactions, and the Authority would be using the same real property transaction processes used by Caltrans; this process features the use of Authority right-of-way agents who generally follow Caltrans procedures. The State of California has a long history of managing real estate transactions through Caltrans and other state entities (e.g., the Department of General Services), which helps promote the success of the Authority's farmland consolidation program.</p>									
AG-AM #3	Permit Assistance	<p>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 would either require relocation of the facility or amendment of its existing regulatory permits.</p>	Design/Construction	Reporting	Monthly	Authority	Authority Representative	At incorporation or completion of design/Monthly Reporting during Construction	Weekly record keeping and monthly reporting/Authority Representative Assignment	N/A	N/A
AG-AM #4	Research	<p>During the HST testing phase, the Authority will fund a program to undertake original research on the wind and noise effects of HST operations on agricultural activities. The Authority will engage qualified researchers within the University of California or California State University system to undertake this research. The researcher will be selected by the Authority through a request for proposal process. The research will include monitoring of noise and wind effects at representative points along the test track. The research period will include the testing phase and extend 2 years after commencement of revenue service. The Authority will publicly distribute a report of the findings of the research program.</p> <p>The research will include, but is not limited to, the following subjects:</p> <ul style="list-style-type: none"> <li>• Generated wind speed, duration, and area of influence from HST trainsets at typical operational speeds.</li> <li>• Effects of HST-generated wind on the effectiveness of honey bee pollination.</li> <li>• Dust production as a result of typical HST operations,</li> </ul>	Testing phase/ Operation	Reporting	Two Years	Authority	Authority	Reporting	Research and report compilation	N/A	N/A

		including entrainment and dispersal patterns of dust in the HST slipstream. <ul style="list-style-type: none"> <li>Generated noise levels and duration from HST trainsets at typical operational speeds.</li> <li>Noise contours depicting modeled noise levels at distance from the tracks.</li> <li>Practical methods for reducing effects on agriculture.</li> </ul>									
<b>Parks, Recreation and Open Space</b>											
PC-AM #1	Design Standards	The design standards applicable to the project are summarized in Section 3.3.8 in Air Quality and Global Climate Change, Section 3.4.6 in Noise and Vibration and Section 3.16.6 in Aesthetics and Visual Resources.	Design/Construction	Reporting	Monthly during construction	Contractor	Contractor	At incorporation or completion of design/Monthly Reporting during Construction	Condition of Design Build Contract	N/A	N/A
<b>Aesthetics and Visual Quality</b>											
AVR-AM #1	Design Standards	The Authority has adopted design standards and design guidelines that are established to create a minimum aesthetic quality for a long-lasting infrastructure. Many of these elements are described in Table 3.16-2 in Section 3.16.5.3, High-Speed Train Alternatives. In addition to the features described in Table 3.16-2, the Authority's Urban Design Guidelines for the California High Speed Train Project (Authority 2011b) briefly discusses the principles of context-sensitive solutions to guide the design of stations. This approach is equally applicable to elevated guideways and will be employed to mitigate visual impacts through context-sensitive design. Aesthetic Guidelines for Non-Station Structures (TM 200-06) (Authority 2011a) will also guide the design of the HST components. These standards and guidelines work to minimize and avoid aesthetic effects on the adjacent surroundings, where possible	Design/Construction/Operation	Reporting	Monthly during construction and as needed during operation	Authority/Contractor	Authority/Contractor	At incorporation or completion of design/Monthly Reporting during Construction and as needed during operation	Condition of Design Build Contract	AVR #4	Lower Visual Quality
<b>Cultural and Paleontological Resources</b>											
CUL- AM #1	Protective Measures	Cultural resources mitigation measures and commitments could occur prior to, during, and following construction. Protective measures, such as conducting archaeological training, building stabilization or archaeological site capping, and recordation of resources would take place prior to construction; other protective measures such as vibration monitoring for built resources or monitoring for archaeological resources during ground-disturbing activities would occur during construction. Measures that could take place after construction may include interpretive programs, including displays, interpretive signage, etc.	Design/Construction/Operation	Reporting/Meetings with Agencies	As needed	Authority/Contractor	Authority/Contractor	At incorporation or completion of design/As needed	Meetings with interested agencies and compilation of reports/Reporting	Impact Cul #1	Potential Adverse Effects on Archaeological Resources due to Construction Activities
										Impact Cul #2	Potential Adverse Effects on Historic Architectural Resources due to Construction Activities
										Impact Cul #3	Potential Adverse Effects on Paleontological Resources due to Construction Activities
CUL -AM #2	PA	The PA established the framework for the development and implementation of measures to avoid, minimize, and/or mitigate adverse effects on historic properties caused by the HST System, in compliance with Section 106 and NEPA. The PA also established that a MOA will be prepared for each section of the HST project to detail the HST project commitments to implement these treatments.	Design/Construction	Reporting	Weekly	Contractor	Contractor	At incorporation or completion of design/Weekly reporting or as dictated by the BETP and the MOA	BETP PA	Impact Cul #2	Potential Adverse Effects on Historic Architectural Resources due to Construction Activities

Transportation											
TRA-AM #1	Off-Street Parking for Construction-Related Vehicles	Identify adequate off-street parking for all construction-related vehicles throughout the construction period. If adequate parking cannot be provided on the construction sites, designate a remote parking area and use a shuttle bus to transfer construction workers to the job site.	Design/Construction	Design/Build and Construction Transportation Plan to be prepared prior to construction, followed by reporting.	Weekly	Contractor	Contractor	At incorporation or completion of design/Implementation during construction	Condition of Design Build Contract	Impact TR #1	Construction (Not Including Stations) Impacts on Circulation and Emergency Access
										Impact TR #2	Impacts on Circulation from Fresno Station Construction
										Impact TR #3	Impacts on Circulation from Kings/Tulare-East Station Construction
										Impact TR #5	Impacts on Circulation from Bakersfield Station Construction
										Impact TR #7	Impacts on Circulation from Rural Area Construction
										Impact TR #9	Construction (Not Including Stations) Impacts on School Districts
TRA-AM #2	Maintenance of Pedestrian Access	Prepare specific construction management plans to address maintenance of pedestrian access during the construction period. Actions to limit pedestrian access would 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. Pedestrian access should be maintained unless maintaining access would be unsafe for pedestrians.	Design/Construction	Design/Build and Construction Transportation Plan to be prepared prior to construction, followed by reporting.	Weekly	Contractor	Contractor	At incorporation or completion of design/Implementation during construction	Condition of Design Build Contract	Impact TR #1	Construction (Not Including Stations) Impacts on Circulation and Emergency Access
										Impact TR #2	Impacts on Circulation from Fresno Station Construction
										Impact TR #3	Impacts on Circulation from Kings/Tulare-East Station Construction
										Impact TR #5	Impacts on Circulation from Bakersfield Station Construction
										Impact TR #7	Impacts on Circulation from Rural Area Construction
										Impact TR #9	Construction (Not Including Stations) Impacts on School Districts
TRA-AM#3	Maintenance of Bicycle Access	Prepare specific construction management plans to address maintenance of bicycle access during the construction period. Actions to limit bicycle access would 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. Bicycle access will be maintained where feasible.	Design/Construction	Design/Build and Construction Transportation Plan to be prepared prior to construction, followed by reporting.	Weekly	Contractor	Contractor	At incorporation or completion of design/Implementation during construction	Condition of Design Build Contract	Impact TR #1	Construction (Not Including Stations) Impacts on Circulation and Emergency Access
										Impact TR #2	Impacts on Circulation from Fresno Station Construction
										Impact TR #3	Impacts on Circulation from Kings/Tulare-East Station Construction
										Impact TR #5	Impacts on Circulation from Bakersfield Station Construction
										Impact TR #7	Impacts on Circulation from Rural Area Construction
										Impact TR #9	Construction (Not Including Stations) Impacts on School Districts
TRA-AM#4	Restriction on Construction Hours	Limit construction material deliveries between 7 a.m. and 9 a.m. and between 4 p.m. and 6 p.m. on weekdays. The number of construction employees arriving or departing the site between the hours of 7 a.m. to 8:30 a.m. and 4:30 p.m. to 6 p.m. would be limited.	Construction	Design/Build and Construction Transportation Plan to be prepared prior to construction, followed by reporting.	Weekly	Contractor	Contractor	Implementation during construction	Condition of Design Build Contract	Impact TR #1	Construction (Not Including Stations) Impacts on Circulation and Emergency Access
										Impact TR #2	Impacts on Circulation from Fresno Station Construction
										Impact TR #3	Impacts on Circulation from Kings/Tulare-East Station Construction
										Impact TR #5	Impacts on Circulation from Bakersfield Station Construction
										Impact TR #7	Impacts on Circulation from Rural Area Construction
										Impact TR #9	Construction (Not Including Stations) Impacts on School Districts

TRA-AM#5	Construction Truck Routes	Deliver all construction-related equipment and materials on the appropriate truck routes. Prohibit heavy-construction vehicles from accessing the site via other routes.	Construction	Design/Build and Construction Transportation Plan to be prepared prior to construction, followed by reporting.	Weekly	Contractor	Contractor	Implementation during construction	Condition of Design Build Contract	Impact TR #1	Construction (Not Including Stations) Impacts on Circulation and Emergency Access
										Impact TR #2	Impacts on Circulation from Fresno Station Construction
										Impact TR #3	Impacts on Circulation from Kings/Tulare-East Station Construction
										Impact TR #5	Impacts on Circulation from Bakersfield Station Construction
										Impact TR #7	Impacts on Circulation from Rural Area Construction
										Impact TR #9	Construction (Not Including Stations) Impacts on School Districts
TRA-AM #6	Protection of Public Roadways during Construction	Repair any structural damage to public roadways, returning any damaged sections to their original structural condition. Survey the condition of the public roadways along truck routes providing access to the proposed project site both before construction and after construction is complete. Complete a before- and after-survey report and submit to the Authority for review, indicating the location and extent of any damage.	Construction	Design/Build and Construction Transportation Plan to be prepared prior to construction, followed by reporting.	Weekly	Contractor	Contractor	Implementation during construction	Condition of Design Build Contract	Impact TR #1	Construction (Not Including Stations) Impacts on Circulation and Emergency Access
										Impact TR #2	Impacts on Circulation from Fresno Station Construction
										Impact TR #3	Impacts on Circulation from Kings/Tulare-East Station Construction
										Impact TR #5	Impacts on Circulation from Bakersfield Station Construction
										Impact TR #7	Impacts on Circulation from Rural Area Construction
										Impact TR #9	Construction (Not Including Stations) Impacts on School Districts
TRA-AM#7	Maintenance of Public Transit Access and Routes	Coordinate with the appropriate transit jurisdiction before limiting access to public transit or limiting movement of public transit vehicles. Potential actions that would impact access to transit include, but are not limited to, relocating or removing bus stops, limiting access to bus stops or transfer facilities, or otherwise restricting or constraining public transit operations. Public transit access and routing will be maintained where feasible.	Design/Construction	Design/Build and Construction Transportation Plan to be prepared prior to construction, followed by reporting.	Weekly	Contractor	Contractor	At incorporation or completion of design/Implementation during construction	Condition of Design Build Contract	Impact TR #1	Construction (Not Including Stations) Impacts on Circulation and Emergency Access
										Impact TR #2	Impacts on Circulation from Fresno Station Construction
										Impact TR #3	Impacts on Circulation from Kings/Tulare-East Station Construction
										Impact TR #5	Impacts on Circulation from Bakersfield Station Construction
										Impact TR #7	Impacts on Circulation from Rural Area Construction
										Impact TR #9	Construction (Not Including Stations) Impacts on School Districts
TRA-AM #8	Construction Transportation Plan	The design-builder will prepare a detailed Construction Transportation Plan for the purpose of minimizing the impact of construction and construction traffic on adjoining and nearby roadways. The Construction Transportation Plan will be prepared in close consultation with the pertinent city or county, and will be reviewed and approved by the Authority prior to commencing 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,	Design/Construction	Design/Build and Construction Transportation Plan to be prepared prior to construction, followed by reporting.	Weekly	Contractor	Contractor	At incorporation or completion of design/Implementation during construction	Condition of Design Build Contract	Impact TR #1	Construction (Not Including Stations) Impacts on Circulation and Emergency Access
										Impact TR #2	Impacts on Circulation from Fresno Station Construction
										Impact TR #3	Impacts on Circulation from Kings/Tulare-East Station Construction
										Impact TR #5	Impacts on Circulation from Bakersfield Station Construction
										Impact TR #7	Impacts on Circulation from Rural Area Construction
										Impact TR #9	Construction (Not Including

		<p>if any. The plan 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 minimum, the following elements:</p> <ul style="list-style-type: none"> <li>• Temporary signage to alert drivers and pedestrians to the construction zone.</li> <li>• Flag persons or other methods of traffic control.</li> <li>• Traffic speed limitations in the construction zone.</li> <li>• Temporary road closures and provisions for alternative access during the closure.</li> <li>• Detour provisions for temporary road closures.</li> </ul> <p>Alternating one-way traffic will be considered as an alternative to temporary closures where practical and where it would result in better traffic flow than would a detour.</p> <ul style="list-style-type: none"> <li>• Identified routes for construction traffic.</li> <li>• Provisions for safe pedestrian and bicycle passage, or convenient detour.</li> <li>• Provisions to minimize access disruption to residents, businesses, customers, delivery vehicles, and buses to the extent practical. Where road closures are required during construction, limit to the hours that are least disruptive to access for the adjacent land uses.</li> <li>• Provisions for farm equipment access.</li> <li>• Provisions for 24-hour access by emergency vehicles.</li> <li>• Safe vehicular and pedestrian access to local businesses and residences during construction. The plan will provide for scheduled transit access where construction would 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 convenient location away from where construction is occurring. Adequate measures will be taken to separate students and parents walking to and from the temporary bus stop from the construction zone.</li> <li>• Advance notification to the local school district of construction activities and rigorously maintained traffic control at all school bus loading zones, to ensure the safety of school children</li> <li>• Project Design Features 1-7 and 9-11.</li> </ul>									Stations) Impacts on School Districts
TRA-AM #9	Construction during Special Events	Provide a mechanism to prevent roadway construction activities from reducing roadway capacity during major athletic events or other special events that attract a substantial number of visitors. Mechanisms include the presence of police officers directing traffic, special event parking, use of within-the-curb parking, or shoulder lanes for through-traffic, traffic cones, and so on. Through such mechanisms, roadway capacity would be maintained.	Construction	Design/Build and Construction Transportation Plan to be prepared prior to construction, followed by reporting.	Weekly	Contractor	Contractor	Implementation during construction	Condition of Design Build Contract	Impact TR #1	Construction (Not Including Stations) Impacts on Circulation and Emergency Access
										Impact TR #2	Impacts on Circulation from Fresno Station Construction
										Impact TR #5	Impacts on Circulation from Bakersfield Station Construction
TRA-AM#10	Protection of Freight and Passenger Rail during Construction	Repair any structural damage to freight or public railways, and return any damaged sections to their original structural condition. If necessary, during construction, a "shoofly" track would be constructed to allow existing train lines to bypass any areas closed for construction activities. Upon completion, tracks would be opened and repaired; or new mainline track would be constructed, and the "shoofly" would be removed	Construction	Design/Build and Construction Transportation Plan to be prepared prior to construction, followed by reporting.	Weekly	Contractor	Contractor	Implementation during construction	Condition of Design Build Contract	Impact TR #1	Construction (Not Including Stations) Impacts on Circulation and Emergency Access



TRA-AM #11	Additional Features in the Cities of Fresno and Bakersfield	<p>In addition to the measures listed above, the Authority will also perform the following in the cities of Fresno and Bakersfield:</p> <ul style="list-style-type: none"> <li>• Maintain detection at signalized intersections where alignment changes or widening are necessary, in order that the traffic signal does not need to be placed on recall (fixed timing).</li> <li>• Changeable message signs (CMS) will be employed to advise motorists of lane closures or detours ahead. The CMSs will be deployed seven days before the start of construction at that location.</li> <li>• Where project construction would cause delays on major roadways during the construction period, the project will provide for a network of CMS locations to provide adequate driver notification. For example, construction-related delays at the railroad grade separations that lead to SR 99 interchanges will require CMS placement to the east to allow drivers to make alternate route decisions. In the case of work on Shaw Avenue, recommended placement would be a CMS at Shaw Avenue just east of SR 41 and a CMS at Shaw Avenue just east of Palm Avenue. Similar CMS usage will be required along Ashlan Avenue, Clinton Avenue, McKinley Avenue, Olive Avenue, and Belmont Avenue.</li> <li>• The Authority, in conjunction with the City of Fresno Public Works Department and City of Bakersfield Public Works Department, will develop a traffic management plan for the surface transportation network to minimize potential impacts on public safety services.</li> <li>• During project construction, alignment of roadways to be grade-separated and freeway overpasses to be reconstructed will be offset from the existing alignment to facilitate staged construction, wherever possible. The Authority will also include the following measures specific to the city of Fresno:                     <ul style="list-style-type: none"> <li>• Clinton Avenue over SR 99 and Ashlan Avenue over the UPRR will be offset from their existing alignments to allow for the existing roadway to remain open while the new structure is being built. It is recognized by the city that this type of staging may necessitate temporary ramps to and from SR 99 during various phases of construction. Four travel lanes will be maintained from 7 a.m. to 9 a.m. and from 4 p.m. to 6 p.m. on Shaw Avenue from Cornelia to Blythe Avenue (at UPRR), on Ashlan Avenue from Parkway to Valentine Avenue (at UPRR), and on Clinton Avenue from Marks Avenue to Weber Avenue (at SR 99).</li> <li>• The Veterans Boulevard overpass and construction of new alignments of Golden State Boulevard and Bullard Avenue will be completed and open to traffic prior to the closure of the Carnegie Avenue at-grade railroad crossing.</li> <li>• One lane of traffic in each direction must be maintained at all times for Olive Avenue and McKinley Avenue for construction of the proposed grade separations. No full closures of these crossings will occur, with the exception of short duration closures of less than 72 hours not more than once per month.</li> <li>• During any Belmont Avenue closures that are determined to be necessary, the adjacent crossings of Olive Avenue and Divisadero Street will remain open with no lane closures at the two crossings.</li> <li>• Two of the three crossings will remain open at any given time at the existing railroad crossings at Divisadero, Tuolumne, and Stanislaus</li> </ul> </li> </ul>	Construction	Design/Build and Construction Transportation Plan to be prepared prior to construction, followed by reporting.	Weekly	Contractor	Contractor	Implementation during construction	Condition of Design Build Contract	Impact TR #1	Construction (Not Including Stations) Impacts on Circulation and Emergency Access
										Impact TR #2	Impacts on Circulation from Fresno Station Construction
										Impact TR #5	Impacts on Circulation from Bakersfield Station Construction

**Attachment A**  
**Transportation Mitigation Measures**





**MMRP Attachment A**  
 Transportation Mitigation

	Caused by Alignment Construction <sup>1</sup>	Caused by HST Station Operation and Future Growth <sup>2</sup>	Mitigation Detail	FEIR/FEIS CH3.2 Table Location	Implementing Party and Monitoring/Reporting Party	Implementation / Reporting Schedule	Implementation Mechanism
<b>Fresno Station Intersections</b>							
4 – Van Ness Ave/SR 41 SB Ramp	N/A	<b>TR MM#3:</b> Add Signal to Intersection to Improve LOS/Operation.	Install a traffic signal at the intersection prior to Fresno Station opening.	<b>Table 3.2-40</b> Future (2035) Plus Project Mitigation Measures – Fresno Station Area	<b>TR MM#3 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#3:</b> Prior to Fresno Station opening	<b>TR MM #3:</b> MOU with City of Fresno and/or Caltrans, as necessary; contract with station contractor
6 – SR 99 NB Ramps/Ventura Ave	N/A	<b>TR MM#3:</b> Add Signal to Intersection to Improve LOS/Operation.	Install a traffic signal at the intersection prior to Fresno Station opening.	<b>Table 3.2-40</b> Future (2035) Plus Project Mitigation Measures – Fresno Station Area	<b>TR MM#3 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#3:</b> Prior to Fresno Station opening	<b>TR MM #3:</b> MOU with City of Fresno and/or Caltrans, as necessary; contract with station contractor
7 – E St/Ventura Ave	N/A	<b>TR MM#3:</b> Add Signal to Intersection to Improve LOS/Operation.	Install a traffic signal at the intersection prior to Fresno Station opening.	<b>Table 3.2-40</b> Future (2035) Plus Project Mitigation Measures – Fresno Station Area	<b>TR MM#3 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#3:</b> Prior to Fresno Station opening	<b>TR MM #3:</b> MOU with City of Fresno, as necessary; contract with station contractor
25 – H St/Tulare St	N/A	<b>TR MM#2:</b> Modify Signal Phasing.	Re-time the existing signal in PM to 60 prior to Fresno Station opening.	<b>Table 3.2-40</b> Future (2035) Plus Project Mitigation Measures – Fresno Station Area	<b>TR MM#2 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#2:</b> Prior to Fresno Station opening	<b>TR MM #2:</b> MOU with City of Fresno, as necessary; contract with station contractor
30 – U St/Tulare St	N/A	<b>TR MM#6:</b> Widen Approaches to Intersections; <b>TR MM#7 -</b> Add Exclusive Turn Lanes to Intersections.	Install southbound left-turn lane. Restripe southbound shared through-/left lane to through-lane prior to Fresno Station opening.	<b>Table 3.2-40</b> Future (2035) Plus Project Mitigation Measures – Fresno Station Area	<b>TR MM#6 and #7 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#6 and #7:</b> Prior to Fresno Station opening	<b>TR MM #6 and #7:</b> MOU with City of Fresno and/or Caltrans, as necessary; contract with station contractor
33-0 – Divisadero St/SR 41 NB Ramps/Tulare St (Existing Plus Project)	<b>TR MM#6:</b> Widen Approaches to Intersections; <b>TR MM#7 -</b> Add Exclusive Turn Lanes to Intersections. <sup>3</sup>	N/A	Widen the westbound approach to provide one exclusive left-turn lane, two through-lanes, and one exclusive right-turn lane at the intersection concurrent with alignment construction.	<b>Table 3.2-39</b> Existing Plus Project Mitigation Measures – Fresno Station Area	<b>TR MM#6 and 7 - Implementing Party:</b> Authority and Alignment Contractor; <b>Monitoring/Reporting Party:</b> Same	<b>TR MM#6 and #7 -</b> Concurrent with alignment construction	<b>TR MM #6 and 7 -</b> MOU with City of Fresno and/or Caltrans, as necessary; Contract with alignment contractor
37 – SR 99 Southbound Ramps/ Fresno St	N/A	<b>TR MM#6:</b> Widen Approaches to Intersections; <b>TR MM#7 -</b> Add Exclusive Turn Lanes to Intersections.	Widen the eastbound approach to provide two exclusive through-lanes and one exclusive right-turn lane at the intersection prior to Fresno Station opening.	<b>Table 3.2-40</b> Future (2035) Plus Project Mitigation Measures – Fresno Station Area	<b>TR MM#6 and #7 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#6 and #7:</b> Prior to Fresno Station opening	<b>TR MM #6 and #7:</b> MOU with City of Fresno and/or Caltrans, as necessary; contract with station contractor

**MMRP Attachment A**  
 Transportation Mitigation

	Caused by Alignment Construction <sup>1</sup>	Caused by HST Station Operation and Future Growth <sup>2</sup>	Mitigation Detail	FEIR/FEIS CH3.2 Table Location	Implementing Party and Monitoring/Reporting Party	Implementation / Reporting Schedule	Implementation Mechanism
38 – SR 99 NB Ramps/Fresno St	N/A	<b>TR MM#4:</b> Restripe Intersections; <b>TR MM#7:</b> Add Exclusive Turn Lanes of Intersections.	Restripe westbound right-turn lane to a shared through-/right-turn lane prior to Fresno Station opening.	<b>Table 3.2-40</b> Future (2035) Plus Project Mitigation Measures – Fresno Station Area	<b>TR MM#4 and #7 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#4 and #7:</b> Prior to Fresno Station opening	<b>TR MM #4 and 7:</b> MOU with City of Fresno, as necessary; contract with station contractor
42 – Van Ness Ave/Fresno St	N/A	<b>TR MM#4:</b> Restripe Intersections; <b>TR MM#7:</b> Add Exclusive Turn Lanes to Intersections.	Install southbound right lane, restripe shared southbound lane to southbound through-lane prior to Fresno Station opening.	<b>Table 3.2-40</b> Future (2035) Plus Project Mitigation Measures – Fresno Station Area	<b>TR MM#4 and #7 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#4 and #7:</b> Prior to Fresno Station opening	<b>TR MM #4 and 7:</b> MOU with City of Fresno, as necessary; contract with station contractor
46 – Fresno St/Divisadero St	N/A	<b>TR MM#4:</b> Restripe Intersections; <b>TR MM#7:</b> Add Exclusive Turn Lanes to Intersections.	Install westbound left-turn lane and restripe shared through-/left lane to through-lane prior to Fresno Station opening.	<b>Table 3.2-40</b> Future (2035) Plus Project Mitigation Measures – Fresno Station Area	<b>TR MM#4 and #7 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#4 and #7:</b> Prior to Fresno Station opening	<b>TR MM #4 and 7:</b> MOU with City of Fresno, as necessary; contract with station contractor
52 – E Street/Stanislaus St	N/A	<b>TR MM#6:</b> Widen Approaches to Intersections; <b>TR MM#7:</b> Add exclusive turn lanes to intersections.	Widen the eastbound approach to provide one exclusive left-turn lane, one exclusive through-lane, and one exclusive right-turn lane at the intersection prior to Fresno Station opening.	<b>Table 3.2-40</b> Future (2035) Plus Project Mitigation Measures – Fresno Station Area	<b>TR MM#6 and #7 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#6 and #7:</b> Prior to Fresno Station opening	<b>TR MM #6 and #7:</b> MOU with City of Fresno, as necessary; contract with station contractor
53 – Broadway St/Stanislaus St	N/A	<b>TR MM#6:</b> Widen Approaches to Intersections; <b>TR MM#7:</b> Add exclusive turn lanes to intersections.	Widen the eastbound approach to provide one exclusive left-turn lane, one exclusive through-lane, and one exclusive right-turn lane at the intersection prior to Fresno Station opening.	<b>Table 3.2-40</b> Future (2035) Plus Project Mitigation Measures – Fresno Station Area	<b>TR MM#6 and #7 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#6 and #7:</b> Prior to Fresno Station opening	<b>TR MM #6 and #7:</b> MOU with City of Fresno, as necessary; contract with station contractor
54 – Van Ness Ave/Stanislaus St	<b>TR MM#5:</b> Revise Signal Cycle Length	<b>TR MM#6:</b> Widen Approaches to Intersections; <b>TR MM#7:</b> Add exclusive turn lanes to intersections	Re-time the existing signal in PM to 60 concurrent with alignment construction. Prior to Fresno Station opening, widen the westbound approach to provide one exclusive left-turn lane, one exclusive through-lane, and one shared through-/right-turn lane at the intersection.	<b>Table 3.2-39</b> Existing Plus Project Mitigation Measures – Fresno Station Area  <b>Table 3.2-40</b> Future (2035) Plus Project Mitigation Measures – Fresno Station Area	<b>TR MM#5 - Implementing Party:</b> Authority and alignment Contractor; <b>Monitoring/Reporting Party:</b> same;  <b>TR MM#6 and #7 - Implementing Party:</b> Authority and station contractor; <b>Monitoring/Reporting Party:</b> same	<b>TR MM#5 -</b> Concurrent with alignment construction;  <b>TR MM#6 and #7:</b> Prior to station opening.	<b>TR MM#5 -</b> Contract with alignment contractor, and MOU with Fresno as necessary;  <b>TR MM #6 and #7:</b> MOU with City of Fresno as necessary, and contract with station contractor

**MMRP Attachment A**  
 Transportation Mitigation

	Caused by Alignment Construction <sup>1</sup>	Caused by HST Station Operation and Future Growth <sup>2</sup>	Mitigation Detail	FEIR/FEIS CH3.2 Table Location	Implementing Party and Monitoring/Reporting Party	Implementation / Reporting Schedule	Implementation Mechanism
55 – N. Blackstone Ave/Stanislaus St	N/A	<b>TR MM#6:</b> Widen Approaches to Intersections; <b>TR MM#7:</b> Add exclusive turn lanes to intersections	Widen the westbound approach to provide one exclusive left-turn lane, one exclusive through-lane, and one shared through-/right-turn lane at the intersection prior to Fresno Station opening.	<b>Table 3.2-40</b> Future (2035) Plus Project Mitigation Measures – Fresno Station Area	<b>TR MM#6 and #7 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#6 and #7:</b> Prior to Fresno Station opening	<b>TR MM #6 and #7:</b> MOU with City of Fresno, as necessary; contract with station contractor
63 – H St/Divisadero St3	<b>TR MM#5:</b> Revise Signal Cycle Length.	N/A	Re-time the existing signal in AM to 120 concurrent with alignment construction.	<b>Table 3.2-39</b> Existing Plus Project Mitigation Measures – Fresno Station Area	<b>TR MM#5 - Implementing Party:</b> Authority and Alignment Contractor; <b>Monitoring/Reporting Party:</b> Same	<b>TR MM#5 -</b> Concurrent with alignment construction	<b>TR MM#5 -</b> MOU with City of Fresno, as necessary; Contract with alignment contractor
74 – N. Blackstone Ave/E. Belmont Ave	N/A	<b>TR MM#6:</b> Widen Approaches to Intersections; <b>TR MM#7:</b> Add exclusive turn lanes to intersections	Install eastbound right-turn lane. Restripe shared southbound through-/left-turn to left-turn lane. Restripe shared southbound through-right lane to through-lane. Install southbound right-turn lane prior to Fresno Station opening.	<b>Table 3.2-40</b> Future (2035) Plus Project Mitigation Measures – Fresno Station Area	<b>TR MM#6 and #7 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#6 and #7:</b> Prior to Fresno Station opening	<b>TR MM #6 and #7:</b> MOU with City of Fresno, as necessary; contract with station contractor
80 – N. Blackstone Ave/SR 180 Westbound Ramps	<b>TR MM#4:</b> Restripe Intersections. <b>TR MM#7:</b> Add Exclusive Turn Lanes to Intersections.	<b>TR MM#4:</b> Restripe Intersections.  (N/A because restriping done for alignment construction impacts mitigates station traffic impact)	Concurrent with alignment construction: (a) Restripe shared eastbound lane to eastbound through- and eastbound right-turn lane and (b) Restripe the eastbound approach to provide one exclusive left-turn lane and one shared left-turn/right-turn/through-lane at the intersection.	<b>Table 3.2-39</b> Existing Plus Project Mitigation Measures – Fresno Station Area  <b>Table 3.2-40</b> Future (2035) Plus Project Mitigation Measures – Fresno Station Area	<b>TR MM#4 and #7 - Implementing Party:</b> Authority and Alignment Contractor; <b>Monitoring/Reporting Party:</b> Authority and Alignment Contractor	<b>TR MM#4, TR MM#7 -</b> Concurrent with alignment construction	<b>TR MM#4 and 7 -</b> MOU with City of Fresno and/or Caltrans, as necessary; Contract with alignment contractor
84 – G St/Mono S	N/A	<b>TR MM#3:</b> Add Signal to Intersection to Improve LOS/Operation.	Install a traffic signal at the intersection prior to Fresno Station opening.	<b>Table 3.2-40</b> Future (2035) Plus Project Mitigation Measures – Fresno Station Area	<b>TR MM#3 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#3:</b> Prior to Fresno Station opening	<b>TR MM #3:</b> MOU with City of Fresno, as necessary; contract with station contractor
86 – H St/Ventura St	<b>TR MM#3:</b> Add Signal to Intersection to Improve LOS/Operation.	<b>TR MM#3:</b> Add Signal to Intersection to Improve LOS/Operation.  (N/A because signal add done for alignment construction impacts mitigates station traffic impact)	Install a traffic signal at the intersection concurrent with alignment construction.	<b>Table 3.2-39</b> Existing Plus Project Mitigation Measures – Fresno Station Area  <b>Table 3.2-40</b> Future (2035) Plus Project Mitigation Measures – Fresno Station Area	<b>TR MM#3 - Implementing Party:</b> Authority and Alignment Contractor; <b>Monitoring/Reporting Party:</b> Authority and Alignment Contractor	<b>TR MM#3 -</b> concurrent with alignment construction.	<b>TR MM#3 -</b> MOU with City of Fresno, as necessary; Contract with alignment contractor
90 – Broadway St/Santa Clara St	N/A	<b>TR MM#3:</b> Add Signal to Intersection to Improve LOS/Operation.	Install a traffic signal at the intersection prior to Fresno Station opening.	<b>Table 3.2-40</b> Future (2035) Plus Project Mitigation Measures – Fresno Station Area	<b>TR MM#3 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#3:</b> Prior to Fresno Station opening	<b>TR MM #3:</b> MOU with City of Fresno, as necessary; contract with station contractor

**MMRP Attachment A**  
 Transportation Mitigation

	Caused by Alignment Construction <sup>1</sup>	Caused by HST Station Operation and Future Growth <sup>2</sup>	Mitigation Detail	FEIR/FEIS CH3.2 Table Location	Implementing Party and Monitoring/Reporting Party	Implementation / Reporting Schedule	Implementation Mechanism
92 – S. Van Ness Ave/E. California Ave	N/A	<b>TR MM#3:</b> Add Signal to Intersection to Improve LOS/ Operation;  <b>TR MM#7:</b> Add Exclusive Turn Lanes to Intersections.	Install a traffic signal at the intersection; also provide exclusive left-turn lanes in both northbound and southbound directions, and change phasing on the northbound left and southbound left to protected plus permissive prior to Fresno Station opening.	<b>Table 3.2-40</b> Future (2035) Plus Project Mitigation Measures – Fresno Station Area	<b>TR MM#3 and #7 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#3 and #7:</b> Prior to Fresno Station opening	<b>TR MM #3 and TR MM #7:</b> MOU with City of Fresno and/or Caltrans as necessary; contract with station contractor
96 – Golden State Blvd/E. Church Ave	N/A	<b>TR MM#2:</b> Modify signal phasing;  <b>TR MM#6:</b> Add Exclusive Turn Lanes to Intersections.	Provide an exclusive right-turn lane in the northbound direction, and change signal phasing on all approaches to provide a protected plus permissive left turn phase prior to Fresno Station opening.	<b>Table 3.2-40</b> Future (2035) Plus Project Mitigation Measures – Fresno Station Area	<b>TR MM#2 and #6 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#2 and #6:</b> Prior to Fresno Station opening	<b>TR MM #2 and TR MM #6:</b> MOU with City of Fresno and/or Caltrans as necessary; contract with station contractor
101 – S. East Ave/Golden State Blvd	N/A	<b>TR MM#2:</b> Modify signal phasing.	Increase cycle length in the PM Peak Hour prior to Fresno Station opening.	<b>Table 3.2-40</b> Future (2035) Plus Project Mitigation Measures – Fresno Station Area	<b>TR MM#2 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#2:</b> Prior to Fresno Station opening	<b>TR MM #2:</b> MOU with City of Fresno, as necessary; contract with station contractor
102 – Golden State Blvd/E. Jensen Ave	N/A	<b>TR MM#7:</b> Add Exclusive Turn Lanes to Intersections.	Provide an exclusive right-turn lane for both northbound and southbound approaches prior to Fresno Station opening.	<b>Table 3.2-40</b> Future (2035) Plus Project Mitigation Measures – Fresno Station Area	<b>TR MM#7 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#7:</b> Prior to Fresno Station opening	<b>TR MM #7:</b> MOU with City of Fresno, as necessary; contract with station contractor
105 – Stanislaus St/99 SB Off	N/A	<b>TR MM#6:</b> Widen Approaches to Intersections;  <b>TR MM#7:</b> Add Exclusive Turn Lanes to Intersections.	Widen the southbound approach to provide one shared left turn/through-lane and one exclusive right-turn lane at the intersection prior to Fresno Station opening.	<b>Table 3.2-40</b> Future (2035) Plus Project Mitigation Measures – Fresno Station Area	<b>TR MM#6 and #7 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#6 and #7:</b> Prior to Fresno Station opening	<b>TR MM #6 and TR MM #7:</b> MOU with City of Fresno and/or Caltrans as necessary; contract with station contractor
106 – Stanislaus St/99 NB On	N/A	<b>TR MM#6:</b> Widen Approaches to Intersections;  <b>TR MM#7:</b> Add Exclusive Turn Lanes to Intersections.	Widen the southbound approach to provide one shared left turn/through-lane and one exclusive right-turn lane at the intersection prior to Fresno Station opening.	<b>Table 3.2-40</b> Future (2035) Plus Project Mitigation Measures – Fresno Station Area	<b>TR MM#6 and #7 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#6 and #7:</b> Prior to Fresno Station opening	<b>TR MM #6 and TR MM #7:</b> MOU with City of Fresno and/or Caltrans as necessary; contract with station contractor
111 – Stanislaus St/ Fulton St	N/A	<b>TR MM#6:</b> Widen Approaches to Intersections;  <b>TR MM#7:</b> Add Exclusive Turn Lanes to Intersections.	Widen the southbound approach to provide one shared left turn/through-lane, and one exclusive right-turn lane at the intersection prior to Fresno Station opening.	<b>Table 3.2-40</b> Future (2035) Plus Project Mitigation Measures – Fresno Station Area	<b>TR MM#6 and #7 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#6 and #7:</b> Prior to Fresno Station opening	<b>TR MM #6 and TR MM #7:</b> MOU with City of Fresno, as necessary; contract with station contractor



**MMRP Attachment A**  
 Transportation Mitigation

	Caused by Alignment Construction <sup>1</sup>	Caused by HST Station Operation and Future Growth <sup>2</sup>	Mitigation Detail	FEIR/FEIS CH3.2 Table Location	Implementing Party and Monitoring/Reporting Party	Implementation / Reporting Schedule	Implementation Mechanism
115 – Stanislaus St/M St	N/A	<b>TR MM#6:</b> Widen Approaches to Intersections; <b>TR MM#7:</b> Add Exclusive Turn Lanes to Intersections.	Widen the southbound approach to provide one shared left-turn/through lane, and one exclusive right-turn lane at the intersection prior to Fresno Station opening.	<b>Table 3.2-40</b> Future (2035) Plus Project Mitigation Measures – Fresno Station Area	<b>TR MM#6 and #7 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#6 and #7:</b> Prior to Fresno Station opening	<b>TR MM #6 and TR MM #7:</b> MOU with City of Fresno, as necessary; contract with station contractor
117 – Stanislaus St/N St	<b>TR MM#3:</b> Add Signal to Intersection to Improve LOS/Operation.	<b>TR MM#6:</b> Widen Approaches to Intersections; <b>TR MM#7:</b> Add Exclusive Turn Lanes to Intersections.	Install a traffic signal at the intersection concurrent with alignment construction. Prior to Fresno Station opening, widen the westbound approach to provide one exclusive left-turn lane, one exclusive through-lane, and one shared through-/right-turn lane at the intersection.	<b>Table 3.2-39</b> Existing Plus Project Mitigation Measures – Fresno Station Area  <b>Table 3.2-40</b> Future (2035) Plus Project Mitigation Measures – Fresno Station Area	<b>TR MM#3 - Implementing Party:</b> Authority and Alignment Contractor; <b>Monitoring/Reporting Party:</b> Authority and Alignment Contractor;  <b>TR MM#6 and #7 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#3 -</b> Concurrent with alignment construction  <b>TR MM#6 and #7:</b> Prior to Fresno Station opening.	<b>TR MM#3 -</b> Contract with alignment contractor, and MOU with Fresno as necessary;  <b>TR MM #6 and 7:</b> MOU with City of Fresno as necessary, and contract with station contractor
124 – West Olive Ave/SR 99 SB Ramps	N/A	<b>TR MM#6:</b> Widen Approaches to Intersections; <b>TR MM#7:</b> Add Exclusive Turn Lanes to Intersections.	Widen southbound approach to provide an exclusive left-turn lane prior to Fresno Station opening.	<b>Table 3.2-40</b> Future (2035) Plus Project Mitigation Measures – Fresno Station Area	<b>TR MM#6 and #7 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#6 and #7:</b> Prior to Fresno Station opening	<b>TR MM #6 and TR MM #7:</b> MOU with City of Fresno and/or Caltrans, as necessary; contract with station contractor
125 – West Olive Ave/SR 99 NB Ramps	N/A	<b>TR MM#6:</b> Widen Approaches to Intersections; <b>TR MM#7:</b> Add Exclusive Turn Lanes to Intersections.	Widen northbound approach to provide an exclusive left-turn lane prior to Fresno Station opening.	<b>Table 3.2-40</b> Future (2035) Plus Project Mitigation Measures – Fresno Station Area	<b>TR MM#6 and #7 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#6 and #7:</b> Prior to Fresno Station opening	<b>TR MM #6 and TR MM #7:</b> MOU with City of Fresno and/or Caltrans, as necessary; contract with station contractor
129 – West Belmont Ave/SR 99 Southbound Ramps	N/A	<b>TR MM#3:</b> Add Signal to Intersection to Improve LOS/Operation.	Install a traffic signal at the intersection with a protected westbound left-turn phase prior to Fresno Station opening.	<b>Table 3.2-40</b> Future (2035) Plus Project Mitigation Measures – Fresno Station Area	<b>TR MM#3 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#3:</b> Prior to Fresno Station opening	<b>TR MM #3:</b> MOU with City of Fresno and/or Caltrans, as necessary; contract with station contractor
130 – West Belmont Ave/SR 99 NB Ramps	N/A	<b>TR MM#3:</b> Add Signal to Intersection to Improve LOS/Operation.	Install a traffic signal at the intersection prior to Fresno Station opening.	<b>Table 3.2-40</b> Future (2035) Plus Project Mitigation Measures – Fresno Station Area	<b>TR MM#3 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#3:</b> Prior to Fresno Station opening	<b>TR MM #3:</b> MOU with City of Fresno and/or Caltrans, as necessary; contract with station contractor

**MMRP Attachment A**  
 Transportation Mitigation

	Caused by Alignment Construction <sup>1</sup>	Caused by HST Station Operation and Future Growth <sup>2</sup>	Mitigation Detail	FEIR/FEIS CH3.2 Table Location	Implementing Party and Monitoring/Reporting Party	Implementation / Reporting Schedule	Implementation Mechanism
<b>Roadway Segments</b>							
7 – Stanislaus St, between Van Ness Ave and O St	N/A	<b>TR MM#8:</b> Add New Lanes to Roadway.	Widen the roadway to provide one additional lane in each direction prior to Fresno Station opening.	<b>Table 3.2-40</b> Future (2035) Plus Project Mitigation Measures – Fresno Station Area	<b>TR MM#8 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#8:</b> Prior to Fresno Station opening	<b>TR MM #8:</b> MOU with City of Fresno, as necessary; contract with station contractor
14 – Fresno Street, between P Street and M Street	N/A	<b>TR MM#8:</b> Add New Lanes to Roadway.	Widen the roadway to provide one additional lane in each direction prior to Fresno Station opening.	<b>Table 3.2-40</b> Future (2035) Plus Project Mitigation Measures – Fresno Station Area	<b>TR MM#8 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#8:</b> Prior to Fresno Station opening	<b>TR MM #8:</b> MOU with City of Fresno, as necessary; contract with station contractor
21 – Tulare St, between R St and U St	N/A	<b>TR MM#8:</b> Add New Lanes to Roadway.	Widen the roadway to provide one additional lane in each direction prior to Fresno Station opening.	<b>Table 3.2-40</b> Future (2035) Plus Project Mitigation Measures – Fresno Station Area	<b>TR MM#8 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#8:</b> Prior to Fresno Station opening	<b>TR MM #8:</b> MOU with City of Fresno, as necessary; contract with station contractor
56 – Stanislaus St, between M St and N St	N/A	<b>TR MM#8:</b> Add New Lanes to Roadway.	Widen the roadway to provide one additional lane in each direction prior to Fresno Station opening.	<b>Table 3.2-40</b> Future (2035) Plus Project Mitigation Measures – Fresno Station Area	<b>TR MM#8 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#8:</b> Prior to Fresno Station opening	<b>TR MM #8:</b> MOU with City of Fresno, as necessary; contract with station contractor
58 – Van Ness Ave, south of Tuolumne Street	N/A	<b>TR MM#8:</b> Add New Lanes to Roadway.	Widen the roadway to provide one additional lane in each direction prior to Fresno Station opening.	<b>Table 3.2-40</b> Future (2035) Plus Project Mitigation Measures – Fresno Station Area	<b>TR MM#8 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#8:</b> Prior to Fresno Station opening	<b>TR MM #8:</b> MOU with City of Fresno, as necessary; contract with station contractor
<b>Kings Tulare Regional Station – East</b>							
<b>Intersections</b>							
1 – Ninth Ave/SR 198	N/A	<b>TR MM#3:</b> Add Signal to Intersection to Improve LOS/Operation.	Widen the roadway to provide one additional lane in each direction prior to Kings Tulare Regional Station–East opening.	<b>Table 3.2-42</b> Future (2035) Plus Project Mitigation Measures – Kings/Tulare Regional Station–East Alternative	<b>TR MM#3 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#3:</b> Prior to Kings Tulare Regional Station–East opening.	<b>TR MM #3:</b> MOU with County of Kings and/or Caltrans, as necessary; contract with station contractor
3 – SR 43/SR 198 Eastbound Ramps	N/A	<b>TR MM#3:</b> Add Signal to Intersection to Improve LOS/Operation.	Widen the roadway to provide one additional lane in each direction prior to Kings Tulare Regional Station–East opening.	<b>Table 3.2-42</b> Future (2035) Plus Project Mitigation Measures – Kings/Tulare Regional Station–East Alternative	<b>TR MM#3 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#3:</b> Prior to Kings Tulare Regional Station–East opening.	<b>TR MM #3:</b> MOU with County of Kings and/or Caltrans, as necessary; contract with station contractor

**MMRP Attachment A**  
 Transportation Mitigation

	Caused by Alignment Construction <sup>1</sup>	Caused by HST Station Operation and Future Growth <sup>2</sup>	Mitigation Detail	FEIR/FEIS CH3.2 Table Location	Implementing Party and Monitoring/Reporting Party	Implementation / Reporting Schedule	Implementation Mechanism
4 – Seventh Ave/SR 198	N/A	<b>TR MM#3:</b> Add Signal to Intersection to Improve LOS/Operation.	Widen the roadway to provide one additional lane in each direction prior to Kings Tulare Regional Station–East opening.	<b>Table 3.2-42</b> Future (2035) Plus Project Mitigation Measures – Kings/Tulare Regional Station–East Alternative	<b>TR MM#3 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#3:</b> Prior to Kings Tulare Regional Station–East opening.	<b>TR MM #3:</b> MOU with County of Kings and/or Caltrans, as necessary; contract with station contractor
6 – Sixth Ave/SR 198	N/A	<b>TR MM#3:</b> Add Signal to Intersection to Improve LOS/Operation.	Widen the roadway to provide one additional lane in each direction prior to Kings Tulare Regional Station–East opening.	<b>Table 3.2-42</b> Future (2035) Plus Project Mitigation Measures – Kings/Tulare Regional Station–East Alternative	<b>TR MM#3 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#3:</b> Prior to Kings Tulare Regional Station–East opening.	<b>TR MM #3:</b> MOU with County of Kings and/or Caltrans, as necessary; contract with station contractor
7 – Second Ave/SR 198	N/A	<b>TR MM#3:</b> Add Signal to Intersection to Improve LOS/Operation.	Widen the roadway to provide one additional lane in each direction prior to Kings Tulare Regional Station–East opening.	<b>Table 3.2-42</b> Future (2035) Plus Project Mitigation Measures – Kings/Tulare Regional Station–East Alternative	<b>TR MM#3 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#3:</b> Prior to Kings Tulare Regional Station–East opening.	<b>TR MM #3:</b> MOU with County of Kings and/or Caltrans, as necessary; contract with station contractor
8 – SR 43/Lacey Blvd	N/A	<b>TR MM#3:</b> Add Signal to Intersection to Improve LOS/Operation.	Widen the roadway to provide one additional lane in each direction prior to Kings Tulare Regional Station–East opening.	<b>Table 3.2-42</b> Future (2035) Plus Project Mitigation Measures – Kings/Tulare Regional Station–East Alternative	<b>TR MM#3 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#3:</b> Prior to Kings Tulare Regional Station–East opening.	<b>TR MM #3:</b> MOU with County of Kings and/or Caltrans, as necessary; contract with station contractor
<b>Bakersfield Station</b>							
<b>Intersections</b>							
6 – Union Ave/E. Brundage Lane	N/A	<b>TR MM#6:</b> Widen Approaches to Intersections. <b>TR MM#7:</b> Add Exclusive Turn Lanes to Intersections.	Widen the westbound approach to provide an additional exclusive left-turn lane at the intersection.	<b>Table 3.2-46</b> Future (2035) Plus Project Mitigation Measures – Bakersfield Stations	<b>TR MM#6 and #7 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#6 and #7:</b> Prior to Bakersfield Station opening	<b>TR MM #6 and TR MM #7:</b> MOU with City of Bakersfield, as necessary; contract with station contractor
15 – SR 99 NB Ramps/ California Ave	N/A	<b>TR MM#4:</b> Restripe Intersections. <b>TR MM#7:</b> Add Exclusive Turn Lanes to Intersections.	Restripe the northbound approach to provide one exclusive left-turn lane, one shared left-turn/through-/right-turn lane, and one exclusive right-turn lane at the intersection.	<b>Table 3.2-46</b> Future (2035) Plus Project Mitigation Measures – Bakersfield Stations	<b>TR MM#4 and #7 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#4 and #7:</b> Prior to Bakersfield Station opening	<b>TR MM #4 and TR MM #7:</b> MOU with City of Bakersfield and/or Caltrans, as necessary; contract with station contractor

**MMRP Attachment A**  
 Transportation Mitigation

	Caused by Alignment Construction <sup>1</sup>	Caused by HST Station Operation and Future Growth <sup>2</sup>	Mitigation Detail	FEIR/FEIS CH3.2 Table Location	Implementing Party and Monitoring/Reporting Party	Implementation / Reporting Schedule	Implementation Mechanism
16 – Oak St/California Ave	N/A	<b>TR MM#5:</b> Revise Signal Cycle Length.	Modify the existing traffic signal to provide protected left-turn phases for the northbound and southbound approaches at the intersection.	<b>Table 3.2-46</b> Future (2035) Plus Project Mitigation Measures – Bakersfield Stations	<b>TR MM#5 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#5:</b> Prior to Bakersfield Station opening	<b>TR MM #5:</b> MOU with City of Bakersfield, as necessary; contract with station contractor
23 – Union Ave/California Ave (North and Hybrid Alternatives only)	N/A	<b>TR MM#5:</b> Revise Signal Cycle Length.	Re-time the signal in AM and PM	<b>Table 3.2-46</b> Future (2035) Plus Project Mitigation Measures – Bakersfield Stations	<b>TR MM#5 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#5:</b> Prior to Bakersfield Station opening	<b>TR MM #5:</b> MOU with City of Bakersfield, as necessary; contract with station contractor
41 – Union Ave/Golden State Ave/21st St	N/A	<b>TR MM#6:</b> Widen Approaches to Intersections. <b>TR MM#7:</b> Add Exclusive Turn Lanes to Intersections.	Widen the northbound approach to provide an additional through-lane to go on Union Ave.	<b>Table 3.2-46</b> Future (2035) Plus Project Mitigation Measures – Bakersfield Stations	<b>TR MM#6 and #7 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#6 and #7:</b> Prior to Bakersfield Station opening	<b>TR MM #6 and TR MM #7:</b> MOU with City of Bakersfield, as necessary; contract with station contractor
42 – F St/23rd St	N/A	<b>TR MM#6:</b> Widen Approaches to Intersections. <b>TR MM#7:</b> Add Exclusive Turn Lanes to Intersections.	Widen the eastbound approach to provide one exclusive left turn lane, two exclusive through lanes, and one shared through-/right-turn lane at the intersection.	<b>Table 3.2-46</b> Future (2035) Plus Project Mitigation Measures – Bakersfield Stations	<b>TR MM#6 and #7 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#6 and #7:</b> Prior to Bakersfield Station opening	<b>TR MM #6 and TR MM #7:</b> MOU with City of Bakersfield, as necessary; contract with station contractor
51 – Q St/Golden State Ave	N/A	<b>TR MM#5:</b> Revise Signal Cycle Length.	Re-time the signal in AM and PM	<b>Table 3.2-46</b> Future (2035) Plus Project Mitigation Measures – Bakersfield Stations	<b>TR MM#5 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#5:</b> Prior to Bakersfield Station opening	<b>TR MM #5:</b> MOU with City of Bakersfield, as necessary; contract with station contractor
56 – M St/28 St/Golden State Ave	N/A	<b>TR MM#6:</b> Widen Approaches to Intersections. <b>TR MM#7:</b> Add Exclusive Turn Lanes to Intersections.	Widen the northbound approach to provide an additional through-lane to go on Union Ave.	<b>Table 3.2-46</b> Future (2035) Plus Project Mitigation Measures – Bakersfield Stations	<b>TR MM#6 and #7 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#6 and #7:</b> Prior to Bakersfield Station opening	<b>TR MM #6 and TR MM #7:</b> MOU with City of Bakersfield, as necessary; contract with station contractor



**MMRP Attachment A**  
 Transportation Mitigation

	Caused by Alignment Construction <sup>1</sup>	Caused by HST Station Operation and Future Growth <sup>2</sup>	Mitigation Detail	FEIR/FEIS CH3.2 Table Location	Implementing Party and Monitoring/Reporting Party	Implementation / Reporting Schedule	Implementation Mechanism
60 – F St/Golden State Ave	N/A	<b>TR MM#6:</b> Widen Approaches to Intersections. <b>TR MM#7:</b> Add Exclusive Turn Lanes to Intersections.	Widen the eastbound approach to provide one exclusive left turn lane, two exclusive through lanes, and one shared through-/right-turn lane at the intersection.	<b>Table 3.2-46</b> Future (2035) Plus Project Mitigation Measures – Bakersfield Stations	<b>TR MM#6 and #7 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#6 and #7:</b> Prior to Bakersfield Station opening	<b>TR MM #6 and TR MM #7:</b> MOU with City of Bakersfield, as necessary; contract with station contractor
71 – Truxtun Ave/Tulare St	N/A	<b>TR MM#3:</b> Add Signal to Intersection to Improve LOS/Operation.	Install traffic signal.	<b>Table 3.2-46</b> Future (2035) Plus Project Mitigation Measures – Bakersfield Stations	<b>TR MM#3 - Implementing Party:</b> Authority and Contractor (station contractor) <b>Monitoring/Reporting Party:</b> Authority and Contractor (station contractor)	<b>TR MM#3:</b> Prior to Bakersfield Station opening	<b>TR MM #3:</b> MOU with City of Bakersfield, as necessary; contract with station contractor

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**Appendix D:**  
Corrections to the Final EIS  
(Errata Sheet)

## Appendix D: Corrections to the Final EIS (Errata Sheet)

No.	Page	Paragraph or Section	Current Text	New Text	Explanation																																																								
<b>Volume I</b>																																																													
1	3.3-48	Table 3.3.7	See Table 1 in this errata	See Table 1 in this errata	Fixes an error in calculation of fill soils needed																																																								
2	3.3-54	Table 3.3-8	<table border="1"> <thead> <tr> <th>Year</th> <th>BNSF Alternative</th> </tr> </thead> <tbody> <tr><td>2014</td><td>51,661</td></tr> <tr><td>2015</td><td>75,421</td></tr> <tr><td>2016</td><td>51,561</td></tr> <tr><td>2017</td><td>16,782</td></tr> <tr><td>2018</td><td>18,509</td></tr> <tr><td>2019</td><td>498</td></tr> <tr><td>2020</td><td>271</td></tr> <tr><td>2021</td><td>10,876</td></tr> <tr><td>2022</td><td>111</td></tr> <tr><td>2023</td><td>38</td></tr> <tr><td><b>Total</b></td><td><b>255,728</b></td></tr> <tr> <td colspan="2"><b>Amortized GHG Emissions (averaged over 25 years)</b></td> </tr> <tr> <td>CO<sub>2</sub>e per Year</td> <td>9,029</td> </tr> </tbody> </table>	Year	BNSF Alternative	2014	51,661	2015	75,421	2016	51,561	2017	16,782	2018	18,509	2019	498	2020	271	2021	10,876	2022	111	2023	38	<b>Total</b>	<b>255,728</b>	<b>Amortized GHG Emissions (averaged over 25 years)</b>		CO <sub>2</sub> e per Year	9,029	<table border="1"> <thead> <tr> <th>Year</th> <th>BNSF Alternative</th> </tr> </thead> <tbody> <tr><td>2014</td><td><del>51,661</del> 102,012</td></tr> <tr><td>2015</td><td><del>75,421</del> 125,079</td></tr> <tr><td>2016</td><td><del>51,561</del> 65,571</td></tr> <tr><td>2017</td><td>16,782</td></tr> <tr><td>2018</td><td>18,509</td></tr> <tr><td>2019</td><td>498</td></tr> <tr><td>2020</td><td>271</td></tr> <tr><td>2021</td><td>10,876</td></tr> <tr><td>2022</td><td>111</td></tr> <tr><td>2023</td><td>38</td></tr> <tr><td><b>Total</b></td><td><b><del>255,728</del> 339,748</b></td></tr> <tr> <td colspan="2"><b>Amortized GHG Emissions (averaged over 25 years)</b></td> </tr> <tr> <td>CO<sub>2</sub>e per Year</td> <td><del>9,029</del> 13,590</td> </tr> </tbody> </table>	Year	BNSF Alternative	2014	<del>51,661</del> 102,012	2015	<del>75,421</del> 125,079	2016	<del>51,561</del> 65,571	2017	16,782	2018	18,509	2019	498	2020	271	2021	10,876	2022	111	2023	38	<b>Total</b>	<b><del>255,728</del> 339,748</b>	<b>Amortized GHG Emissions (averaged over 25 years)</b>		CO <sub>2</sub> e per Year	<del>9,029</del> 13,590	Fixes an error in calculation of fill soils needed
Year	BNSF Alternative																																																												
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3	3.3-69	5 <sup>th</sup> full paragraph	Because of the large reduction of GHG emissions during the operational phase, the GHG emissions from construction would be "paid back," meaning that the increases in construction emissions would be accounted for in less than 12 months of the HST operation under the worst-case construction-phase emission scenario.	Because of the large reduction of GHG emissions during the operational phase, the GHG emissions from construction would be "paid back," meaning that the increases in construction emissions would be accounted for in less than <del>42</del> 18 months of the HST operation under the worst-case construction-phase emission scenario.	Fixes an error in calculation of fill soils needed and hauling needs																																																								
4	3.9-1—2	Sentence splitting the	The Fresno to Bakersfield Section of the HST project would require approximately 1,700,000 tons of aggregate for ballasted track, approximately 1,000 tons of aggregate for slab track, and	The Fresno to Bakersfield Section of the HST project would require approximately 1,700,000 tons of aggregate <del>ballast</del> for ballasted track, approximately 1,000 tons of aggregate for slab	Fixes an error in calculation of fill																																																								

No.	Page	Paragraph or Section	Current Text	New Text	Explanation
		first and second pages	11,300,000 cubic yards of fill (assuming no fill is provided by project excavation).	track, and <del>11,300,000</del> <u>29,400,000 net</u> cubic yards of fill (assuming no fill is provided by project excavation).	soils needed and hauling needs
<b>Volume II</b>					
5	4-5	Air Quality Technical Report Appendix A	California High Speed Rail Fresno to Bakersfield Construction Analysis Summary of Emissions (Tables in FEIS Document)	California High Speed Rail Fresno to Bakersfield Construction Analysis Summary of Emissions (Tables in FEIS Document) – see revised appendix for revised tables	Fixes an error in calculation of fill soils needed and hauling needs
6	78-79	Air Quality Technical Report Appendix A	California High Speed Rail Fresno to Bakersfield Construction Analysis Material Hauling Truck Emissions (Tables in FEIS Document)	California High Speed Rail Fresno to Bakersfield Construction Analysis Material Hauling Truck Emissions (Tables in FEIS Document) – see revised appendix for revised tables	Fixes an error in calculation of fill soils needed and hauling needs
<b>Volume V</b>					
9	40-982	BO091-33	However, the Authority has entered into an agreement with the UPRR (the Engineering, Construction, and Maintenance Agreement) that sets out a process of cooperation between the two parties in planning the HST route and gives UPRR review and approval rights for engineering, construction, and maintenance plans. The Authority recognizes the July 2012 Memorandum of Understanding (MOU) with UPRR and notes that the Authority has been working cooperatively with UPRR under the MOU to address issues that UPRR has raised. No such agreement was in place before the City of Atherton litigation. The Authority understands the risk that future design refinements could result in the shifting of the HST alignment away from the UPRR right-of-way and that this shift could result in new or more significant impacts. For this reason, the Authority has advanced a range of viable and practicable project alternatives. The Authority continues to work with UPRR in refining the design of the project. The Authority is confident that its work with UPRR to develop the final designs will mean that the alignment will need only minor adjustment and that both parties' right-of-way needs will be met.	However, the Authority <del>has entered into an agreement with the</del> <u>and UPRR have been in negotiations on an agreement</u> (the Engineering, Construction, and Maintenance Agreement) that sets out a process of cooperation between the two parties in planning the HST route and gives UPRR review and approval rights for engineering, construction, and maintenance plans. The Authority recognizes the July 2012 Memorandum of Understanding (MOU) with UPRR and notes that the Authority has been working cooperatively with UPRR under the MOU to address issues that UPRR has raised. No such agreement was in place before the City of Atherton litigation. The Authority understands the risk that future design refinements could result in the shifting of the HST alignment away from the UPRR right-of-way and that this shift could result in new or more significant impacts. For this reason, the Authority has advanced a range of viable and practicable project alternatives. The Authority continues to work with UPRR in refining the design of the project. The Authority is confident that its work with UPRR to develop the final designs will mean that the alignment will need only minor adjustment and that both parties' right-of-way needs will be met.	Fixes an error
10	40-981 – 40-982	BO091-32	As discussed in comment response 1488, the proposed project does not conflict with the Union Pacific Railroad's (UPRR's) ability to comply with FRA's Title 49 Code of Federal Regulations (CFR) Part 213. The commenter asserts that the proposed project constrains UPRR maintenance access to its right-of-way, but there is no compelling evidence provided to change the significance threshold. The Authority will design its right-of-way in accordance with Sections 3.1, 7, and 8 of the draft Engineering, Construction, and Maintenance Agreement. Through this process with UPRR, UPRR can be reasonably assured that it will have adequate	As discussed in comment response <u>BO09-31</u> 1488, the proposed project does not conflict with the Union Pacific Railroad's (UPRR's) ability to comply with FRA's Title 49 Code of Federal Regulations (CFR) Part 213. The commenter asserts that the proposed project constrains UPRR maintenance access to its right-of-way, but there is no compelling evidence provided to change the significance threshold. The Authority will design its right-of-way in accordance with Sections 3.1, 7, and 8 of the draft Engineering, Construction, and Maintenance Agreement. Through this process with UPRR, UPRR can be reasonably	Fixes an error

No.	Page	Paragraph or Section	Current Text	New Text	Explanation
			maintenance access to its right-of-way even in emergency situations necessitating a rapid response.	assured that it will have adequate maintenance access to its right-of-way even in emergency situations necessitating a rapid response.	

Table 1: Page 3.3-48, Table 3.3-7 errata fixes

Activities	VOC	CO			NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	
		Total	Fresno	Bakersfield					
<b>Year 2014</b>									
Final EIS	Emissions (tons/year)	16.86	104.03	27.67	26.95	380.80	0.63	42.66	13.40
	Exceeds SJVAPCD CEQA thresholds?	Yes	N/A	N/A	N/A	Yes	N/A	Yes	No
	Exceeds GC threshold?	Yes	N/A	No	No	Yes	No	No	No
Revision	Emissions (tons/year)	<del>16.86</del> 24.01	<del>104.03</del> 147.75	<del>27.67</del> 30.51	<del>26.95</del> 29.79	<del>380.80</del> 622.40	<del>0.63</del> 1.19	<del>42.66</del> 51.44	<del>13.40</del> 20.20
	Exceeds SJVAPCD CEQA thresholds?	Yes	N/A	N/A	N/A	Yes	N/A	Yes	<del>No</del> Yes
	Exceeds GC threshold?	Yes	N/A	No	No	Yes	No	No	No
<b>Year 2015</b>									
Final EIS	Emissions (tons/year)	36.69	289.42	72.31	62.12	617.99	1.17	67.63	30.85
	Exceeds SJVAPCD CEQA thresholds?	Yes	N/A	N/A	N/A	Yes	N/A	Yes	Yes

Activities		VOC	CO			NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
			Total	Fresno	Bakersfield				
	Exceeds GC threshold?	Yes	N/A	No	No	Yes	No	No	No
Revision	Emissions (tons/year)	<del>36.69</del> 42.78	<del>289.42</del> 328.45	<del>72.31</del> 74.79	<del>62.12</del> 64.59	<del>617.99</del> 818.30	<del>1.17</del> 1.73	<del>67.63</del> 75.12	<del>30.85</del> 36.47
	Exceeds SJVAPCD CEQA thresholds?	Yes	N/A	N/A	N/A	Yes	N/A	Yes	Yes
	Exceeds GC threshold?	Yes	N/A	No	No	Yes	No	No	No
<b>Year 2016</b>									
Final EIS	Emissions (tons/year)	32.27	256.37	65.63	57.37	500.73	0.88	60.47	27.22
	Exceeds SJVAPCD CEQA thresholds?	Yes	N/A	N/A	N/A	Yes	N/A	Yes	Yes
	Exceeds GC threshold?	Yes	N/A	No	No	Yes	No	No	No
Revision	Emissions (tons/year)	<del>32.27</del> 33.82	<del>256.37</del> 266.70	<del>65.63</del> 66.14	<del>57.37</del> 57.88	<del>500.73</del> 548.64	<del>0.88</del> 1.04	<del>60.47</del> 62.43	<del>27.22</del> 28.66
	Exceeds SJVAPCD CEQA thresholds?	Yes	N/A	N/A	N/A	Yes	N/A	Yes	Yes
	Exceeds GC threshold?	Yes	N/A	No	No	Yes	No	No	No