

## APPENDIX B: U.S. FISH AND WILDLIFE SERVICE BIOLOGICAL OPINION



# United States Department of the Interior



In Reply Refer to:  
08ESMF00-  
2012-F-0248-16

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

SEP 27 2019

Marck A. McLoughlin  
Director of Environmental Services  
California High-Speed Rail Authority  
770 L Street, Suite 620  
Sacramento, California 95814

Subject: Reinitiation of Formal Consultation on the California High-Speed Train System:  
Merced to Fresno Section Project, Merced, Madera, and Fresno Counties Biological  
Opinion (08ESMF00-2012-F-0248)

Dear Mr. McLoughlin:

This letter is sent to the California High-Speed Rail Authority (Authority) in its role as the federal lead agency under the National Environmental Policy Act (NEPA) and other federal laws. Pursuant to 23 U.S.C. 327, under the NEPA assignment Memorandum (MOU) between the Federal Railroad Administration (FRA) and the State of California, effective July 23, 2019, the Authority is the federal lead agency for environmental reviews and approvals for all Authority Phase 1 and Phase 2 projects. Under the MOU, the Authority has been assigned FRA's Endangered Species Act Section 7 (16 U.S.C. 1536) responsibilities for consultations (formal and informal) with respect to High-Speed Rail and other projects described in subpart 3.3 of the MOU.

Prior to the NEPA assignment MOU, when FRA was the lead agency for High-Speed Rail projects, the Authority, on behalf of FRA, sent letters to the U.S. Fish and Wildlife Service on August 8, 2018, and May 28, 2019. In those letters, the Authority requested reinitiation of formal consultation with the Service on the California High-Speed Train System: Merced to Fresno Section Project (CHST-MF Project), in Merced, Madera, and Fresno Counties, California. These requests were received by the Service on August 17, 2018, and June 3, 2019, respectively. At issue are revisions of effects on the following federally-listed species and critical habitats:

The federally-listed as endangered:

- San Joaquin kit fox (*Vulpes macrotis mutica*) (kit fox);
- Fresno kangaroo rat (*Dipodomys nitratoides exilis*) (FKR);
- giant kangaroo rat (*Dipodomys ingens*) (GKR);
- blunt-nosed leopard lizard (*Gambelia sila*) (lizard);
- Conservancy fairy shrimp (*Branchinecta conservatio*);
- vernal pool tadpole shrimp (*Lepidurus packardii*) (tadpole shrimp) and designated critical habitat;
- hairy Orcutt grass (*Orcuttia pilosa*);
- Greene's tuctoria (*Tuctoria greenae*);
- Palmate-bracted bird's-beak (*Corchylanthus palmatus*) (bird's-beak); and

- San Joaquin woollythreads (*Monolopia condonii*) (woollythreads).

and the federally-listed as threatened:

- giant gartersnake (*Thamnophis gigas*) (snake);
- Central California distinct population segment of the California tiger salamander (*Ambystoma californiense*) (salamander);
- valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) (beetle);
- vernal pool fairy shrimp (*Branchinecta lynchi*) and designated critical habitat;
- Colusa grass (*Neostapfia colusana*);
- San Joaquin Valley Orcutt grass (*Orcuttia inaequalis*);
- succulent owl's-clover (*Castilleja campestris* ssp. *succulenta*) (owl's-clover); and
- Hoover's spurge (*Chamaesyce hooveri*).

This response is provided under the authority of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act) and in accordance with the implementing regulations pertaining to interagency cooperation (50 CFR §402).

The Service previously issued the September 14, 2012 *Biological Opinion on the California High-Speed Train System: Merced to Fresno Section Project, Merced, Madera, and Fresno Counties* (Service File Number 08ESMF00-2012-F-0248) (2012 MF-BO). The 2012 MF-BO analyzed the CHST-MF Project's effects on federally-listed species under two design options, and incidental take was exempted only for Permitting Phase 1 of the project (PP1) at that time. Due to the Design/Build nature of the project, design refinements occur as construction progresses. In addition, acquisition of right-of-way provides access for surveys and updated habitat mapping. These changes in project description and effects to federally-listed species are addressed through reinitiation of formal consultation. We have previously amended or revised the 2012 MF-BO as follows:

- September 26, 2013: Clarification to Conservation Measures and Term and Condition 3 requested by the Authority.
- March 13, 2014: Added the Lazy K Ranch Mitigation Site (LKMS) project to the Project Description, evaluated the LKMS project's effects on federally-listed species, and updated habitat impacts within PP1 due to additional habitat assessment surveys.
- May 21, 2015: Evaluated design refinements at Avenue 13 in Madera County and in the vicinity of the Fresno River.
- April 12, 2016: Evaluated design refinements between Storey and downtown Fresno.
- June 16, 2016: Extended PP1 north to include overcrossings at Avenue 17 and Road 27.
- April 14, 2017: Extended PP1 north to Avenue 19 (North Extension) and evaluated minor design refinements, revised estimates of habitat loss, and impacts associated with the discovery of occupied hairy Orcutt grass habitat in 2016.
- February 22, 2018: Revised Conservation Measure 1 in order to clarify the approval process, roles, and responsibilities of biologists who directly implement the conservation measures.

The 2012 M-F BO presented two design options for the Central Valley Wye (CV-Wye) portion of the CHST M-F Project and analyzed conservative assumptions about the magnitude and nature of impacts resulting from construction and operation of the entire section. At that time, incidental take was exempted only for PP1, from the Fresno station north to Avenue 17 (later extended north to Avenue 19). The August 8, 2018 request addresses the selection of a preferred alternative for the CV-Wye, the State Route 152 (North) to Road 11 segment, including electrical interconnections and network upgrades, as well as the Ranch Road to Merced Variation (RR-M), which differs from the design previously proposed. In addition, the Conservation Measures proposed by the Authority have been modified for clarification and consistency among biological opinions and requirements of other regulatory agencies. The May 28, 2019 concerned project refinements on PP1 to include the abandonment and replacement of a water line, relocation of telecommunication lines, acquisition of eight single-family residential parcels, and modifications of the Tremaine Avenue and Road 27 intersection design.

#### *Fresno kangaroo rat*

The Service concurs with your determination that the proposed project is not likely to adversely affect the FKR. The proposed project reached the 'may affect' level, and the subsequent requirement for a biological assessment, due to the fact that portions of the proposed project occur within the historic range of the FKR and suitable habitat is present in the action area. There are currently no known populations of the FKR (Service 2010a); however, not all suitable habitat has been surveyed. Presence of the FKR within the limited suitable habitat in the action area is unlikely; however, because surveys have not been conducted in the action area, absence cannot be confirmed. Therefore, the Authority has proposed the following conservation measures:

**CM-FKR-1: Habitat Assessment.** Prior to the start of ground-disturbing activities, a Service-approved biologist will conduct a habitat assessment of areas in the project footprint that may support the FKR to determine the species potential presence based on the presence of their sign or burrows. The habitat assessment will be submitted to the Service for review and approval.

**CM-FKR-2: Exclusion Fencing along Perimeter of Project Footprint.** If no potential burrows or signs of kangaroo rats are detected and kangaroo rats are determined to be absent from the project footprint, but the footprint is bordered by potentially suitable habitat, the Service-approved biologist may install, maintain, and monitor exclusion fencing along the perimeter of the project footprint to ensure that no take of FKR or destruction of their potential habitat outside of the project footprint occurs.

**CM-FKR-3: Agency Notification.** In the unlikely event that FKR individuals, their burrows, or signs of them are found within the project footprint during the habitat assessment or relocation of GKR, the Service will be notified immediately and consultation will be reinitiated to identify appropriate conservation measures to be implemented for the FKR.

Due to the fact that no FKR populations are known to exist and the conservation measures proposed by the Authority, the Service believes that any potential adverse effects to the FKR from the CHST-MF Project are extremely unlikely to occur, and are therefore discountable for purposes of this consultation.

#### *Critical habitat for the vernal pool fairy shrimp and the vernal pool tadpole shrimp*

Critical habitat for the vernal pool fairy shrimp and the tadpole shrimp occurs within the LKMS project area. The Service has determined that the project, as proposed, may affect but is not likely to

adversely affect critical habitat for the vernal pool fairy shrimp or the tadpole shrimp based on the following:

1. Permanent destruction or alteration of the critical habitat is not expected to occur as a result of the LKMS project, as proposed;
2. Adverse effects to the Primary Constituent Elements (PCEs) that occur within the LKMS are not anticipated;
3. The effects from habitat restoration activities proposed are expected to be temporary and occur over a short duration (less than 3 months);
4. The habitat restoration proposed for the LKMS project will result in 16.76 acres of restored vernal pool habitat, and thus provide an increase in PCEs available for the vernal pool fairy shrimp; and
5. The LKMS project will provide 12.03 acres of preserved vernal pool habitat and 16.76 acres of vernal pool restoration to support breeding, feeding, and sheltering (PCEs) for the vernal pool fairy shrimp, and the Lazy K Mitigation Site will be protected and managed for the conservation of this species in perpetuity.

The remainder of this document provides our biological opinion on the effects of the proposed project on the kit fox, the GKR, the lizard, the snake, the salamander, the Conservancy fairy shrimp, the vernal pool fairy shrimp, the tadpole shrimp, the beetle, the hairy Orcutt grass, the Greene's tuctoria, the bird's-beak, the woollythreads, the Colusa grass, the San Joaquin Valley Orcutt grass, the owl's-clover, and the Hoover's spurge.

This biological opinion is based on:

- (1) *Draft Merced to Fresno Section Project EIR/EIS, Volume I Report*, dated August 2011;
- (2) *Draft Merced to Fresno Section Project EIR/EIS, Volume II: Technical Appendices*, dated August 2011;
- (3) *Draft Biological Resources and Wetlands Technical Report, Merced to Fresno Section Project EIR/EIS*, dated August 2011;
- (4) *Draft Wetlands Delineation Report, Merced to Fresno Section Project EIR/EIS*, dated August 2011;
- (5) *Draft Special Status Plant Survey Report, Merced to Fresno Section Project EIR/EIS*, dated August 2011;
- (6) *Draft Biological Assessment, Merced to Fresno Section Project EIR/EIS*, dated November 2011;
- (7) *Draft Biological Assessment Appendix B-Suitable Habitat for Branchiopods and Central California tiger salamander, Appendix C-Suitable Habitat for Valley Longhorn Elderberry Beetle, Merced to Fresno Section Project EIR/EIS*, dated October 2011;
- (8) *Draft Biological Assessment, Merced to Fresno Section*, dated November 2011;
- (9) *Supplemental Information on the Preferred Hybrid Alternative for the Merced to Fresno Section of the California High-Speed Train*, dated February 21, 2012;
- (10) *Memorandum: Response to Request for Supplemental Information for the Merced to Fresno (MF) Section of the California High-Speed Train Project*, dated February 29, 2012;
- (11) *Merced to Fresno Section Draft Landscape Permeability Plan (LPP)*, dated March 2012;
- (12) *Draft Merced to Fresno Section Mitigation Strategy and Implementation Plan (MSIP)*, dated March 2012 and updated July 2012;
- (13) site visit conducted on March 20, 2012;
- (14) *Project Description, Hybrid Alternative, Merced to Fresno Section*, dated April 2012;
- (15) *Memorandum: Dedicated Wildlife Crossings for the Merced to Fresno Section of the California High-Speed Train System*, dated April 13, 2012;
- (16) *USFWS Conservation Measures Matrix*, received on April 16, 2012;
- (17) *Additional Information Regarding the Cumulative Effects of Implementing the Merced to Fresno High-Speed Train Project*, received on April 16, 2012;
- (18) *Final California High-Speed Train Final Merced to Fresno Section Project EIR/EIS*, dated April 2012;

- (19) additional documents available to the Service, including the *Preliminary Alternatives Analysis Report, Merced to Fresno Section High-speed Train Project EIR/EIS*, dated April 2010; the *Supplemental Alternatives Analysis Report, Merced to Fresno Section High-speed Train Project*, dated August 2010 EIR/EIS; the *Final Bay Area to Central Valley High-Speed Train (HST) Program Environmental Impact Report/Environmental Impact Statement (EIR/EIS)*, dated May 2008 and revised in 2010; the *Bay Area to Central Valley High-Speed Train (HST) Revised Final Program Environmental Impact Report (EIR)*, dated August 2010; the *Final Program Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for the Proposed California High-Speed Train System*, dated August 2005; the *Fresno to Bakersfield Section California High-Speed Train Draft EIR/Supplemental Draft EIS*, dated August 2011; and the *Fresno to Bakersfield Section California High-Speed Train Revised Draft EIR/Supplemental Draft EIS*, dated July 2012;
- (20) the August 13, 2013 letter from the Authority suggesting clarification to Conservation Measures in the MF-BO;
- (21) *Biological Assessment Addendum for the Lazy K Ranch Permittee-Responsible Mitigation Component of the Merced to Fresno Section*, dated November 2013 (Lazy K BA);
- (22) *Merced to Fresno Section Permitting Phase I Impact Change Summary for San Joaquin kit fox*, *Technical Memorandum*, dated November 2013 (2013 SJKF TM);
- (23) *Merced to Fresno Section Permitting Phase I Aquatic and Upland Habitat Impacts for California Tiger Salamanders Technical Memorandum*, dated November 2013 (2013 CTS TM);
- (24) *Merced to Fresno Section Permitting Phase I Evaluation of Habitat for Vernal Pool Branchiopods*, *Technical Memorandum*, dated November 2013 (2013 VPB TM); and
- (25) *Merced to Fresno Section Permitting Phase I Special-Status Plant Sites-Specific Habitat Assessments for Succulent Owls-Cloven Hairy Orcutt Grass, and San Joaquin Valley Orcutt Grass*, *Technical Memorandum*, dated November 2013 (2013 Special-Status Plant TM);
- (26) *Permittee-Responsible Mitigation Plan for Onsite and Offsite Mitigation for Permitting Phase 1 of the Merced to Fresno Section*, dated November 2013 (2013 PRMP);
- (27) *Draft Permittee Responsible Mitigation Plan for Onsite and Offsite Mitigation for Permitting Phase 1 of the Merced to Fresno Section*, dated January 2014 (2014 Final PRMP);
- (28) *Supplemental technical memorandum for the USFWS on the California tiger salamander potential breeding habitat assessment for the HST (PPI) in Madera County, California*, dated March 3, 2014;
- (29) *Supplemental technical memorandum for the USFWS on the succulent owl's-clover, hairy Orcutt grass, and San Joaquin Valley Orcutt grass for the HST (PPI) in Madera County, California*, dated March 10, 2014;
- (30) *Permittee Responsible Mitigation Plan for Onsite and Offsite Mitigation for Permitting Phase 1 of the Merced to Fresno Section*, dated March 2014 (2014 Final PRMP);
- (31) *Merced to Fresno Section Permitting Phase 1 Project Description update: Ave 13 Design Refinement*, *Technical Memorandum*, dated January 2015;
- (32) *Merced to Fresno Section Permitting Phase 1 Evaluation of Habitat for Conservancy Fairy Shrimp*, *Technical Memorandum*, dated January 2015;
- (33) *Merced to Fresno Section Permitting Phase 1 Biological Assessment Addendum for Fresno River River Design Refinements*, *Technical Memorandum*, dated April 23 2015;
- (34) *Merced to Fresno Section Lazy K Ranch Mitigation Site California tiger Salamander Relocation Plan*, *Technical Memorandum (2015 Lazy K CTS Relocation Plan)*, dated February 2015;
- (35) *Merced to Fresno Section Permitting Phase 1 California tiger Salamander Relocation Plan*, *Technical Memorandum (2015 PP1 CTS Relocation Plan)*, dated February 2015;
- (36) *Merced to Fresno Section Permitting Phase 1 Project Description update: Biological Assessment Addendum for Storey to Fresno Design Refinements*, *Technical Memorandum*, dated June 19, 2015;
- (37) *Merced to Fresno Section Permitting Phase 1 Biological Assessment Addendum for Storey to Fresno Design Refinements*, *Technical Memorandum*, dated September 2015;
- (38) *Reinitiation of Formal consultation on the California High-Speed Train System: Merced to Fresno Section Project, Merced, Madera, and Fresno Counties (08ESMF00-2012-0248)*, dated April 12, 2016 ;
- (39) *Email from the Authority to the Service entitled "CAHSR CP1 BO Amendment No. 4 (08ESMF00-2012-0248)"*, dated April 27, 2016;

- (40) *Merced to Fresno Section Permitting Phase I Biological Assessment Addendum for Avenue 17 and Road 27 Overcrossings*, dated May 2016;
- (41) the March 29, 2017 letter requesting reinitiation of formal consultation and the enclosed March 2017 *Merced to Fresno Section CP1D Biological Assessment Addendum Technical Memorandum*, prepared by the Authority;
- (42) the April 4, 2017 email from the Authority providing clarifications regarding the proposed conservation measures;
- (43) the February 7, 2018 email from the Authority requesting a revision of Conservation Measure 1;
- (44) the August 8, 2018 letter requesting reinitiation of formal consultation with the enclosed April 2018 *Merced to Fresno Section: Central Valley Wye Final Biological Assessment*, prepared by the Authority;
- (45) the September 2018 *Merced to Fresno Section: Central Valley Wye Draft Supplemental Environmental Impact Report/Environmental Impact Statement*;
- (46) the October 29, 2018 letter from the Authority providing updated information on proposed compensatory habitat and conservation measures;
- (47) the May 28, 2019 letter and biological assessment detailing changes to impacts in the vicinity of Road 27;
- (48) meetings and email and telephone correspondence between representatives of the Service, the Authority, other regulatory agencies and consultants; and
- (49) and other information available to the Service.

### **Consultation History**

- December 1, 2011: The Service received the biological assessment and request for formal consultation for the CHST-MF Project from the FRA.
- February 15, 2012: The Service requested further information regarding the LPP, estimates of habitat loss and action area, conservation measures, effects analyses for federally-listed species, train operations, and mitigation during the weekly conference call with the Authority.
- February 21, 2012: The Authority submitted supplemental information regarding the Hybrid Alternative, particularly with a more focused analysis of effects of the Hybrid Alternative to federally-listed species and updated appendices for the biological assessment.
- February 29, 2012: The Authority submitted supplemental information to the Service in response to their February 15, 2012 email request.
- March 7, 2012: The Service provided our request for information and a set of example conservation measures to the Authority via email.
- March 9, 2012: The Authority submitted the Draft LPP to the Service.
- March 12, 2012: The Authority submitted the Draft MSIP to the Service.
- March 14, 2012: The Service participated in a meeting at the Sacramento Fish and Wildlife Field Office, Sacramento, California, with the Authority, California Department of Fish and Wildlife (CDFW; formerly, California Department of Fish and Game), AECOM, and CH2M HILL.

- March 15, 2012: The Service provided comments regarding the LPP and the MSIP to the Authority via email.
- March 16, 2012: The Service received some information from the CH2M HILL consultants via email.
- March 21, 2012: The Service participated in a site visit with the Authority, CDFW, AECOM, and CH2M HILL.
- March 27, 2012: The Service provided a checklist for information necessary for formal consultation and the *50 Code of Federal Regulations, Part 402, Interagency Cooperation-Endangered Species Act of 1973, As Amended* to the Authority via email.
- March 28, 2012: The Service participated in a meeting at the AECOM office, Sacramento, California, with the Authority, FRA, CDFW, AECOM, CH2M HILL, and URS, Inc.
- April 4, 2012: The Service participated in a meeting at the AECOM office, Sacramento, California, with the Authority, CDFW, CH2M HILL, and URS, Inc.
- April 5, 2012: The Service provided guidance regarding the LPP to the Authority via email.
- April 16, 2012: The Service received some of the requested information from the Authority via email.
- April 18, 2012: The Service provided clarification regarding our information requests to the Authority via email.
- April 19, 2012: The Service provided additional clarification regarding our information requests to the Authority via email. The Service participated in a conference call with the Authority and AECOM. The Service received requested information from the Authority via email.
- April 20, 2012: The Service received requested information from the Authority via email.
- April 24, 2012: The Service requested further information from the Authority via email.
- May 8, 2012: The Service received requested information from the Authority via email.
- July 18, 2012: The Authority provided additional information about kit fox conservation measures to the Service via email.
- December 2011 to August 2012: The Service participated in weekly conference calls and email correspondence with the FRA, Authority, CDFW, AECOM, and CH2M HILL.
- September 14, 2012: The Service issued a biological opinion to the FRA.
- September 26, 2013: The Service issued an amendment to the MF BO.

- November 12, 2013: The Service received the 2013 PRMP from the FRA/Authority via email.
- November 22, 2013: The Service received the request for reinitiation of formal consultation, the Lazy K BA, the 2013 SJKF TM, the 2013 CTS TM, the 2013 VPB TM, and the 2013 Special-Status Plant TM from the FRA/Authority via email.
- November 20, 2013 & January 8, 2014: The Service participated in a meeting with the Authority and ECORP Consulting, Inc. (ECORP) regarding the proposed LKMS project.
- February 1, 2014: The Service received the 2014 Final PRMP, dated January 2014, from the FRA/Authority via email.
- February 7, 2014 & February 12, 2014: The Service participated in a meeting with the Authority, ECORP, and CDFW regarding the proposed LKMS project.
- February 14, 2014 - February 19, 2014: The Service requested and received information from the Authority via email.
- February 25, 2014: The Service provided comments to the FRA/Authority regarding the 2014 PRMP and requested further information via email.
- March 6, 2014: The Service received responses from the FRA/Authority to our comments regarding the 2014, PRMP, dated March 2014, and the Inoculum Collection Memo via email.
- March 7, 2014: The Service received the *Supplemental technical memorandum for the USFWS on the California tiger salamander potential breeding habitat assessment for the HST (PPI) in Madera County, California*, dated March 3, 2014, via email from the FRA/Authority.
- March 10, 2014: The Service received the Final 2014 PRMP and the *Supplemental technical memorandum for the USFWS on the succulent owl's-clover, hairy Orcutt grass, and San Joaquin Valley Orcutt grass for the HST (PPI) in Madera County, California*, dated March 10, 2014 from the FRA/Authority via email.
- November 2013 - March 2014: The Service participated in weekly conference calls and email correspondence with the FRA, the Authority, and ECORP.
- March 13, 2014: The Service issued an amendment to the MF-BO.
- October 21, 2014: The Service received the letter from the FRA and the Authority, via email, regarding notification to the Service of project-related activities that occurred outside of the project footprint of PP1 analyzed in the 2012 MF-BO.
- January 23, 2013: The FRA and the Authority requested reinitiation of section 7 consultation for changes to the project description that would alter the amount of habitat that would be permanently lost for the Conservancy fairy shrimp.
- January 26, 2015: The Service sent a letter to the FRA and the Authority regarding our response to the October 21, 2014, letter and non-compliance issues.

- February 10, 2015: The Service participated in a meeting with the FRA and the Authority to discuss the issues addressed in our January 26, 2015, letter.
- February 19, 2015: The Service participated in a meeting with the FRA and the Authority to discuss the overall status of the PP1 construction package, the status of any Environmental Studies that were to be completed after the Record of Decision, the process for design changes and permit modifications, and compliance monitoring and reporting issues. The FRA and the Authority submitted the 2015 Lazy K CTS Relocation Plan and the 2015 PP1 CTS Relocation Plan via email correspondence.
- February 26, 2015: The Service approved the 2015 Lazy K CTS Relocation Plan and the 2015 PP1 CTS Relocation Plan via email correspondence to the FRA and the Authority.
- March 4, 2015: The Service received a request for reinitiation of section 7 consultation, via email, for changes to the project description that resulted from project-related activities that occurred outside of the project footprint of PP1.
- April 24, 2015: The Service received the letter from the FRA and the Authority requesting reinitiation of section 7 consultation for changes to the project description that resulted from project-related activities that occurred outside of the project footprint of PP1 and design refinements that result in revised habitat loss estimates.
- April 28, 2015: The Service participated in a meeting with the FRA and the Authority to discuss proposed schedule of reinitiation packages.
- May 21, 2015: The Service issued an amendment to the MF-BO.
- July 15, 2015: The Service received the draft *Merced to Fresno Section Permitting Phase 1 Project Description update: Biological Assessment Addendum for Storey to Fresno Design Refinements, Technical Memorandum*, dated June 19, 2015, via email correspondence, for our review.
- September 25, 2015: The Service received the letter from the FRA and the Authority requesting reinitiation of section 7 consultation for changes to the project description that resulted from project-related activities that occurred outside of the project footprint of PP1 and design refinements that result in revised habitat loss estimates, along with the final *Merced to Fresno Section Permitting Phase 1 Biological Assessment Addendum for Storey to Fresno Design Refinements, Technical Memorandum*, dated September 2015.
- April 12, 2016: The Service issued an amendment to the MF-BO.
- April 27, 2016: The Service received an email from the Authority notifying the Service that an error was discovered in the total acreage impacts in the *Reinitiation of Formal Consultation on the California High-Speed Train system: Merced to Fresno Section Project, Merced, Madera, and Fresno Counties*, dated April 16, 2016.

- May 2, 2016: The Service received the letter from the FRA and the Authority requesting reinitiation of section 7 consultation for changes to the project description that resulted from design refinements that result in revised habitat loss estimates, along with the final *Merced to Fresno Section Permitting Phase I Biological Assessment Addendum for Avenue 17 and Road 27 Overcrossings Design Refinement, Technical Memorandum*, dated May 2, 2016.
- June 16, 2016: The Service issued an amendment to the MF-BO.
- March 29, 2017: The Service received the March 29, 2017 letter from the Authority requesting reinitiation of formal consultation with the March 2017 *Merced to Fresno Section CP1D Biological Assessment Addendum Technical Memorandum* enclosed.
- April 4, 2017: The Service received an email from the Authority clarifying the proposed conservation measures.
- April 14, 2017: The Service issued an amendment to the MF-BO.
- February 22, 2018: The Service issued a revision to the MF-BO.
- August 17, 2018: The Service received the August 8, 2018 letter from the Authority requesting reinitiation of formal consultation to exempt take for the Central Valley Wye portion of the CHST M-F Project.
- October 29, 2018: The Service received the October 29, 2018, letter from the Authority, including a summary of proposed compensatory habitat and updated conservation measures.
- December 14, 2018: The Service received additional information requested by the Service in order to complete the reinitiation request.
- June 3, 2019: The Service received the May 28, 2019, request from the Authority for design modifications to the Road 27 area for the PP1 portion of the CHST M-F Project.

## **BIOLOGICAL OPINION**

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

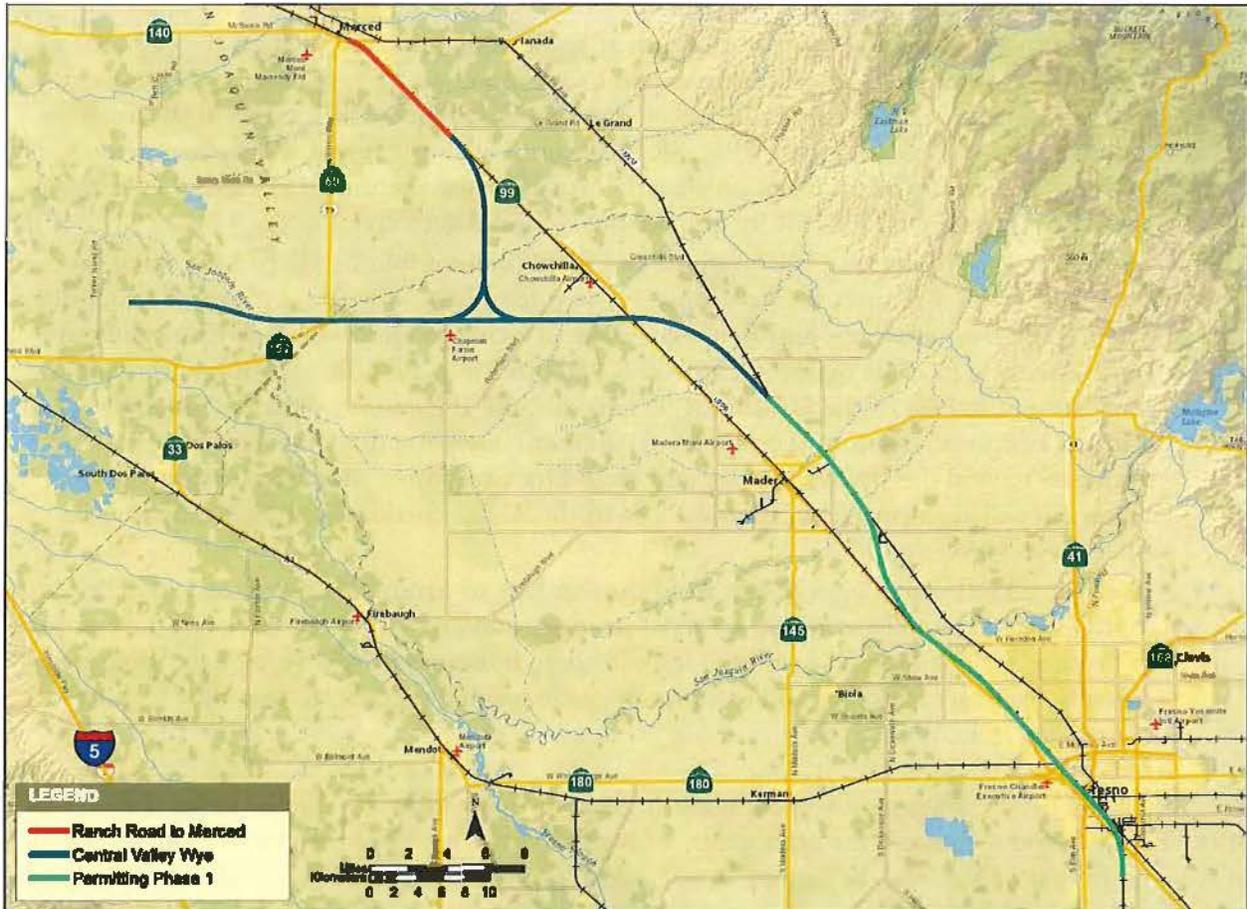
#### *Project overview*

The proposed project consists of construction and operation of a rail line to support an inter-city High-Speed Train (HST) from Merced to Fresno. The State of California proposes to build an HST System to connect the major population centers of the San Francisco Bay Area with the Los Angeles metropolitan region. The HST System is envisioned as an electrically powered, high-speed, steel-wheel-on-steel-rail technology with state-of-the-art safety, signaling, and automated train-control systems. The trains will be capable of operating at speeds of up to 220 miles per hour (mph) over a fully grade-separated, dedicated track alignment.

The Hybrid Alternative of the Merced to Fresno Section alignment of the HST originally proposed will generally parallel the Union Pacific Railroad (UPRR) Railway in the north and the Burlington Northern Santa Fe (BNSF) Railway in the south (Figure 1). HST stations are proposed for both the

City of Merced and the City of Fresno. The alignment will begin at the HST station in downtown Merced, on the west side of the UPRR right-of-way.

**Figure 1. Proposed High-Speed Train: Merced to Fresno Section.**



South of the Merced Station, the alignment extends approximately 7.5 miles from G Street to Ranch Road. This RR-M portion is primarily at-grade or on embankment, with the exception of three aerial structures over watercourses, 1.15 miles of retained-cut construction, and 0.11 mile of cut-and-cover tunnel. The proposed project includes the permanent closure of seven public roadways and the construction of three overcrossings in lieu of closure. The alignment will pass under East Mission Avenue, Childs Road, and State Route (SR) 99 through cut-and-cover tunnel. Local roads paralleling the proposed alignment may be shifted and reconstructed to maintain their function.

South of Ranch Road is the CV-Wye portion of the section, where trains will transition between the Merced to Fresno Section and the future San Jose to Merced Section. The wye configuration will be located west-southwest of the city of Chowchilla, with the east-west axis along the north side of SR 152 and the north-south axis on the east side of Road 11. The CV-Wye includes approximately 51 miles, mostly at-grade on raise embankment, with some aerial structures. Beginning in Merced County at the intersection of Henry Miller Road and Carlucci Road, the CV-Wye will continue at-grade on embankment east toward Elgin Avenue., where it will curve southeast. Approaching Willis Road, the alignment will rise to cross the San Joaquin River on an aerial structure, return to embankment, then cross the Eastside Bypass on an aerial structure. It will then continue east, crossing SR 59 at-grade just north of the existing SR 152/SR 59 interchange, which will be reconstructed to the south. In order to create a grade-separated crossing, SR 59 will be raised to

span over the HST. The alignment will continue east at-grade along the north side of SR 152 towards Chowchilla, splitting into two legs (four tracks) near Road 10, crossing Ash Slough on an aerial structure. All but the northbound track of the San Jose to Merced leg will return to at-grade embankment; the northbound track will rise to cross over the tracks of the San Jose to Fresno leg on an aerial structure as it curves north towards Merced. The legs will be routed as follows:

- The San Jose to Merced leg will turn north at-grade and continue north on the east side of Road 11, crossing the Chowchilla River and then over Road 11 to its west side. Returning to grade, the alignment will curve northwest, crossing Dutchman Creek on an aerial structure, following the west side of the UPRR/SR 99 corridor. The alignment will continue north, crossing over Sandy Mush Road on an aerial structure, then return to grade and continue on the west side of the UPRR/SR 99 to meet the Hybrid Alternative at Ranch Road.
- The San Jose to Fresno leg will continue east from the wye split near Road 10, along the north side of SR 152 toward Chowchilla. It will primarily be at-grade, with aerial structures over several road crossings and Berenda Slough. The leg will pass south of Chowchilla at-grade, then rise to cross over the UPRR/SR 99 corridor and Fairmead Boulevard on an aerial structure. East of the UPRR/SR 99 corridor, the alignment will extend at-grade through Fairmead, north of Avenue 23. At approximately Road 20, the leg will curve southeast toward the BNSF corridor and cross Dry Creek on a short aerial structure. The alignment will align parallel to the west side of the BNSF corridor as it meets the Hybrid Alternative at Avenue 19.
- The Merced to Fresno leg will split from the San Jose to Fresno leg near Road 13. The southbound track will ascend on an aerial structure and cross over the tracks of the San Jose to Fresno leg. The Merced to Fresno leg will curve northwest, rise on a high embankment crossing over several roads, and continue at-grade on embankment to join the San Jose to Merced leg near Avenue 25.

The Merced to Fresno alignment will continue at grade through agricultural areas along the west side of the BNSF corridor through the community of Madera Acres north of the city of Madera. South of Avenue 15 east of Madera, the alignment will transition toward the UPRR corridor, following the east side of the UPRR corridor near Avenue 9 south of Madera, then cross the San Joaquin River before entering Fresno. After crossing the San Joaquin River, the alignment will rise over the UPRR Railway on an elevated guideway, supported by straddle bents, before crossing over the existing Herndon Avenue and descending into an at-grade profile and continuing west of and parallel to the UPRR right-of-way.

South of Golden State Boulevard, the alignment will be constructed at grade and cross under the reconstructed Ashlan Avenue and Clinton Avenue overhead structures. Advancing south from Clinton Avenue between Clinton Avenue and Belmont Avenue, the HST guideway will run at grade adjacent to the western boundary of the UPRR right-of-way. The HST guideway will descend in a retained cut to pass underneath the San Joaquin Valley Railroad spur line and SR 180, transition back to being at grade before Stanislaus Street, and continue at grade into the station in downtown Fresno. The Mariposa Street station has been identified as the preferred HST station location in Fresno.

The physical elements of the Merced to Fresno Section will include trainsets, at-grade track and elevated track, road crossings, HST stations (the Merced Station and the Fresno Station), the electrical system and associated facilities (including substations, switching stations, and paralleling stations) that power the train, control and maintenance facilities, the maintenance-of-way facility, access control systems, and potentially one Heavy Maintenance Facility (HMF). A location for the

HMF has not yet been selected. However, impacts associated with five alternative HMFs within the CHST-MF Project study area were studied in detail in the Final EIR/EIS for the CHST-MF Project, including supporting technical documents. The HMF alternative with the greatest potential impacts to habitat for federally listed species was identified for the purposes of the Service's jeopardy evaluation.

The HST System will be designed for the operation of trainsets ranging from 8 to 16 cars that are 9 to 11 feet wide and 660 to 1,320 feet long and designed to operate at a top speed of 220 mph. The current design preference is for a single-level train. The Merced to Fresno Section of the California HST Project will consist of a fully dedicated rail line, constructed from continuous welded steel rail. The Merced to Fresno Section will use four different track profiles: (1) Tracks that are near-the-ground tracks in open areas (i.e., "at grade"); (2) Tracks that are at-grade in constrained areas or transitioning to elevated (i.e., "retained fill"); (3) Tracks that are below-grade (i.e., "retained cut"); and (4) Tracks that are supported by piers or straddle bents (i.e., "elevated track"). The types of bridges that may be installed include multiple short span structures or full channel spans for the smaller natural water courses, while utilizing box culverts or pipes for canals or minor drainage features. The larger river crossings will utilize longer spans, which are limited to the piers within the ordinary high-water channel. The various track profiles are described in Table 1.

**Table 1. Track Profiles**

Design Feature	Hybrid <sup>a</sup>	CV-Wye <sup>a</sup>
<b>Total length (linear miles)</b>	75	51
At-grade profile (linear miles)	60	46.5
Elevated profile <sup>b</sup> (linear miles, including retained fill)	15	4.5
Number of straddle bents <sup>c</sup>	55	27
Number of railroad crossings	6	1
Number of water crossings	113	13
Approximate number of road closures <sup>d</sup>	49	33
Number of roadway overcrossings	48	24
<sup>a</sup> The Hybrid Alternative included two Design Options for a portion of the CV-Wye. In addition, the CV-Wye extends farther west than what was evaluated in the 2012 M-F BO. Therefore, these columns cannot be totaled. <sup>b</sup> Lengths shown are based on equivalent dual-track alignments. For example, the length of single-track elevated structure will be divided by a factor of 2 to convert to dual-track equivalents. <sup>c</sup> The number of straddle bents was estimated by dividing the preliminary structural span lengths by 100 feet, the assumed spacing between columns/bents. Actual structural configuration would be determined during design. <sup>d</sup> Includes public and private road closures.		

At-grade track profiles are best suited in areas where the ground is relatively flat, as in the Central Valley, and in rural areas where interference with local roadways is less. Where the rail line is at grade, the track will be built on compacted soil and ballast material (a thick bed of angular rock) to prevent subsidence or changes in the track surface from soil movement. For at-grade track, 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 sometimes wildlife movement.

Retained-cut profiles are used when the rail alignment crosses under existing roads or highways that are at grade. This profile type is only used for short distances in highly urbanized and constrained situations. In some cases, it is less disruptive to the existing traffic network to depress the rail profile under these crossing roadways. Retaining walls will typically be needed to protect the adjacent properties from a cut slope extending beyond the rail guideway. Retained-cut profiles may be used

for roads or highways when it is more desirable to depress the roadway underneath an at-grade HST alignment, which may be at grade on either side.

Elevated profiles can be used in urban areas where extensive road networks must be maintained. An elevated profile must have a minimum clearance of approximately 16.5 feet over roadways and 23.5 feet over railroads. Pier supports will typically be approximately 10 feet in diameter at the ground. These types of structures may also be used to cross water bodies; even though the trackway might be at grade on either side, the width of the water channel could require a bridge at the same level, which will be built in the same way as an elevated profile.

When the HST elevated profile crosses over a roadway or a railway on a very large skew (degree of difference from the perpendicular), a straddle bent ensures that the piers are outside the roadway or railway right-of-way. A straddle bent is a pier structure that spans (or “straddles”) the functional/operational right-of-way limit of a roadway, highway, or railway. Typical roadway and highway crossings that have a smaller skew angle (i.e., the crossing is nearly perpendicular) generally use intermediate piers in medians and span the functional right-of-way. However, for large-skew-angle crossing conditions, median piers will result in excessively long spans that are not feasible. Straddle bents that clear the right-of-way can be spaced as needed (typically 110 feet apart) to provide feasible span lengths for bridge crossings at large-skew angles.

The Merced to Fresno Section consists of a fully grade-separated and access-controlled guideway in order to maintain local traffic and agricultural access. Unlike existing passenger and freight trains in the project vicinity, there will be no at-grade road crossings in this section, and the HST System will not share its rails with freight trains. There are numerous roadway and State route facilities that currently cross at grade with or over the UPRR and BNSF railroad tracks that may be grade-separated over both the HST and the railroad. Similar conditions occur when an at-grade HST alignment crosses rural roads adjacent to farmland. These overcrossings will generally occur approximately every 2 miles to provide continued mobility for local residents and farm operations.

California’s electricity grid will power the HST System. According to the FRA and the Authority, although the HST System would result in increased electricity demand, it would reduce the energy demands from automobile and airplane travel, resulting in an overall beneficial effect on statewide energy use. The Merced to Fresno Section will not include construction of separate power sources, although the extension of power lines existing power substations positioned along the HST project corridor will be included to even out the power feed to the HST System.

The Overhead Catenary System (OCS) will consist of a series of mast poles approximately 23.5 feet higher than the top of rail, with contact wires suspended from the mast poles between 17 to 19 feet from top of rail. The train will have an arm, called a pantograph, to maintain contact with this wire to provide power to the train. The mast poles will be spaced approximately every 200 feet along straight portions of the track down to every 70 feet in tight-turn track areas. The OCS will be connected to the substations described below, required at approximately 30-mile intervals. Statewide, the power supply will consist of a 2-by-25-kilovolt (kV) overhead contact system for all electrified portions of the system.

Based on the HST System’s estimated power needs, Traction Power Substations (TPSSs) will each need to be approximately 32,000 square feet (200 feet by 160 feet) and located at approximately 30-mile intervals. TPSSs will accommodate the power supply stations and require a substantial buffer area around them for safety purposes. The TPSS could be screened from view with a wall or fence. Each TPSS site will have a 20-foot-wide access road (or easement) from the street access point to

the protective fence perimeter at each parcel location. Each site will require up to a 2-acre parcel. Each substation will include an approximately 450-square-foot control room.

Switching and paralleling stations work together to balance the electrical load between tracks, and to switch power off or on to either track in the event of an emergency. Switching stations will be required at approximately 15-mile intervals, midway between the TPSSs. These stations will need to be approximately 9,600 square feet (120 feet by 80 feet). Paralleling stations will be required at approximately 5-mile intervals between the switching stations and the TPSSs. The paralleling stations will be approximately 8,000 square feet (100 feet by 80 feet). Each station will include an approximately 450-square-foot (18 feet by 25 feet) control room. TPSS, switching stations, and paralleling stations are included in the design as appropriate.

During normal system operations, power will be provided by the local utility service and/or from the TPSS. Should the flow of power be interrupted, the system will automatically switch to a back-up power source, through use of an emergency standby generator, an uninterruptable power supply, and/or a DC battery system. For the Merced to Fresno Section, permanent emergency standby generators are anticipated to be located at passenger stations and at the HMF, and terminal layup/storage and maintenance facilities.

Signaling and train control elements include small signal huts/bungalows within the right-of-way that house signal relay and microprocessor components, cabling to the field hardware and track, signals, and switch machines on the track. These will be located in the vicinity of track switches, and will be grouped with other power, maintenance, station, and similar HST facilities where possible.

The CV-Wye portion of the Merced to Fresno Segment includes three sites for electrical interconnection and network upgrade (EINU). For Site 6-El Nido, interconnection facilities will include a 115 kV TPSS located at the northwest quadrant of the intersection of SR 152 and Lincoln Road and occupying approximately 2 acres, an approximately 2.5-mile long, 115 kV tie-line connecting the Site 6 TPSS to the El Nido Substation and constructed on approximately twenty-five 60-75 foot-tall tubular steel poles along the west side of Lincoln Road, and an approximately 2.5-mile-long fiber optic cable trenched underground between the Site 6 TPSS and the El Nido Substation.

For Site 7-Wilson, interconnection facilities will include a 230 kV TPSS and an approximately 2.3-mile double-circuit 230 kV transmission line to the Wilson Substation. New conductors will be installed on new self-supporting lattice steel towers. Beneath this 230 kV transmission line, an approximately 2.3-mile-long fiber optic cable will be trenched underground. To support this interconnection, the existing Wilson Substation will be reconfigured to a 4-Bay Breaker-and-a-Half within the existing fence line.

For Site 8-Storey, interconnection facilities will include an expansion of the Storey Substation by approximately 3.0 acres, and reconductoring of approximately 6.2 miles of the Borden-Gregg 230 kV No. 1 and No. 2 transmission line

### *Heavy Maintenance Facility*

California's HST System includes three types of maintenance facilities (maintenance-of-way facilities, a heavy maintenance facility, and an operations control center). Each section will have maintenance-of-way facilities. A number of overnight layover and servicing facilities will be distributed throughout the HST System. In addition, the HST System will have a single HMF.

Maintenance-of-way facilities will provide for equipment, materials, and replacement parts storage, and support quarters and staging areas for the HST System subdivision maintenance personnel. Each subdivision will cover about 150 miles; the maintenance-of-way facility will be centrally located in the subdivision, no more than 75 miles in each direction. For the Merced to Fresno Section, the maintenance-of-way facility will be co-located with the HMF.

The maintenance-of-way facility will sit on a linear site adjacent to the HST tracks with a maximum width of two tracks, and will be approximately 0.75 mile long for a total size of 26 acres. The track will be approximately 1,600 feet long, will not have electric power, and will be connected to the main line. Access by road for work crews will be required, along with enough space to park work crew vans while working from the site and to drive the length of the track. The track and access area will be within the fenced and secure area of the HST line.

An HST rail heavy vehicle maintenance and layover facility, otherwise known as the HMF, may be located in the Merced to Fresno Section. However, the location of an HMF in this section will be determined by the San Jose to Merced and Fresno to Bakersfield Sections. The HMF alternative within the CHST-MF Project area with the greatest potential impacts to federally listed species will occupy 392 acres with space for all activities associated with train fleet assembly, disassembly, and complete rehabilitation; all on-board components of the trainsets; and overnight layover accommodations and servicing facilities. The site will include a maintenance shop, Operations Control Center building, one traction power substation, other support facilities, and a train interior cleaning platform.

The HMF will have two functions. First, it will support train arrival, assembly, testing, and commissioning to operations. Second, it will become the State's system-wide heavy maintenance workshop. The HMF will support the following functions:

1. **Assembly, Testing, and Commissioning:** During the pre-revenue service period, the HMF will be used for the assembly, testing, acceptance, and commissioning of the HST System's new trains. Implementation of the testing, acceptance, and commissioning activities will require a mainline test track between 80 and 105 miles in length, connected directly to the HMF. This will also accommodate the equipment decommissioning or retirement of equipment from the system to make way for the future generations of trains.
2. **Train Storage:** Some trains will be stored at the HMF prior to the start of revenue service.
3. **Service Monitoring:** Service monitoring will include daily train testing and diagnostics of certain safety sensitive apparatus on the train in addition to automatic on-board and on-ground monitoring devices.
4. **Examinations in Service:** Examinations will include inspections, tests, verifications, and "quick" replacement of certain train components on the train. Examples include inspection and maintenance tasks associated with the train's running gear, bogies, underbody elements, and pantographs.
5. **Inspection:** Periodic inspections will be part of the planned preventive maintenance program requiring specialized equipment and facilities. Examples include examination of interior fittings and all train parts, passenger environment, in-depth inspection of axles and underbody components critical to train safety, and/or wheel condition diagnostics and re-profiling (wheel truing).
6. **Rolling Stock Modifications and Accident Repair:** Rolling stock modifications and accident repair will include major design modifications for improving safety, reliability, and passenger comfort.
7. **Overhaul:** Part of planned lifecycle maintenance program, overhauls require a specialized heavy maintenance shop with specific heavy-duty equipment. Activities will include complete

overhaul of train components. Overhauls will be completed on each trainset every 7 to 10 years (30 days per trainset) and mid-life overhauls will be performed on each trainset every 15 to 20 years (45 days per trainset).

A single, gated entry will control access to the HMF. A two-way, 24-foot-wide circulation road will follow the facility's interior perimeter and a 50-foot-wide asphalt apron will surround the main shop building to provide emergency vehicles access to the structure. About 1,200 to 1,500 employees may be accommodated during peak shifts, including overlapping personnel departures and arrivals. The HMF will require parking for approximately 1,200 vehicles based on an estimate of 80 percent automobile share, and assuming 20 percent of employees will use public transportation or ride-share. In addition, up to 150 parking spaces near the facility will be available for management and administrative personnel, visitors, deliveries, and parking. Some crew, rolling stock preparation personnel, and train yard employees will park their vehicles near the yard tracks. Thus, the plan will include spaces for approximately 50 crew, 50 rolling stock preparation personnel, and 150 yard support employees at full build-out. A pedestrian bridge over the train yard tracks will connect the employee parking lot to the main shop building.

The HMF may house the Operations Control Center on the second floor, and will provide space for employee parking, pedestrian access/egress, and appropriate bathroom and lunchroom facilities. Housing the Operations Control Center in the HMF will minimize costs and impacts because it will not increase the HMF's footprint or require a separate building. If not housed on the HMF site, the Operations Control Center will be housed in an office building where adequate and reliable electronic data connections could be provided for up to 200 employees.

### *Stations*

Stations are sited and designed to allow for connection to local transit, airports, and highways; to maximize the use of existing transportation corridors and rights-of-way; and to develop a practical and economically viable transportation system. The stations contain the following elements:

1. Station buildings of 40,000 to 60,000 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 handling areas.
2. Parking structures of 5.5 to 7.5 acres in Merced and Fresno.
3. Waiting areas and queuing space for taxis and shuttle buses.
4. Pedestrian connections.

The Downtown Merced and Downtown Fresno station areas will each occupy several blocks, to include station plazas, drop-offs, a multimodal transit center, and parking structures. The areas will include the station platform and associated building and access structure, as well as lengths of platform tracks to accommodate local and express service at the stations. Both the Downtown Merced and Downtown Fresno stations will be at grade, including all trackway and platforms, passenger services and concessions, and back-of-house functions.

The Downtown Merced Station will be between Martin Luther King Jr. Way to the northwest and G Street to the southeast, approximately 7 blocks west of the existing Amtrak station. The station will be accessible from both sides of the UPRR, but the primary station house will front 16th Street. The major access points from SR 99 include V Street, R Street, Martin Luther King Jr. Way, and G Street. Primary access to the parking facility will be from West 15th Street and West 14th Street, just one block east of SR 99. The closest access to the parking facility from the SR 99 freeway will be R Street, which has a full interchange with the freeway. The site proposal includes a parking

structure that will have the potential for up to 6 levels with a capacity of approximately 2,250 cars and an approximate height of 50 feet.

The Mariposa Street Station will be located in Downtown Fresno, less than 0.5 mile east of SR 99. The station will be centered on Mariposa Street and bordered by Fresno Street on the north, Tulare Street on the south, H Street on the east, and G Street on the west. The station building will be approximately 75,000 square feet, with a maximum height of approximately 60 feet. The two-level station will be at-grade, with passenger access provided both east and west of the HST guideway and the UPRR tracks, which will run parallel with one another adjacent to the station. Entrances will be located at both G and H Streets. The eastern entrance will be at the intersection of H Street and Mariposa Street, with platform access provided via the pedestrian overcrossing. The main western entrance will be located at G Street and Mariposa Street.

The station and associated facilities will occupy approximately 18.5 acres, including 13 acres dedicated to the station, bus transit center, surface parking lots, and passenger drop-off areas. A new intermodal facility will be included in the station footprint on the parcel bordered by Fresno Street to the north, Mariposa Street to the south, Broadway Street to the east, and H Street to the west. The site proposal includes the potential for up to three parking structures occupying a total of 5.5 acres. Two of the three potential parking structures will each sit on two acres, and each will have a capacity of approximately 1,500 cars. The third parking structure will have a slightly smaller footprint (1.5 acres), with 5 levels and a capacity of approximately 1,100 cars. Surface parking lots will provide approximately 300 additional parking spaces.

#### *Project roadway modifications*

Project roadway modifications will have varying right-of-way (widths) and extent from the HST right-of-way and will include the following:

1. New two-lane overcrossings over the HST right-of-way.
2. Shift of frontage roads (two to four lanes, with shoulders) that parallel the HST right-of-way.
3. Shift of SR 99 two-lane overcrossings and interchanges and associated two-lane roadway connections.
4. Shift of SR 99 between Clinton Avenue and Ashlan Avenue (six lanes) and one new interchange.

#### *Project construction footprint*

The HST Project will require acquisition of property necessary for project operation. When the remnant portion of an acquired parcel beyond the right-of-way is too small to sustain current use without other modifications, it will also be acquired. These remnant parcels have been considered a part of the construction footprint, or the total area disturbed during construction and by building the project because they could be used for construction staging. The construction footprint or project footprint refers to the entire area of potential permanent impacts associated with the project, including construction, construction staging, and built facilities, such as the track, the stations, electrical facilities, road modifications, crossings, and the HMF sites.

The construction footprint for the Merced to Fresno Section includes staging, laydown, and casting yards for fabrication of the piers or columns for elevated portions of the alignment. All construction staging areas for storage of equipment and materials have been considered directly impacted. If staging areas are needed outside the construction footprint, the Authority or its contractors will be responsible for obtaining all necessary environmental permits. As described in conservation measure

3 below, if the contractor needs to establish a temporary staging area near the San Joaquin River, it will be located at least 50 feet from the channel in order to minimize impacts on the riparian corridor.

If the pre-cast span method is used to build the concrete bridge spans associated with elevated sections, casting yards will be required. Casting yards will be located in the construction footprint. The HST construction area will be fenced and secured. Construction access roads must be inside the construction footprint and will be designed and/or maintained for dust control.

Some disposal of earth unsuitable for reuse in construction (e.g., expansive clays and organic materials) is anticipated. Because the project area is predominantly flat and does not contain geographic barriers, extensive excavation and material removal is not anticipated. The material unsuitable for reuse will be hauled off site to a permitted landfill or sold as fill for another project.

#### *Preconstruction activities*

During final design phase, 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 pre-casting yards which will be needed for the casting, storage, and preparation of pre-cast concrete segments, temporary spoil storage, workshops, and the temporary storage of delivered construction materials. Field offices and/or temporary job-site trailers will also be located at the staging areas. Construction staging will use the areas within the construction footprint. For example, staging areas may be placed at the future locations of the HST maintenance yards or other facilities. Additional staging areas may be located within other identified parcels within the construction footprint at various points along the HST right-of-way, chosen in part for their easy access to the local road network and highways. As described in conservation measure 3 below, if the contractor needs to establish a temporary staging area near the San Joaquin River, the staging area will be located at least 50 feet from the riparian corridor in order to minimize impacts on the riparian corridor.
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. Initiating utility relocations, where the contractor will work with the utility companies to relocate or protect in place high-risk utilities such as overhead tension wires, pressurized transmission mains, oil lines, fiber 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. Locating temporary batch plants, which will be required to produce Portland cement concrete (PCC) or asphaltic concrete (AC) needed for roads, bridges, aerial structures, retaining walls, and other large structures. The facilities 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*

Major construction activities anticipated for the Merced to Fresno Section include earthwork; bridge and aerial construction; road crossing construction; at-grade construction; construction of elevated structures; construction of elevated structures at the San Joaquin River; railroad systems construction; and station construction.

**Earthwork:** Earth support is an important factor in constructing 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. There are three general excavation support categories, which 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, taking into account the natural repose angle of adjacent ground material and global stability.
2. **Temporary:** Temporary excavation support structures are designed and installed to support vertical or near vertical faces of the excavation in areas where room to open-cut does not exist. This structure does not contribute to the final load carrying capacity of the tunnel or trench structure and is either abandoned in place or dismantled as the excavation is being backfilled. This construction component may consist of soldier piles and lagging, sheet piles, slurry walls, secant piles, or tangent piles.
3. **Permanent:** Permanent structures are designed and installed to support vertical or near vertical faces of the excavation in areas where room to open-cut does not exist. This structure forms part of the permanent final structure, and may consist of slurry walls, secant piles, or tangent pile walls.

**Bridge and Aerial Structure Construction:** Similar to existing high-speed rail systems around the world, it is anticipated that the elevated guideways will be designed and built using pre-fabricated elements such as single-cell pre-cast-prestressed concrete box span-by-span segmental girder construction. Where needed, other structural types will be considered and used, including steel plate and box girders, steel trusses, various cast-in-place concrete (both reinforced and prestressed), and cable-supported structures.

1. **Foundations:** A typical aerial structure foundation pile cap is supported by an average of four large-diameter piles with diameters ranging from 5 to 9 feet. Commonly referred to as drilled shafts, they are holes drilled to the design depth and filled with reinforced concrete. Depth of piles depends on geotechnical site conditions. Pile construction can be achieved by using rotary drilling rigs, and either bentonite or synthetic slurry along with temporary steel pipe casings may be used to stabilize pile shaft excavation. The estimated pile production rate varies with the diameter and depth of the drilled hole, with an estimate of 3 to 4 days per pile

for installation of the larger diameter elements. 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.

2. For pile caps constructed near existing structures such as railway, bridges, and underground drainage culverts, temporary sheet piling (i.e., temporary walls) may be used to minimize disturbances to adjacent structures. It is anticipated that sheet piling installation and extraction may be accomplished using vibratory pile driving equipment where impact driving will affect adjacent facilities or sensitive resources.
3. Substructure: Aerial structures with pier heights ranging from 20 to 90 feet may be constructed using conventional slip 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. Each 12 feet increment of pour height may be completed over a three-day cycle.
4. The final size and spacing of the piers will depend upon the type of superstructure and spans they will support.
5. 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, balanced cantilever, etc. Where structures will be constructed over areas of the San Joaquin River containing sensitive resources, top down methods will be used to the maximum extent feasible to minimize impacts on those resources

**Road Crossing Construction:** Road crossings of existing railroads, roads, and the HST System will be constructed on the line of the existing road or offline at some locations. When constructed online, the existing road will be closed or temporarily diverted. When constructed offline, the existing road will be maintained in use until the new crossing is completed. Where new roadway undercrossings of existing railroads are required, a temporary shoofly track would be constructed to maintain railroad operations during undercrossing construction.

**Construction of At-Grade Sections:** Contractors will begin construction of at-grade sections, which may require excavating or leveling the ground surface in areas with highly compressible soils, such as peat or soft clay, are present and cannot be remedied by other means due to construction or cost constraints. Prior to buildup of the track, rough grading will occur within the alignment footprint, and typically excavation to a depth of 3 feet, although excavation of up to 6 feet may be necessary where zones of poor material are encountered. Cut and fill will be balanced to the extent feasible, including for building embankments for nearby overpasses. Contractors will obtain borrow materials from existing, permitted borrow pits and quarries, and complete construction of the rail bed using ballast material from existing permitted quarries.

**Construction of Elevated Structures:** Contractors may implement various methods of construction for the elevated portions of the Merced to Fresno Section, using cast-in-place (CIP) or pre-cast concrete and structural steel in various combinations. Installation methods and equipment required to install the elements of a structure will vary depending on the method utilized by the contractor. Under the pre-fabricated method, the contractor will produce the various pre-fabricated elements offsite, while concurrently constructing the substructure required to support them at the various locations. Once the substructure is complete, the pre-fabricated elements will be transported

to the job site for installation whether they are retaining wall components, part of a column/pier, or the super-structure. Contractors may produce large pre-fabricated bridge segments at a temporary, purpose-built facility, known as a fabrication/casting yard. To provide enough onsite concrete, portable concrete batch plants will be used during construction of the alignment sections. Portable batch plants have a footprint of approximately 2,500 to 3,000 square feet, and will be located so that the duration of concrete hauls to the construction site minimizes potential impacts on the quality of the concrete due to extended travel time once mixed.

Once completed, the contractors will move each pre-fabricated element on a special wheeled transporter to the job site for installation. Depending on the type of pre-fabricated element, the transporters may travel atop the already-completed portion of the viaduct and then feed a segment to a special gantry crane (which will also sit atop the already completed viaduct) that hoists and positions the segment. The contractors will then place the segments on piers constructed prior to arrival of the segments at the site.

The pre-cast span-by-span segmental method of viaduct construction may be implemented because it appears to be less expensive, faster, and results in less schedule uncertainty. However, other methods for viaduct construction include the cast-in-place, box girders, erection of specially designed steel structures, American Association of State Highway and Transportation Officials girders, pre-cast segmental balanced cantilevers, and pre-cast segmental span-by-span.

**Construction of Elevated Structures at the San Joaquin River:** The HST guideway will be elevated from approximately 1,000 to 1,500 feet north of the north bank of the San Joaquin River to just north of Veterans Boulevard, a distance of between 9,000 and 12,000 feet. The soffit or lowest portion of the structure, spanning the waterway will be a minimum of 10 to 15 feet above the top bank on both sides of the river, providing ample clearance for passage of flood flows and wildlife. The section of the elevated structure or guideway that crosses the San Joaquin River is anticipated to be supported on foundations consisting of CIDH with cast-in-place concrete column extensions.

Currently, the existing UPRR Railway and the Caltrans SR 99 bridge structures downstream from the future crossing have piers in the San Joaquin River corridor that are spaced approximately 160 feet apart. The proposed HST design presents a configuration for a crossing that uses a combination of the typical precast segmental construction at each approach to the crossing and then spans the main low-flow channel with a 160 to 320-foot steel truss superstructure to minimize the need to enter the wetted perimeter of the low-flow river channel. Where required, the construction of foundations within the edge of the active waterway will use construction methods such as installation of sheet pile cofferdams to isolate the activity from the live stream to avoid or minimize the potential for adverse effects on anadromous fish within the Action Area. In addition, both temporary and permanent steel casings for CIDH pile construction and piling for falsework will use vibratory pile hammers for installation, which will minimize underwater sound pressures.

The number of foundation elements will be directly related to the span arrangement necessary to meet the requirements for bridge hydraulics. Because the future crossing will be located upstream from the two existing bridge structures, the hydraulic effect of placing new piers in the river corridor on downstream structures and the geomorphology of the channel will be considered during the design of the final configuration of the structure.

**Railroad Systems Construction:** 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 requires welding of

transportable lengths of steel running onto longer lengths (approximately 0.25 mile), which will be placed in position on crossties or track slabs and field-welded into continuous lengths.

Both tie and ballast track construction and slab track construction will be used. Tie and ballast track construction typically requires that crossties and ballast be distributed along the trackbed by truck or tractor. In sensitive areas where the HST is parallel to or in close proximity to 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. A slab track system will be used to construct elevated track and might involve using cast-in-place or precast slabs.

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

Signaling equipment to be installed will include 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.

**Station Construction:** For the Merced and Fresno stations, the worksites will be located in urban areas with both commercial and residential land uses nearby. Station improvements will require significant coordination and planning to accommodate safe and convenient access to existing businesses and residences, as well as traffic control during construction periods. 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 as a result of taking existing facilities on the worksite out of service. For new facilities, the contractor will be required to perform street improvement work, site clearing and earthwork, drainage work, and utility relocations. Additionally, 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. Additionally, the contractor will 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. Additionally, the contractor may install other tenant improvements if requested.

#### *Construction Utility Requirements and Waste Disposal*

Contractors will need to use water for construction activities such as dust control during demolition of surface and subsurface features, excavation, soil compaction, landscape restoration, concrete work, general cleanup, hygiene, and drinking. If no available water sources exist near the site, then contractors will use tanker trucks, storage tanks, and/or water towers to provide water to the site. Contractors will temporarily store excavated materials produced by construction activities in within the construction footprint. Wherever possible, they will return excavated soil to its original location

to be used as backfill, and dispose waste materials associated with construction, including soils unsuitable for backfill, in landfills permitted to take these types of materials in conformance with ESA.

### *Construction Materials and Equipment*

Materials required for construction include steel rails, building materials for the maintenance facilities, control buildings, and power supply facilities, as well as concrete, reinforcing steel, ballast, cement, aggregates, specialized train system components, fuel, and water. Materials will be delivered and stored at the Merced to Fresno Section project site for use. Various construction types of equipment will be used and staged at the site, including but not limited to cranes, pile drivers, dump trucks, bulldozers, and bucket loaders.

In procuring fill materials to build the grade-separated alignment, the Authority will attempt to identify available material from existing quarries as close to the construction site as practicable. For soils used as temporary fill material within the San Joaquin River, the contractor will be required to use native soils similar to that within the Action Area. In procuring fill materials to build the grade-separated alignment, the contractor will source the materials in conformance with the California Department of Transportation's, and other standard engineering specifications.

### *Construction timeline*

The Authority intended to begin final design and project construction in 2013, with construction of the Initial Operating Section (IOS) first construction to be completed by December 2018. The Authority's Revised 2012 Business Plan for the California HST System specified that the IOS would connect the Central Valley and San Fernando Valley with operation of the IOS starting in 2022.

Construction of the CHST-MF Project began in 2015. The Authority's Revised 2018 Business Plan identifies the Silicon Valley to Central Valley Line, connecting San Francisco and Bakersfield, to be delivered using an incremental approach. Work that has been initiated in the Central Valley (Madera to Poplar Avenue north of Bakersfield), including Permit Package 1, will be completed by 2022.

The Merced to Fresno Section will be built using a Design/Build (D/B) approach, which is a method of project delivery where one entity works under a single contract with the project owner to provide design and construction services. This differs from the "design-bid-build" approach, where design and construction services are managed under separate contracts and the design is completed before the project is put out for construction bids. The D/B approach offers greater flexibility to adapt the project to changing conditions. The contract with the D/B contractor will require compliance with standard development practices and regulations, as well as implementation of any project design features and all applicable conservation measures.

One or more D/B packages will be developed and the Authority will then issue construction requests for proposals, start right-of-way acquisition, and procure construction management services to oversee physical construction of the project. During peak construction periods, work is envisioned to be under way at several locations along the route, with overlapping construction of various project elements. The overall general sequence of construction is presented in Table 2.

**Table 2. Construction Sequence.**

Activity	Tasks	Average Durations (Months)
Right-of-way acquisition	Per Assembly Bill 3034, proceed with right-of-way acquisitions after the state legislature appropriates funds in the annual budget.	18–24
Survey and preconstruction	Locate utilities, establish right-of-way and project control points and centerlines, and establish or relocate survey monuments.	6–8
Mobilization and site preparation	Relocate utilities, and clear and grub right-of-way (demolition); establish detours and haul routes; erect safety devices and mobilize special construction equipment; prepare construction equipment yards and stockpile materials; and establish precast concrete segment casting yard.	8–12
Heavy construction	Construct aerial structures, grade separations, highway realignments, surface streets, and major facilities (e.g., maintenance, stations).	30–36
Medium construction	Lay tracks, install drainage facilities, conduct backfilling operations, and perform street paving.	6–9
Light construction	Install and test systems (e.g., train control systems, overhead contact system, communication system); install traffic signals, street lighting, and striping; close detours; and clean up site.	12–18

Project construction will generally occur in 8-hour shifts between 7 a.m. and 7 p.m., 6 days per week. Occasionally, double shifts might also be required and will be subject to local regulations regarding construction hours. Whenever feasible and where local ordinances allow, contractors might work on Sundays. The construction schedule is presented in Table 3.

**Table 3. Construction Package 1 Schedule.**

Phase	Tasks
Mobilization	Mobilize safety devices and special construction equipment.
Site preparation	Relocate utilities; clear/grub right-of-way; establish detours and haul routes; and prepare construction equipment yards, stockpile materials, and precast concrete segment casting yard.
Earth moving	Excavate for earth support structures.
Construction of road crossings	Modify surface streets, and make grade separations.
Construction of aerial structures	Construct aerial structure and bridge foundations, substructure, and superstructure.
Track laying	Perform backfilling operations, and construct drainage facilities.
Systems	Potential construction of train control systems, overhead contact system, and communication system, and install signaling equipment.
Demobilization	Clean up site.

*Operations and maintenance*

**Train Service:** After the HST is constructed, three categories of trains will be operated. Express trains will run between major stations (e.g., San Francisco, Los Angeles, and San Diego). An express train could make the trip between San Francisco and Los Angeles in 2 hours and 40 minutes. Express trains will not stop at and will travel through the two HST stations in the Merced to Fresno Section on dedicated through-tracks. Limited-stop trains will provide service to some intermediate stations, as well as to the major stations. Frequent-stop trains will make all stops between the two terminus stations and will focus on regional service. Trains will not pass each other within an interval of three minutes or less.

The conceptual HST service plan for Phase 1 begins with service between Anaheim/Los Angeles running through the Central Valley from Bakersfield to Merced, and traveling northwest into the Bay Area. Subsequent stages of the HST System include a southern extension from Los Angeles to San Diego via the Inland Empire and an extension from Merced north to Sacramento. Trains will run in diverse patterns between various terminals. Three basic service types are proposed:

1. Express trains, which will serve major stations only, providing fast travel times; for example, between Los Angeles and San Francisco during the morning and afternoon peak with a run time of 2 hours and 40 minutes.
2. Limited-stop trains, which will skip selected stops along a route to provide faster service between stations.
3. All-stop trains, which will focus on regional service.

The vast majority of trains will provide limited-stop services and offer a relatively fast run time along with connectivity among various intermediate stations. Numerous limited-stop patterns will be provided, to achieve a balanced level of service at the intermediate stations. The service plan envisions at least four limited trains per hour in each direction, all day long, on the main route between San Francisco and Los Angeles. Each intermediate station in the Bay Area, Central Valley between Fresno and Bakersfield, Palmdale in the High Desert, and Sylmar and Burbank in the San Fernando Valley will be served by at least two limited trains every hour—offering at least two reasonably fast trains an hour to San Francisco and Los Angeles. Selected limited-stop trains will be extended south of Los Angeles as appropriate to serve projected demand. Trains will not pass each other within an interval of three minutes or less.

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

The service plan provides direct train service between most station pairs at least once per hour. Certain routes may not always be served directly, and some passengers will need to transfer from one train to another at an intermediate station, such as Los Angeles Union Station, to reach their final destination. Generally, the Phase 1 and full-build conceptual operations and service plans offer a wide spectrum of direct service options and minimize the need for passengers to transfer. Specifically for the Merced to Fresno Section, trains will take approximately 25 minutes to run between Merced and Fresno. The maximum operating speed will reach 220 mph in this section. In Phase 1 the first train will start from Merced after 5 a.m. at the earliest, and the last train will arrive before midnight. In the full system, trains will originate from Sacramento no earlier than 5 a.m.,

arriving in Merced before 6 a.m. In the late evening, the last train to Sacramento will pass through Merced shortly after 11 p.m. and reach Sacramento before midnight.

The Merced and Fresno stations will see a mix of stopping trains and through trains peaking for the full system. In 2035 for the high ridership scenario, the full system will see four trains an hour stop at Fresno in each direction at the peak, and six trains run through. At the off-peak the same number of stops will be made, but the through trains will drop to three per hour. At Merced, three trains will stop each hour per direction at the peak, with two running through. At the off-peak both of the two hourly trains will stop at Merced.

**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 requiring lighting 24 hours per day. Typically, exterior lights will be mounted on tall masts, towers, or poles, and flood 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. A maintenance-of-way program will be instituted to schedule inspection and maintenance activities. The maintenance-of-way program has two types of activities: preventative maintenance and corrective maintenance. Preventative maintenance will maintain the quality of the system and aid in defining a maintenance cycle for each project component type. Corrective maintenance will establish the level of performance of the infrastructure for both safety and comfort. Corrective maintenance is anticipated to be performed within the rail line right-of-way during off-peak hours of operation, or at power supply system facilities. Corrective maintenance will consist of light maintenance, heavy maintenance, or major renewals. Regular maintenance for the HST will include the following activities:

1. Inspection and repair of the rail line, the power supply system, and the maintenance facilities.
2. Vegetation control monthly to several times per year.
3. Maintenance of ballasted track every 4 to 5 years.
4. Culvert replacement along road crossings and debris clearance from the rail lines, as necessary.
5. Regular inspection of foundation elements at river crossings, such as the San Joaquin River crossing, are expected to occur on a bi-annual basis for exposed elements (accessible on foot or by light vehicle) and on a 5-year cycle for the inspection of components which are underwater and require a dive team for the process.
6. Regular clearing and removal of vegetation and sediment at the dedicated wildlife crossings to allow these structures to be free of obstruction and maintain their function.
7. Long-term maintenance may include intermittent activities, such as replacing short lengths of rail or ballast.

**LKR: Project Description (the following project description was provided to the Service by the FRA/ Authority)***Project Overview*

The Authority proposes to contract with the Lazy K Ranch Heritage Preserve B, LLC for the LKMS to provide the land and services necessary to mitigate the potential loss of regulated aquatic resources and listed species habitat as a result of the construction and operation and maintenance of PP1. The LKMS features high-density vernal pools and swales, with mima-mound topography and upland annual grasslands that support a high density and diversity of Federally-listed species. Restoration and preservation of the LKMS will address most impacts associated with construction and operation and maintenance of PP1 on federally-listed species.

There are two components of the Mitigation Proposal: the restoration portion and the long-term management portion. Restoration of riparian habitat is proposed for the Riparian Restoration Area (RRA), and restoration of vernal pools is planned for the Wetland Restoration Area (WRA). Restoration activities would require the following site development activities (generally in chronological order):

1. Land grading and contouring for creation of vernal pools will occur in the WRA.
2. Inoculum collection activities will be conducted in the Preservation Area (PA) and Inoculum Collection Area (ICA).
3. Vernal pool inoculation and erosion control will be conducted in the WRA.
4. Riparian planting, installation and maintenance of a temporary irrigation system, weeding, and associated erosion control measures above the ordinary high-water mark of the Chowchilla River in the RRA.
5. Success monitoring and reporting to the Service and other agencies.
6. Long-term management of the LKMS will be occur in accordance with the Long Term Management Plan (LTMP), including monitoring and maintenance activities.

The second component of the Mitigation Proposal includes a number of activities that are associated with long-term management of the LKMS after vernal pool restoration and riparian habitat restoration, including monitoring and maintenance activities. These activities will be described in more detail in the final LTMP to be submitted to the Service for review and approval prior to implementation.

*LKR: Land Grading and Contouring*

Land grading and contouring will occur only within the WRA, where vernal pool habitat will be restored. Grading activities will be restricted to the dry season (April 15 to October 15). Vernal pool slopes would be constructed to mimic side slopes of natural vernal pools in the design reference site within the Preservation Area. Vernal pool slopes will range from approximately 2 percent to 6 percent, with a targeted mean average of approximately 3 percent. Excavation depths will vary for each vernal pool and be determined by size, shape, slope, and position of each pool. Vernal pools will be restored to include outlet features (topographic, not structural) that will limit ponding depth to better mimic natural features observed 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 115-acre construction area will be identified and the topsoil scraped down 3 to 4 inches and stockpiled in an adjacent area. Existing wetlands in this area will be avoided by establishing a 50-foot buffer around each of them.
2. Pools will be excavated and contoured according to the design plan, with grades 3 inches below the final design grade.
3. Excavated 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., seed from native and non-native but naturalized grassland plants already on the site) to minimize erosion and invasive plant establishment.
7. Inoculum will be collected from natural vernal pools within the ICA and PA and distributed within the restored vernal pool basins.
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 WRA will require the temporary establishment of a 1.23-acre storage and laydown area (staging area) to support vernal pool restoration construction activities. This area is already used for ranch operations and will be an ideal area for staging. The staging area may include fuel and lubricant storage areas, which will be located at least 100 feet from water sources and sensitive areas and will be contained by implementing the appropriate best management practices (BMPs). The staging area will be restored to pre-project conditions (currently actively used for Ranch operations) upon completion of the vernal pool restoration.

#### *LKR: Inoculum Collection, Inoculation, and Erosion Control*

Restored vernal pools will be inoculated with a mix of soil, seeds, and organic material collected from natural vernal pools in the PA and the ICA. Numerous natural vernal pools in those areas support vernal pool fairy shrimp and vernal pool tadpole shrimp (Vollmar Consulting 2009). Inoculum collection will occur when the donor vernal pools are dry (approximately June 15 to October 15) under the direction of a Service-approved biologist and in a manner consistent with all federal and state permits and authorizations.

The vernal pools within the Preservation and Inoculum Collection Areas would be divided into four tiers to ensure the most appropriate inoculum is collected to support an overall goal of restoring vernal pool ecosystem function (e.g., floral and faunal communities). The top three tiers would have documented populations of Federally-listed large branchiopods, while the Tier 4 would support populations of non-listed large branchiopods. If there are not enough vernal pools with documented occurrences of Federally-listed large branchiopods, vernal pools without documented occurrences would be used. Table LKR-1 presents the acreage of vernal pools in each category within the Inoculum Collection Area and the Preservation Area. The three categories of potential donor pools are displayed on Figure 2.

Table LKR-1. Acreage of potential donor pools available within the LKMS.

<b>Category<sup>a</sup></b>	<b>Inoculum Collection Area</b>	<b>Preservation Area</b>	<b>Total</b>
Tiers 1 - 3	4.92	7.76	12.68
Tier 4	0.00	3.59	3.59
Other Potential Donor Pools	33.72	6.03	39.75
<b>Subtotal</b>	<b>38.64</b>	<b>17.37</b>	<b>56.01</b>
Not Suitable (listed plants present)	2.31	5.26	7.57
<b>Grand Total</b>	<b>40.95</b>	<b>22.63</b>	<b>63.58</b>

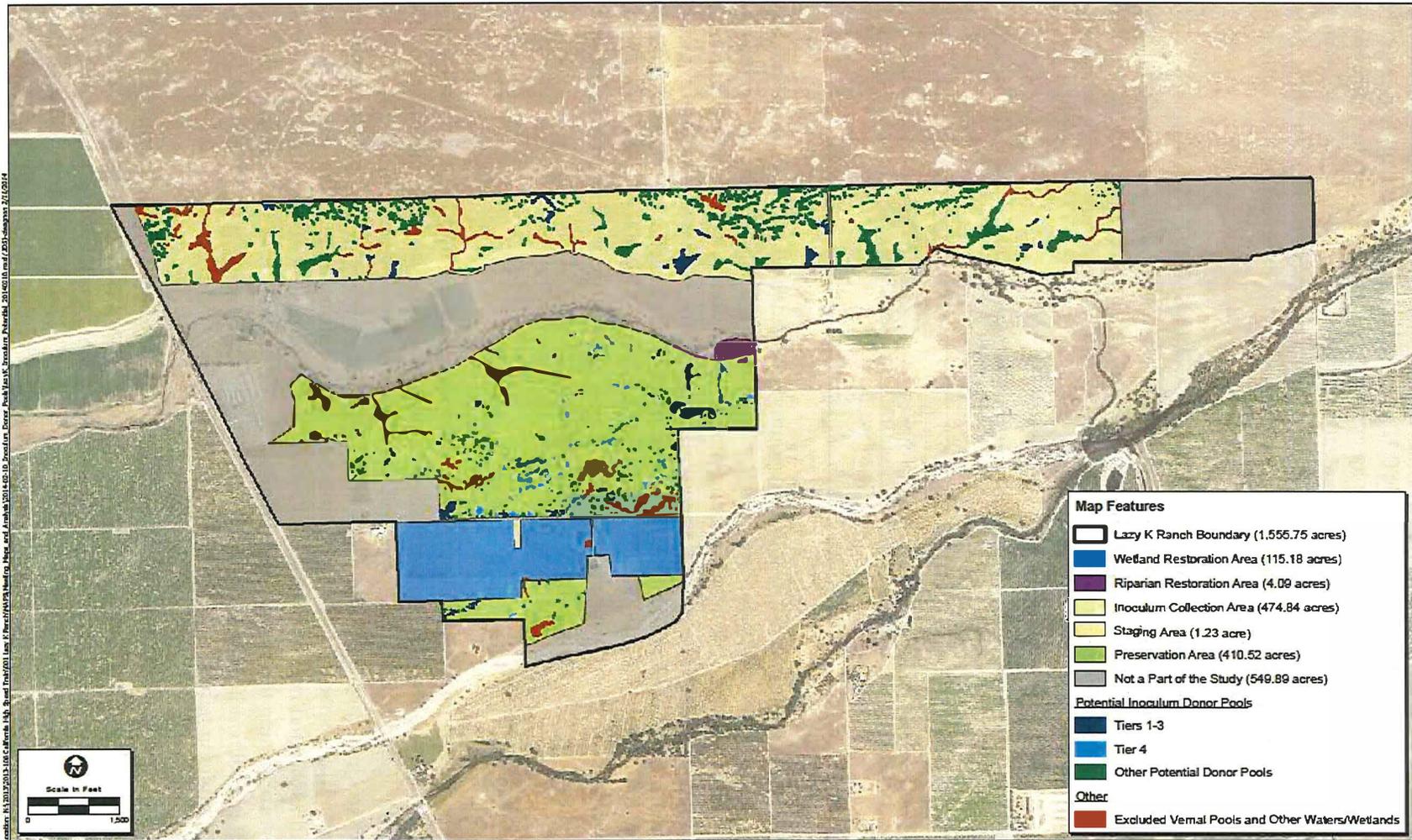
<sup>a</sup> Note that acreages shown in this table are based on surveys to date. As discussed in the PRMP, prior to inoculum collection, additional surveys for listed plants and invasive plant species will be conducted. For this reason, pools currently included in “Tier 4” or “Other Potential Donor Pools” may move up into “Tiers 1 - 3” based on the results of additional branchiopod surveys. Likewise, any of the potential donor pools listed in this table could change to “Not suitable” if listed plants or invasive plant species are found in these features during the plant surveys.

Only pools that do not support invasive species (especially waxy manna grass) will be selected for inoculum collection. Inoculum will not be collected from vernal pools known to support succulent owl’s-clover, or any other listed plant species, to avoid potential damage to the seed bank caused by the disturbance of the surface soils. Surveys for listed plant species will be conducted prior to inoculum collection to avoid and minimize adverse effects on these species.

Inoculum collected from vernal pools with documented midvalley 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 preferred habitat for this species.

The inoculum collected from these vernal pools will likely include aquatic invertebrate cysts and plant seeds. The inoculum will be collected in accordance with applicable federal permits and authorizations to minimize disturbance. Inoculum will be collected manually with hand tools or by using small, relatively light equipment (rubber-tired tractor or skip loader with a gannon box blade and bucket, skip loader with a small harrow, mower vacuum, or shop vacuum). A Service-approved biologist will be present daily to directly supervise this activity at all times to verify there are no unintended negative effects on existing natural vernal pools and upland habitat. The Service-approved biologist will specifically identify and clearly mark travel routes that avoid vernal pools and direct the tractor operator along these routes.

Figure 2. Lazy K Ranch inoculum donor pool potential.



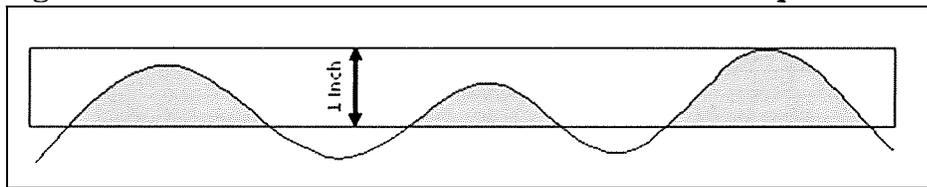
Lazy K Ranch - Inoculum Donor Potential

2013-106 California High Speed Train - Lazy K Ranch

At a maximum 1 inch deep over 2 acres, the maximum volume of inoculum collected would be approximately 270 cubic yards. Applying 270 cubic yards of inoculum over 16.76 acres of restored vernal pools would result in approximately 0.12 inch of inoculum being applied. A little more than 1/10-inch, on average a “light dusting”, is an appropriate application for the restored vernal pools and consistent with multiple successful restoration projects the consultants have been involved with. Without a reasonable amount of inoculum, the restored pools are more susceptible to colonization by nonnative plant species that have the potential to slow the establishment of endemic vernal pool vegetation, resulting in a lower probability of success.

It is unlikely, however, that the full 270 cubic yards would be collected, because the 1-inch depth is a maximum, with variation of 1/2 inch in some locations, depending on donor pool bottom conditions. Also, because vernal pool bottoms are not uniform, a 1-inch scraping is unlikely to yield the volume associated with a full inch of material. As shown in Figure 3, only the shaded areas could feasibly be collected.

**Figure 3. Inoculum collection variation within a selected pool.**



Silt fencing will be temporarily installed as required or needed along the portions of the perimeter of the WRA where swales provide the potential for sediment runoff into the Chowchilla River or Ash Slough. These measures will be implemented prior to the construction period and removed when the disturbed areas have revegetated, in accordance with the stormwater pollution prevention plan. 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 to two rain seasons, depending on the extent of re-establishment of vegetation.

#### *LKR: Riparian Restoration*

Riparian habitat restoration will occur on 3.0 acres within the 4.09-RRA adjacent to the Chowchilla River. These activities will be accomplished by obtaining and planting approximately 300 canes from species propagated from cuttings (i.e. willow and cottonwood) within the LKMS (maximum of 10 canes per tree), as specified in the 2014 PRMP. Container plants will be used to supplement cuttings, if needed, and for species that do not propagate from cuttings (e.g., valley oak, other native riparian trees, and associated native shrubs). Collection and planting will occur between November and February. Increasing the riparian habitat along the Chowchilla River will enhance the value of the habitat for wildlife adjacent to the river and surrounding areas by providing shade, shelter, nesting sites, and foraging habitat.

Water required to support initial planting growth will be obtained from existing wells. Establishment of plantings will require an estimated 22,240 gallons of groundwater (0.06 acre-feet) per year for up to 3 years, after which it is expected that plantings will have reached the water table. Holes for planting will be augured to a 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 will be installed in late summer or fall, outside the raptor nesting season (March 1 to September 15); installation will be monitored by a

Service-approved biologist to verify there are no impacts on sensitive resources. If necessary, the Service-approved biologist will have the authority to stop work to avoid impacts on sensitive resources. The irrigation system would be installed by hand; a utility truck would transport irrigation 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 irrigation system will occur as necessary, and the system will be removed within two to three seasons after the first planting season.

*LKR: Construction Schedule and Equipment*

Vernal pool restoration activities are scheduled to begin in 2014, the same year as impacts to habitat will occur as a result of PP1 construction activities. The creation of vernal pools will require one construction season (April to October) to complete. For every month that vernal pool restoration lags behind the start of the wet season (November) after the first PP1 impact on vernal pool and seasonal wetland habitat, a 0.05 increase to the ratios used to calculate the required vernal pool restoration acreage will be implemented. Additional mitigation is available within the LKMS to address the need for temporal loss mitigation if it is required. Preparation of the construction site (e.g., flagging and markings) will occur during June or early July. Wetland restoration work will be performed during late summer and early fall, when natural vernal pools on the site are dry (approximately July 15 to October 15); restoration work will be supervised and monitored by a Service-approved biologist. Application of inoculum will occur either during construction activities or during the final phase of construction of the WRA prior to winter rains.

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 trucks (two)
- Water truck
- Landscape tractor

Collection and planting of the RRA will be conducted primarily in the fall (October to December), before the winter rainy season. Riparian restoration activities will be limited to the use of hand tools, an auger mounted on a small tractor, privately-owned vehicles, and light-duty work trucks (to transport and plant riparian trees and shrubs). During restoration, equipment will be temporarily stored in the 1.23-acre Riparian Restoration Temporary Storage Area (staging area) on the bluff outside of the river floodplain directly adjacent to the RRA. The area will be mowed or grazed, but not scraped or otherwise cleared at the start of the planting activities. BMPs (e.g., installation of straw wattles) will be implemented as needed to ensure that the adjacent wetlands in the riparian zone are protected. 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 (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 provide the greatest benefit. As previously discussed, irrigation is expected to be required immediately after planting and for two or three seasons after planting.

## Conservation measures

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

### *General Conservation Measures*

**CM-GEN-1: Qualified Biologists and Biological Monitors.** At least 15 days prior to the onset of ground disturbing activities, including but not limited to geotechnical investigations, utility realignments, creation of staging areas, or initial clearing and grubbing, the Authority will submit, for approval and review by the Service, the name(s), contact information, and relevant qualifications and experience of Project Biologists, Designated Biologists, and Species-Specific Biological Monitors who will conduct activities specified in the conservation measures. No ground disturbing activities will begin until the Authority has received approval from the Service that the Project Biologists, Designated Biologists, and Species-Specific Biological Monitors are approved to do the work. The selection of General Biological Monitors by the Authority does not require approval by the Service. The roles of Project Biologists, Designated Biologists, and Species-Specific and General Biological Monitors will be as follows:

- a. **Project Biologist(s).** The Project Biologist (inclusive of the term mitigation manager also) will be responsible for the overall implementation of the conservation measures, the scheduling and work of Designated Biologists, Species-Specific and General Biological Monitors, and overall compliance reporting.
- b. **Designated Biologist(s).** Designated Biologists and Designated Botanists (also referred to as contractor's biologist) will be responsible for directly overseeing and reporting the implementation of general and species-specific conservation measures. In some instances, Designated Biologists will only be approved for specific species, in which case they will only be authorized to conduct surveys and implement measures for the species for which they have been approved. The Designated Biologists will have support from Species-Specific and General Biological Monitors. Designated Biologists will submit memoranda and reports to document compliance with conservation measures. In addition, Designated Biologists can also perform the duties of the General Biological Monitor.
- c. **Species-Specific Biological Monitor(s).** Species-Specific Biological Monitors will be responsible for implementation of species-specific measures and will report directly to a Designated Biologist. In addition, Species-Specific Biological Monitors can also perform the duties of the General Biological Monitor.
- d. **General Biological Monitor(s).** General Biological Monitors will report directly to a Designated Biologist or to the Project Biologist. General Biological Monitors will be responsible for conducting Worker Environmental Awareness Program (WEAP) training, implementing general conservation measures, except where specified that a specific individual with specific qualifications (such as Project or Designated Biologist) must implement them, conducting general compliance monitoring, and reporting on compliance monitoring activities. If any potentially federally-listed species is observed in the construction footprint, the General Biological Monitor will have the authority to halt work as soon as practicable (as described in Conservation Measure 28 below) and contact and appropriate Designated Biologist. Work will not resume until the individual leaves the work area, or until a Designated Biologist implements the appropriate species-specific conservation measures or determines that it is not a federally-listed species.

No ground-disturbing project activities (e.g., geotechnical investigations, utility realignments, creation of staging areas, or initial clearing and grubbing) will begin until proponents have received written approval from the Service that the biologists and biological monitors are approved to conduct the work. This approval will be provided in 15 (calendar) days except under unusual or extraordinary cases.

**CM-GEN-2: Regulatory Agency Access.** If requested before, during, or upon completion of construction activities, the Authority or its designee will allow access by the Service or other resource agency staff to project lands (including mitigation lands) where these lands are under permittee control with 24-hour notice. To address any safety issues, all visitors will check in with the resident engineer prior to accessing the construction site. The Service will report any noncompliance issues to the Authority within 24 hours.

**CM-GEN-3: Prepare and Implement a Biological Resources Management Plan.** Prior to construction activities, the designated biologist will prepare the Biological Resources Management Plan (BRMP). The goal of the BRMP will be to provide the project biologist, designated biologists, and general biological monitors with an organized reference and reporting tool to verify that the mitigation measures and terms and conditions are implemented and reported in a timely manner. The BRMP will include terms and conditions from applicable permits and agreements and make provisions for monitoring assignments, scheduling, and responsibility. These will include all conservation measures and repair, mitigation, and compensatory actions included in the biological opinion. These measures and conditions will be tracked through final design, implementation, and post-construction phases. For all measures, terms, and conditions, requirements and planned mechanisms for documenting and reporting compliance will be identified. The BRMP will also identify the individual responsible for post-construction compliance reporting.

**CM-GEN-4: Prepare and Implement a Worker Environmental Awareness Program.** A WEAP will be developed and trainings and training updates conducted by designated biologists or general biological monitors as described below:

- a. **Develop a Worker Environmental Awareness Program.** WEAP training materials will include the following: discussion of the Act and other applicable laws and regulations; consequences and penalties for noncompliance with these laws and regulations and project permits; identification and value of special-status plants, special-status wildlife, jurisdictional waters, and special-status plant communities; the contact person in the event of the discovery of a dead or injured wildlife species; and conservation measures including the location of planned minimization and avoidance measures. Training materials will include a fact-sheet handout or wallet-sized card conveying this information to be distributed to all participants in WEAP training sessions.
- b. **Conduct Worker Environmental Awareness Training for Contractor Personnel.** Prior to working on project lands, construction contractor personnel who work onsite will attend a WEAP training session. 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.
- c. **Provide Worker Environmental Awareness Training Updates to Contractor Personnel.** Updates and a synopsis of the training will be provided during the daily safety ("tailgate") meeting. Maintenance crews will be required to attend a contractor education and environmental training class annually.

**CM-GEN-5: Prepare and Implement a Weed Control Plan.** The contractor will prepare and implement a Weed Control Plan (WCP) to minimize or avoid the spread of weeds during construction activities, as described below:

- a. **WCP Preparation.** Prior to construction activities, the contractor will prepare a WCP to minimize or avoid the spread of weeds during construction activities. The WCP will include the following:
  - i. Schedule for conducting noxious weed surveys to be conducted in coordination with the BRMP.
  - ii. Measures to prevent and control the introduction and spread of weeds, including cleaning of equipment to remove mud and plant materials, and use of herbicides by certified pesticide applicators in accordance with the compound label, other restrictions mandated by the Environmental Protection Agency, and requirements of the California Department of Pesticide Regulation and County Agricultural Commissioner.
  - iii. Success criteria for noxious and invasive weed control as established by a qualified biologist.
  - iv. Provisions to ensure that the development of the WCP will be coordinated with development of the Restoration and Revegetation Plan (RRP) so that measures to reduce the spread and establishment of noxious weeds and revegetation performance standards for percent cover of noxious weed may be incorporated in the RRP.
- b. **WCP Implementation.** The contractor will implement the guidelines in the WCP during the project construction period. The Authority or its designee will require that maintenance crews follow the guidelines in the WCP and will appoint the responsible party for implementing the WCP during the operations period.

**CM-GEN-6: Restoration and Revegetation Plan.** An RRP for upland vegetation will be prepared and implemented as described below:

- a. **RRP Preparation.** The RRP will describe the restoration and revegetation of habitat for federally listed species where vegetation or soil has been temporarily disturbed. Restoration activities will include but are not limited to grading landform contours to approximate pre-disturbance conditions, returning soil to its original location wherever possible, stockpiling and spreading of topsoil, removal of invasive plant species, stabilizing soil surfaces with mulch or straw certified as weed-free, and revegetating disturbed areas using native plant species to the extent practicable. During final design, a designated biologist will prepare the RRP describing restoration activities, the materials that should be used, timing of the work, monitoring requirements (including the monitoring schedule), success criteria, and contingency measures. The designated biologist will approve all procedures for handling of topsoil and all seed mixes. The RRP will be submitted to the Service for review and approval prior to its implementation.
- b. **RRP Implementation.** During construction activities, the contractor will implement the RRP in temporarily disturbed areas. The designated biologist or general biological monitor will include documentation of this measure's implementation in the project's post-construction compliance reports (described in CM-GEN-22).

**CM-GEN-7: Dedicated Wildlife Crossings.** A combination of temporary wildlife crossings and permanent designated wildlife crossings will be incorporated during construction to mirror the proposed spacing of dedicated post-construction wildlife crossings as specified in the *Draft Landscape Permeability Plan for the Merced to Fresno Section* and the *Memorandum: Dedicated Wildlife Crossings for the*

*Merced to Fresno Section of the California High-Speed Train System* Accordingly, during construction, temporary or permanent wildlife crossings will be spaced at approximately 0.3-linear-mile intervals within the Eastman Lake–Bear Creek Essential Connectivity Area (ECA). Outside the ECA where adjacent land uses are relatively conducive to wildlife movement (e.g., grazing land; grain, hay, and idle pasture), temporary or permanent wildlife crossings would be spaced at no more than 2.5-linear-mile intervals. In areas outside the ECA where adjacent land uses are not conducive to wildlife movement (e.g., vineyards, high-density development), temporary or permanent wildlife crossings would be spaced at no more than 5-linear-mile intervals. All crossings will be placed for optimal use considering surrounding land cover and land uses, including built features, and under the advice of a qualified biologist.

**CM-GEN-8: Land Cover and Habitat Verification.** Under supervision of the project biologist, designated biologists or general biological monitors will verify the mapped land cover and habitats for federally listed species. Throughout the project footprint, this verification will be conducted prior to ground-disturbing activities. Results of preconstruction habitat verification surveys will be used to update maps of land cover in the project footprint and to identify where species-specific measures (including subsequent species habitat assessments and surveys) will be implemented.

**CM-GEN-9: Biological Monitoring during Construction Activities.** From on-site or remotely, a designated biologist will direct the work of general biological monitors who will be present onsite during initial ground-disturbance activities and for all construction activities conducted within or adjacent to identified Environmentally Sensitive Areas (ESAs) (i.e., occupied or potentially occupied habitat in footprint, suitable habitat abutting footprint, or occupied habitat within buffer distance of footprint), wildlife exclusion fence zones (WEF), or non-disturbance zones to oversee permit compliance and monitoring efforts. General biological monitors will also conduct daily biological ‘sweeps’ to ensure no listed species are located within the area to be disturbed during that day’s forecasted activities. The general biological monitor(s) will advise the contractor on methods that may minimize or avoid impacts on federally-listed species, including all required species-specific measures.

**CM-GEN-10: "Take" Notification and Reporting.** The Service will be notified as soon as practicable, but no later than 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 identify all Service-approved individuals responsible for take notification and reporting.

**CM-GEN-11: Scent Dog Surveys.** With Service approval of the survey procedure, trained scent dogs may be used to perform preconstruction or protocol-level surveys required by the conservation measures.

**CM-GEN-12: Establishment of Environmentally Sensitive Areas and Wildlife Exclusion Zones.** Fencing or stakes, flags, and rope 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 construction areas, where feasible based on site-specific constraints. The location of fencing will be based on the species-specific conservation measures and will be determined through consultation with the Service. Two types of fencing, high visibility ESA fence and WEF, will be used for these purposes. ESA fencing will be delineated in the field by the designated biologists or general biological monitor(s), and will be identified on project plans where feasible.

- a. **Delineation and Marking ESAs.** Prior to construction activities, ESAs will be delineated in the field by the designated biologist or general biological monitor(s). The contractor will mark ESAs with posted signs, posting stakes, flags, or rope or cord, and will place high-visibility fencing as necessary to minimize the disturbance of sensitive areas.
- b. **Construction Activity Avoidance in ESAs.** The contractor will enforce exclusion of construction personnel and equipment from all ESAs. These areas will be monitored by a general biological monitor during all site preparation and subsequent construction activities.
- c. **Maintenance of ESA Markings.** The contractor will maintain all fencing, stakes, flags, and signage until the completion of construction. ESA fences, WEF, stakes, flags, and signage will be removed when construction is complete or the resource has been cleared according to agency permit conditions.

**CM-GEN-13: Placement of 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 a designated 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 practicable. The designated biologist will prepare a memorandum documenting compliance with this measure.

**CM-GEN-14: Seasonal Restriction on Storage of Material and Equipment in Areas Subject to Flooding.** Material and equipment storage on the active floodplain of a river will be limited to the restricted period from April 15 to October 31. During November 1–April 14, equipment may enter into the restricted river channel areas but will be removed daily and stored outside the areas subject to flooding.

**CM-GEN-15: Stockpiling and Redistributing Excavated Soil.** Excavated materials will be stockpiled and redistributed as described below:

- a. **Stockpiling of Excavated Materials.** Contractors will temporarily store excavated materials produced by ground-disturbing activities in designated stockpile areas at or near the excavation site, and within the project footprint or another authorized location.
- b. **Handling of Topsoil.** The collection, stockpiling, and redistribution of topsoil will be conducted as described in the RRP.

**CM-GEN-16: Construction Site Vehicle Traffic Routes.** To minimize dust levels and the potential for construction equipment to strike federally listed species, the designated biologists and general biological monitors will restrict project vehicle traffic to routes established, monitored, and maintained as follows:

- a. **Establish Traffic Routes.** The designated biologists and general biological monitors will establish vehicle traffic routes, which where feasible will be in construction areas, locations disturbed by previous activities to prevent further adverse effects, or on existing roads. Routes will be clearly flagged and marked by the contractor per the direction of the designated biologists and general biological monitors.
- b. **Monitor and Maintain Traffic Routes.** The designated biologists and general biological monitors will require use of the established vehicle travel routes. The contractor will maintain their markings.

**CM-GEN-17: Construction Speed Limit.** A speed limit of 15 mph will be enforced during project construction for all vehicles operating on unimproved access roads and in temporary and permanent construction areas within the limit of direct effect.

**CM-GEN-18: Monofilament Restrictions.** During construction activities, the general biological monitor(s) will verify that the Contractor is not using plastic monofilament netting (erosion-control matting) or similar material in erosion control materials. Non-monofilament substitutes including coconut coir matting, tackified hydroseeding compounds, rice straw wattles, and reusable erosion, sediment, and wildlife control systems that have been approved by the regulatory agencies may be used.

**CM-GEN-19: Avoidance of Entrapment.** At the beginning and end of each work day, all excavated, steep-walled holes or trenches that are more than 8 inches deep with sidewalls steeper than a 1:1 (45 degree) slope will be covered at the close of each day with plywood or similar materials or provided a minimum of one escape ramp constructed of fill earth per 10 feet of trenching. Before such holes or trenches are filled, they will be thoroughly inspected for trapped wildlife by the general biological monitor(s). All culverts, pipes, or similar structures with a diameter of 3 inches or greater that are stored at a construction site will be inspected for wildlife before the pipe is subsequently used or moved.

**CM-GEN-20: Work Stoppage.** During construction activities, the designated biologists and general biological monitors will have stop work authority to protect any federally listed wildlife species within the project footprint. This work stoppage will be coordinated with the Authority or its designee. The contractor will suspend ground-disturbing activities in the construction area(s) 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-approved handling techniques and relocation methods, or as required by the Service.

**CM-GEN-21: Offsite Disposal of Materials.** The contractor will dispose of waste materials associated with construction, including soil materials unsuitable for reuse, in local landfills permitted to take these types of materials, and in conformance with the Act.

**CM-GEN-22: Post-Construction Compliance Report.** A post-construction compliance report will be submitted to the Service upon completion of each construction package, as defined by the Authority-contractor design/build contracts. The post-construction compliance report will provide the following information:

- a. Dates of project groundbreaking and completion
- b. Pertinent information concerning the success of the project in meeting compensation and other conservation measures, and explanation of failure to meet such measures, if any
- c. Known project effects on listed species
- d. Observed incidences of injury or mortality of any listed species
- e. Other pertinent information

#### *San Joaquin Kit Fox Conservation Measures*

**CM-SJKF-1: Wildlife Crossings.** The following measures are proposed to allow movement of kit foxes and maintain connectivity among populations of this species within and around the action area:

- Dedicated wildlife crossings will be constructed throughout wildlife corridors identified for movement of kit fox. The primary design for dedicated wildlife crossings will use one of two basic concrete structure types (box culverts or short span slab bridges) to provide an opening below the HST tracks. The choice of structure used to provide the opening will depend on the height of the embankment supporting the HST track at each location. The primary design, as outlined in the 2012 MF-BO, will provide a minimum opening 3 feet high, 10 feet wide, and up to 73 feet long, resulting in an openness factor of 0.41 as measured by  $(\text{height} \times \text{width}) / \text{length}$ . Any crossings longer than 73 feet will have an openness factor of at least 0.41. Where feasible from an engineering perspective, and appropriate from an ecological perspective, dedicated wildlife crossings will be constructed with larger openings. The dimensions of these larger wildlife structures will be 6 feet high, 10 feet wide, and approximately 73 feet long.
- The length of the wildlife crossings will be reduced whenever possible to improve the openness factor and reduce cost. To accommodate variations in topography, the height of the structure could extend as much as 18 inches below-grade; however, at least 50 percent of the vertical clearance will be above grade. This will allow kit fox entering the crossing to see light coming from the opposite end of the crossing structure.
- At locations where stormwater features (ditches, swales, detention basins, etc.) are constructed parallel to the HST track embankment to control stormwater, they would be designed to terminate at the wildlife crossing to prevent water from ponding in the structure. The path would be shaped to drain to the sides, and small retention basins would be provided adjacent to the path to collect runoff. These features would keep the crossing passable during normal rain events.
- Right-of-way fencing will be diverted toward the toe of the slope, up the embankment, and above the entrance of the structure, thus allowing kit fox unimpeded access to the crossing structures. Before HST operations begin, the contractor will install security fencing enhanced with a semipermeable wildlife barrier from 6 inches below ground surface to 12 inches above ground surface that prevents amphibians, reptiles, and small mammals from moving into the right-of-way in areas of designated natural habitat. The design and location of wildlife-proof fencing will be determined in consultation with Service and CDFW. The agency-approved project biologist will verify that the installation is consistent with terms and conditions in the Service biological opinion and CDFW incidental take permit.
- For each crossing, four sections of corrugated metal pipe, 20 feet long and 10 inches in diameter, would be anchored to either the floor or the wall of the crossing. The openings of both ends of all corrugated metal pipes would be narrowed to a 4- to 6-inch diameter. Kit foxes will gain temporary refuge within the corrugated metal pipes in the event they find themselves in a culvert with a larger predator.

**CM-SJKF-2: Pre-Construction Surveys.** Pre-construction surveys for the kit fox will be conducted within the project footprint in suitable habitat areas (alkali desert scrub, annual grassland, pasture, and barren) and in additional areas identified by the biologist designated to identify known or potential kit fox dens. Pre-construction surveys will be conducted by a designated biologist no less than 14 days and no more than 30 days prior to the start of ground-disturbing activities and will be phased with project build-out. All dens recorded during the pre-construction survey will be mapped and characterized as to type such that their status can be later evaluated. Den types are defined as:

- Potential Den: any suitable subterranean hole within the range of the kit fox that has an opening of at least 4 inches and for which available evidence is insufficient to conclude that

it is currently being used or has been used by a kit fox, or is being used by another animal that precludes occupation by a kit fox. Potential dens include: (1) any suitable subterranean hole; or (2) any den or burrow of another species (e.g., coyote, badger, red fox, or ground squirrel) that otherwise has appropriate dimensions and characteristics for kit fox use;

- Known Den: any existing natural den or manmade structure that is currently being used or has been used at any time in the past by a kit fox;
- Natal (or Pupping) Den: any den used by kit foxes to whelp and/or rear their pups; and
- Atypical Den: any manmade structure which has been or is being occupied by a kit fox.
- Atypical dens may include pipes, culverts, and diggings beneath concrete slabs and buildings.

The designated biologist will notify the Service within 24 hours via telephone or e-mail if any kit fox known dens or natal dens are discovered within or immediately adjacent to any work area. Potential dens will be monitored for a minimum of four days with a trail camera to evaluate current use. If there is a risk that cameras may be stolen or vandalized, then at that site, monitoring may be conducted using tracking medium only with the prior concurrence of the Service. Without camera monitoring, any detected fox or small canid tracks would be considered kit fox tracks, unless additional information justifies a different interpretation. If no kit fox activity is detected during this period, any potential den within the construction footprint will be hand excavated and collapsed, or blocked by the designated biologist immediately following the monitoring period (i.e., during the morning after the last night of monitoring). Mechanical equipment under direct voice control of the designated biologist can be used to excavate dens in areas of hard soil, provided protective piping or other means are employed to protect any wildlife from harm resulting from den collapse. Reports for each survey will be submitted to the Service within 30 days of completion and before ground-disturbing activities. Inaccessible dens within 200 feet of construction activities, will be camera monitored where visible from within the project footprint. To maintain required exclusion distances from natal and known dens, observed but inaccessible natal and known dens would be documented.

**CM-SJKF-3: Avoid Disturbance of Dens.** Disturbance to all kit fox dens (natal, known, atypical, and potential) will be avoided to the maximum extent possible. Dens that will not be directly disturbed may be temporarily blocked during completion of construction activities in that area.

**CM-SJKF-4: Avoidance of Dens during Breeding Season.** During the breeding season (December 1 through July 31), all construction activities will be prohibited within the following limits:

- An atypical or potential den exclusion zone of 50 feet will be implemented in areas surrounding potential and atypical dens unless otherwise adequately determined to be unoccupied and subsequently removed (e.g. excavated, collapsed, or blocked).
- A known non-natal den exclusion zone of 100 feet will be implemented in areas surrounding occupied/non-occupied known dens.
- A natal den exclusion zone of 200 feet (or as approved by the Service) will be implemented in areas surrounding occupied or unoccupied natal dens.

Within the project footprint, exclusion zones around known and natal dens will be fenced with high-visibility construction fencing, and exclusion zones around atypical and potential dens will be staked and flagged or fenced with high-visibility construction fencing. Fencing will include openings for kit fox ingress/egress, artificial dens, or both, so as not to prevent access to the den by kit foxes. Where site conditions preclude establishment of construction exclusion fencing around known and natal

dens, other marking or exclusion methods will be identified and implemented in coordination with the Service.

**CM-SJKF-5: Timing of Work near Occupied Dens.** 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.

**CM-SJKF-6: Work in Non-Disturbance Zones during Breeding and Pupping Season.** If construction activities within the non-disturbance exclusion zone of known or natal kit fox dens cannot be avoided during the breeding and pupping season, the designated biologist will contact the Service to discuss additional measures that may be implemented to minimize effects to kit foxes.

**CM-SJKF-7: Excavation of Atypical, Potential, and Known Non-Natal Dens.** After the designated biologist has determined that an atypical or potential den is unoccupied, it may be excavated at any time of year. If a known non-natal kit fox den cannot be avoided during the breeding and pupping season and thus excavation of the den is being proposed, the designated biologist will seek the Service's approval. No disturbance or encroachment into the exclusion zone of the den will occur without prior specific approval from the Service. A minimum of 5 days of known non-natal den monitoring by a designated biologist (who may be assisted by general biological monitors under the direct, on-site, supervision of the designated biologist) using cameras and tracking medium is required to allow animals to relocate from known non-natal dens, during which time passive harassment measures (i.e., partially blocking den entrances with soil) may be pursued to encourage relocation. After a known non-natal den is determined to be unoccupied, it may be excavated at any time of year under the direct supervision of a designated biologist following Service approval.

**CM-SJKF-8: Excavation of Vacated Natal Dens.** Natal dens may be excavated 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 kit fox dens cannot be avoided, the designated biologist will contact the Service for approval to initiate passive harassment measures. A minimum of 5 days of den monitoring by a designated biologist using cameras (who may be assisted by general biological monitors under the direct supervision of the designated biologist) is required to allow animals to relocate. During this den monitoring, passive harassment measures (i.e., partially blocking den entrances with soil) may be pursued to encourage relocation (with prior Service concurrence). After the designated biologist has determined that the natal den is vacant (unoccupied), it may be carefully hand excavated during the time period stated above.

**CM-SJKF-9: Artificial Dens.** To offset the temporary impacts of ESA and WEF fencing on kit fox movement during construction, artificial dens for kit foxes will be installed along the outer perimeter of the ESA and WEF fencing, where applicable.

**CM-SJKF-10: Pipe Inspections.** 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.

**CM-SJKF-11: Removal from the Project Area.** If a kit fox does not vacate the project footprint after five days of implementation of passive harassment measures, or a kit fox has become accidentally trapped within the project footprint, a designated biologist, in accordance with agency

guidance, will contact the Service and CDFW to discuss capture and relocation of the kit fox, if appropriate.

#### *Giant Kangaroo Rat Conservation Measures*

**CM-GKR-1: Pre-Construction Surveys of Suitable Habitat.** A qualified, agency-approved biologist (designated by the agency-approved project biologist) will conduct a pre-construction assessment of suitable habitat 14 days prior to any activities within the project footprint and out 50 feet for potential GKR burrows or their sign. Should potential burrows or sign be located, either protocol level surveys will be conducted or burrows will be considered to be occupied. Surveys will be conducted according to the most recent agency-approved survey protocol for San Joaquin kangaroo rats (i.e., *Survey Protocol for Determining Presence of San Joaquin Kangaroo Rats* (March 2013) unless the Service develops specific survey protocols for GKR, in which case the most current protocols will be completed).

**CM-GKR-2: Avoid Disturbance of Burrows.** A buffer distance of at least 50 feet will be maintained around occupied burrows at least 14 days before the start of ground-disturbing activities.

**CM-GKR-3: Timing of Work near Occupied Burrows.** All construction activities within 50 feet of any occupied burrow will cease one-half hour before sunset and will not begin earlier than one-half hour after sunrise to avoid indirect impacts from artificial light to this nocturnal species.

**CM-GKR-4: Relocation.** If any burrow cannot be avoided, and it is determined that the burrow is occupied by a GKR, the animal will be allowed to leave the burrow and move to an area that will not be disturbed. The non-disturbance exclusion fence with one-way exit/escape points will be placed to exclude GKR from the construction area. The wildlife exclusion fence will be established around burrows in a manner that allows the species to leave the project footprint. Additional measures such as one or both of the following will be implemented after the exclusion fencing is installed.

- Vegetation will be cleared to the ground by hand or using hand-operated equipment to discourage the presence of GKR in the project footprint. The cleared vegetation will remain undisturbed by project construction equipment for 14 days to allow GKR passively to relocate through the one-way exit/escape points along the wildlife exclusion fencing.
- A qualified, agency-approved biologist, designated by the Project Biologist, will conduct GKR trapping and relocation as determined in coordination with the Service.

#### *Blunt-Nosed Leopard Lizard Conservation Measures*

**CM-BNLL-1: Habitat Assessment.** Within one year prior to the start of construction, a habitat assessment of the project footprint will be conducted by a designated biologist to identify all habitat suitable for the lizard within the project alignment. Prior to ground-disturbing activities, the designated biologist will submit a memorandum documenting the assessment for review and approval by the Service.

**CM-BNLL-2: Protocol-Level Survey.** A designated biologist(s) will conduct protocol-level surveys within the project footprint in areas identified as potential lizard habitat, per CM-BNLL-1. Surveys will be conducted no more than one year prior to ground-disturbing activities and will follow the CDFW's *Approved Survey Methodology for the Blunt-Nosed Leopard Lizard*. Surveying biologists

will also document burrows likely used by a lizard or with egg clutches, where feasible. Reports for each survey will be submitted to the Service within 30 days of completion.

**CM-BNLL-3: Active Season Avoidance.** During the active season (April 15 through October 15), in areas where lizards or lizard sign have been observed, the following measures will be implemented:

- a. **Establishment of No-Work Buffers.** A designated biologist will establish 50-foot no-work buffers around active burrows and egg clutch sites identified during the protocol-level survey (CM-BNLL-2). The 50-foot no-work 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 lizards may leave the project footprint after the young have hatched. Project activities within the 50-foot no-work buffers will be prohibited until the eggs have hatched and lizards have been allowed to leave the project footprint, as determined by the designated biologist.
- b. **Monitoring and Maintenance of No-Work Buffers.** During construction activities, a Service-approved biologist or general biological monitor will monitor and maintain the 50-foot no-work buffers established per CM-BNLL-3a. The contractor as directed by the designated biologist or general biological monitor will maintain the 50-foot no-work buffers to minimize take of lizards, and their burrows/nests.
- c. **Fencing of Project Footprint.** Unless prohibited from doing so by other regulatory authorizations, the project footprint will be delineated with high-visibility ESA fence and wildlife exclusion fence of a non-gaping, non-climbing, barrier using a rigid and non-climbable material where: (a) no-work buffers were established per CM-BNLL-3a, and the eggs have hatched and lizards have been allowed to leave the project footprint; and (b) in potentially suitable areas (alkali desert scrub, annual grassland, barren, valley foothill riparian) where no-work buffers were not established per Conservation Measure BNLL-3a. Such fencing will include one-way escape exits spaced every 100 feet.
- d. **Monitoring and Maintenance of Fencing.** During construction activities, the wildlife exclusion fence and work area within it will be monitored daily by a general biological monitor and maintained by the contractor as directed by the general biological monitor to avoid the possibility for take of lizards, their burrows/nests, or the species' habitat outside of the project footprint.

**CM-BNLL-4: Non-active Season Avoidance.** During the non-active season (October 16 through April 14), suitable lizard burrows identified during the protocol-level survey, or otherwise observed, will be avoided by the Contractor. A 50-foot no-work buffer will be established around burrows to prevent impacts until the active season. The no-work buffer will be established by placing 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 lizards 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 Service.

**CM-BNLL-5: Agency Notification.** If lizards are observed during protocol-level surveys, pre-construction surveys, or the construction period, the designated biologist(s) and general biological monitor(s) will attempt to identify the active burrow(s), and the Service and CDFW will be immediately contacted. Appropriate measures to avoid take of the species will be established through consultation with the Service.

*Giant Garter Snake Conservation Measures*

**CM-GGS-1: Maintenance of Construction Equipment near Wetlands.** All construction equipment will be maintained to prevent leaks of fuels, lubricants, or other fluids and service and refueling procedures will be conducted in uplands at least 100 feet away from wetlands or waterways.

**CM-GGS-2: Dewatered Habitat.** Any dewatered snake habitat will remain dry for at least 15 consecutive days after April 15 and prior to excavating or filling of the dewatered snake habitat.

**CM-GGS-3: Conduct Work during Active Season.** To the extent practicable, construction activity within 200 feet of snake habitat will be confined to the period between May 1 and October 1. This is the active period for the snake and direct mortality is lessened because snakes are expected to actively move and avoid danger.

**CM-GGS-4: Pre-Construction Survey.** Within 24 hours prior to construction activities, a designated biologist will survey the work area for snakes. A survey of the work area will be repeated if a lapse in construction activity of 2 weeks or greater has occurred. If a snake is encountered during surveys or construction, cease activities until the biological monitor has determined that the snake will not be harmed or the snake leaves the work area on its own.

**CM-GGS-5: Inactive Season Measures.** If construction activities in snake habitat are necessary between October 2 and April 30, the need for additional avoidance and **minimization** measures will be evaluated in coordination with the Service, and identified measures will be implemented as necessary.

*California Tiger Salamander Conservation Measures*

**CM-CTS-1: Pre-Construction Survey.** Prior to ground-disturbing activities, a designated biologist will conduct a pre-construction survey of potential breeding and suitable upland habitat within and adjacent to the project footprint to evaluate the presence or absence of salamanders. 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 salamanders are found, the designated biologist will immediately notify the Service.

**CM-CTS-2: Exclusion Barriers.** Within 1.24 miles of known or potential breeding habitat, exclusion barriers will be installed, monitored, and maintained along the perimeter of the project footprint where it is located adjacent to suitable salamander habitat, as follows:

- a. **Installation of Exclusion Barriers.** The contractor as directed by a designated biologist will install exclusion barriers (e.g., silt fences) along the perimeter of the project footprint, unless prohibited from doing so by other regulatory authorizations. Exclusion barriers will be installed prior to initial ground-disturbing activities to **minimize** take of the salamander and destruction of their potential habitat outside of the project footprint. 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 salamanders from passing under the fence. Barriers will be installed with turn-arounds at any access openings needed in the fencing, to redirect salamanders away from openings.
- b. **Monitoring and Maintenance of Exclusion Barriers.** Exclusion fencing will be maintained by the contractor throughout the salamander's entire active period (November to

June) or until all construction activities are completed, whichever occurs first. Barriers must be inspected by the designated biologists or general biological monitors at least twice weekly on nonconsecutive days outside of the breeding season. Barriers will be inspected daily following any rain event, and during months when juvenile salamanders are most likely emigrating from their breeding ponds in search of burrows in surrounding upland habitat.

**CM-CTS-3: Non-Disturbance Exclusion Zones around Breeding Habitat.** A non-disturbance exclusion zone will be established, monitored, and maintained around breeding habitat as follows:

- a. **Establishment of Non-Disturbance Exclusion Zones.** A non-disturbance/exclusion zone will extend 250 feet from the edge of breeding habitat. At the boundary of this zone, the contractor as directed by a designated biologist will install fencing composed of a combination of high-visibility ESA fence and WEF.
- b. **Monitoring and Maintenance of Non-Disturbance Exclusion Zones.** Non-disturbance/exclusion zones will be monitored by the general biological monitor(s) to minimize take of salamanders and destruction of their potential habitat outside of the project footprint. The contractor, as directed by designated biologist(s) or general biological monitor(s), will maintain the fencing around the exclusion zone.

**CM-CTS-4: Work within Non-Disturbance Exclusion Zones.** Construction activities within Non-Disturbance Exclusion Zones, while breeding habitat is inundated, will be avoided to the extent possible. If construction activities are to occur within the Non-Disturbance Exclusion Zones during the wet season, the following steps will be taken:

- Prior to the start of construction, wet season surveys will be conducted by a designated biologist within the breeding habitat.
- If any life-stage of salamander is found, the designated biologist will immediately contact the Service to discuss additional measures to minimize take of the salamander.

**CM-CTS-5: California Tiger Salamander Relocation Plan.** If any salamanders are located in burrows within the project footprint or their burrows will be collapsed in preparation for project-related activities, the Authority will develop and implement a Salamander Relocation Plan that will be provided to the Service prior to the collapse of any burrows. A designated biologist will oversee the collapse of burrows and will be assisted by general biological monitors.

#### *Vernal Pool Habitat and Invertebrate Conservation Measures*

**CM-VP-1: Non-Disturbance Exclusion Zones.** Non-disturbance exclusion zones will be established, monitored, and maintained as follows:

- a. **Establishment of Exclusion Zones.** The contractor, under supervision of the designated biologists, will erect exclusion fencing around the perimeter of a non-disturbance exclusion zone, where accessible, to minimize take of vernal pool crustaceans or destruction of their habitat outside of the project footprint where suitable habitat (e.g., vernal pools, seasonal wetlands) occurs and the species have potential to occur. Non-Disturbance exclusion zones will extend 250 feet from the edge of suitable habitat (e.g., vernal pools, seasonal wetlands) where the species have potential to occur.
- b. **Monitoring and Maintenance of Exclusion Zones.** General biological monitor(s) will monitor the non-disturbance exclusion zone to minimize take of vernal pool crustaceans or destruction of their habitat outside of the project footprint where suitable habitat (e.g.,

vernal pools, seasonal wetlands) occurs and the species have potential to occur. The contractor will maintain the zone's fencing as directed by the general biological monitor(s) or designated biologist(s).

**CM-VP-2: Seasonal Work Restriction.** Initial ground-disturbing 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 to the dry season (June 2 to October 14), or when the habitat is dry (i.e., lacks flowing or standing water). If construction activities must occur during the October 15 - June 1 period within 250 feet of suitable habitat, erosion control materials will be installed to reduce sedimentation into vernal pools and other suitable habitat, with concurrence from the Service.

#### *Federally-listed Plant Conservation Measures*

**CM-PLT-1: Protocol-Level Surveys.** Protocol level surveys for federally listed plant species will be conducted by designated biologists prior to any ground-disturbing activities in suitable habitat for federally listed plant species.

**CM-PLT-2: Salvage, Relocation, or Propagation and Monitoring Plan.** Prior to construction (any ground-disturbing activity), the project biologist will prepare a salvage, relocation, and monitoring plan for federally listed plant species observed within the project footprint during protocol surveys. The plan would include provisions that address the techniques, locations, and procedures required for the collection, storage, and relocation of seed or plant material; collection, stockpiling, and redistribution of topsoil (and associated seed). The plan would include provisions for performance, maintenance, monitoring, implementation, and the annual reporting requirements. The plan will be submitted to the agency-approved project biologist for review and approval. The relocation or propagation of these plants and their seed will be performed at a suitable mitigation site, as appropriate for each species.

**CM-PLT-3: Restoration of Disturbed Areas to Pre-Project Conditions.** Areas that support federally listed plant species that will be temporarily disturbed will be restored 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. Success criteria for restored areas will be submitted to the Service for review and approval.

**CM-PLT-4: Documentation of Directly Affected Plants.** All directly affected populations of federally listed plants will be documented. Documentation will include density and percent cover of the affected species; key habitat characteristics, including soil type, associated species, hydrology, and topography; and photo documentation of pre-construction conditions.

**CM-PLT-5: Service Notification and Coordination.** In the event that federally listed plants are identified in the project area through the protocol-level botanical surveys required by CM-PLT-1, the Service will be notified and the Authority will work with the Service to avoid, minimize, and potentially compensate for direct and indirect effects on the species.

**CM-PLT-6: Salvage and Relocation of Affected Plants.** Prior to ground-disturbing construction activities, seeds, plant materials, and top soil will be collected from areas with populations of federally listed plant species that are to be permanently lost. These materials will be salvaged, relocated, and used according to the salvage and relocation plan described by CM-PLT-2.

*Valley Elderberry Longhorn Beetle Conservation Measures*

**CM-VELB-1: Construction Setback.** Within the species' range as depicted on the map of the species occurrence in the Service's Environmental Conservation Online System, a no-activity buffer zone will be established around elderberry shrubs whose retention is feasible. Complete avoidance (i.e., no adverse effects) may be assumed when a 100-foot (or wider) buffer is established and maintained around elderberry plants containing stems measuring 1 inch or greater in diameter at ground level. In areas where encroachment on the 100-foot buffer has been approved by the Service, the contractor will provide a minimum setback of at least 20 feet from the dripline of each elderberry plant. In buffer areas, construction activities should be minimized, and any damaged area will be restored (with erosion control and appropriate native plants) following construction. The Service must be notified, and must approve in advance, any ground or vegetation disturbance in the buffer area, and the restoration of damaged areas must be approved by the Service based on a written description provided by the contractor.

**CM-VELB-2: Signage.** The agency-approved project biologist will erect signage every 50 feet along the edge of the 100-foot buffer area with the following information: *'This area is habitat of the valley elderberry longhorn beetle, a federally threatened species, and must not be disturbed. This species is protected by the Endangered Species Act of 1973, as amended. Violators are subject to prosecution, fines, and imprisonment.'* The signs will be installed prior to the start of construction, must be clearly readable from a distance of 20 feet, and must be maintained by the contractor throughout the duration of construction activities.

**CM-VELB-3: Pre-Construction Surveys.** Prior to vegetation or ground-disturbing activities within the species' range as depicted on the map of the species occurrence in the Service's Environmental Conservation Online System, an agency-approved project biologist will search all elderberry stems greater than 1 inch in diameter at ground level for beetle exit holes.

**CM-VELB-4: Minimization Measures during Construction.** If based on the surveys conducted under CM-VELB-3, beetles are determined to be present within the limit of direct effect, the following measures will be implemented:

- Dust control procedures, such as regular watering of disturbed soils and soil piles, and covering of soil piles, will be used throughout the construction period.
- No insecticides, herbicides, fertilizer, or other chemicals that might harm the beetle or its host plant will be used within the 100-foot buffer area.
- Elderberry plants with one or more stems measuring 1.0 inch or greater at ground level that cannot be avoided during construction will be transplanted according to the methods outlined in the *ANSI A300 Standards for Tree Care Operations* for arboriculture. Shrubs will be transplanted to a Service-approved conservation area during the dormancy period (November 1 to February 15). Each agency-approved conservation area will be a minimum of 1,800 square feet per transplanted shrub.

*Compensatory Habitat*

A mitigation plan was proposed by the Authority for the Merced to Fresno Section to compensate for the permanent loss of habitat and provide long-term habitat conservation for federally-listed species. The Draft MSIP was submitted to Service for review and comments in March 2012. An updated Draft MSIP was submitted in July 2012. The MSIP included: (1) a comprehensive approach designed to mitigate project effects on the kit fox, the salamander, the Conservancy fairy shrimp, the

vernal pool fairy shrimp, the tadpole shrimp, the beetle, the Colusa grass, the San Joaquin Valley Orcutt grass, the hairy Orcutt grass, the Greene’s tuctoria, the owl’s-clover and their respective habitats; (2) a proposed methodology for determining appropriate compensation; (3) an analysis of mitigation sites; and (4) a mitigation package to provide conservation value for, and mitigate the Merced to Fresno Section’s effects on sensitive biological resources, including listed species.

The MSIP employed a comprehensive, landscape-scale approach to habitat conservation that seeks to increase the amount of conserved wetlands and protected habitat for special-status species, preserve and enhance important wildlife movement corridors, and consolidate and expand existing protected habitat.

The Draft MSIP included a proposal to secure conservation easements, and develop long-term management plans, for a number of permittee-responsible mitigation sites. The list of potential permittee-responsible mitigation sites identified in the Draft MSIP has not been finalized and is subject to augmentation with Service approval. The permittee-responsible mitigation sites were selected based on their relatively high conservation value (e.g., proximity to other protected habitats or conserved areas, location within important wildlife movement corridors, recovery areas, or designated critical habitat, the presence of listed species and/or suitable habitat, and ability to satisfy the requirements of the Service and other permitting agencies). The permanent protection of the permittee-responsible mitigation sites would also support goals identified in the recovery plan for vernal pool plants and crustaceans by protecting habitat within key vernal pool core areas; support goals identified in the recovery plan for San Joaquin kit fox by protecting habitat within key wildlife movement corridors; and protect habitat that the Service has deemed critical for the survival and recovery of listed vernal pool plants and crustaceans. For all proposed mitigation sites, long-term management plans, conservation easements, and funding analyses for the long-term endowments will be submitted to the Service for review and approval before the plans are finalized and implemented. The Authority may purchase habitat compensation credits at a Service-approved mitigation site or conservation bank in addition to securing permittee-responsible sites.

The Authority has proposed phasing of the mitigation strategy in accordance with the progress of construction of the Merced to Fresno Section. Effects associated with PP1 will be mitigated before or at the onset of construction of PP1. Implementation of permittee-responsible mitigation that is consistent with the MSIP for PP1 and each future phase of construction for the Merced to Fresno Section will commence on or before the commencement of construction for each respective project phase. The Authority anticipates that effects associated with PP1 and future permitting phases will be mitigated before or concurrently with each of those respective phases; when this is not feasible, the Authority will provide financial or other legal assurances deemed sufficient by the Service that guarantee performance of the phase-specific compensatory mitigation plan.

The Authority has proposed the following for the CV-Wye and RR-M portions of the CHST M-F Project:

Federally Listed Species/ Species Group	Minimum Compensatory Habitat
San Joaquin kit fox	1:1 ratio for natural lands <sup>1</sup> 0.1:1 for suitable urban or agricultural lands <sup>2</sup>
Blunt-nosed leopard lizard	1:1 ratio for permanent effects 0.5:1 ratio for temporary effects
Giant garter snake	1:1 ratio for aquatic habitat 0.1:1 ratio for upland habitat

California tiger salamander	1:1 ratio for permanent effects 0.5:1 ratio for temporary effects
Valley elderberry longhorn beetle	Compensatory mitigation will follow the Service’s May 2017 <i>Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle</i> .
Vernal pool fairy shrimp and vernal pool tadpole shrimp	2:1 ratio for vernal pool habitat 1.1:1 ratio for seasonal wetland habitat
Federally-listed plant species	1:1 ratio based on actual acres of direct effects (i.e., acres of occupied habitat directly impacted)

<sup>1</sup>California Annual Grassland, Barren, Constructed Watercourse, Inactive Agriculture, Pasture, Ruderal

<sup>2</sup>Orchard, Row Crop

### Analytical Framework for the Jeopardy Determination

Section 7(a)(2) of the Endangered Species Act requires that federal agencies ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of listed species. “Jeopardize the continued existence of” means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR § 402.02).

The jeopardy analysis in this biological opinion considers the effects of the proposed federal action, and any cumulative effects, on the rangewide survival and recovery of the listed species. It relies on four components: (1) the *Status of the Species*, which describes the rangewide condition of the species, the factors responsible for that condition, and its survival and recovery needs; (2) the *Environmental Baseline*, which analyzes the condition of the 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.

### 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-MF area footprint and lands surrounding it. The estimated length of the Merced to Fresno alignment will extend approximately 85 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-MF Project. The action area is estimated to include a total of 30,709 acres, which will be considered for the purposes of this opinion (Table 4). The estimated project action area for the proposed LKMS project is 1,555.75 acres. Therefore, the total project action area for the Merced to Fresno alignment and the LKMS project combined is estimated to be 32,264.75 acres.

**Table 4. Total Action Area Estimates**

Area	Hybrid <sup>a</sup>	PP1	CV-Wye	RR-M	LKR
Area of Direct Effect <sup>b</sup> (acres)	3,496	1,788	2,872	391	1,555.75
Area of Indirect Effect <sup>c</sup> (acres)	24,588	9,036	14,075	2,547	0
Estimated Project Action Area (acres)	28,084	10,824	16,947	2,938	1,555.75

<sup>a</sup> The Hybrid Alternative included two Design Options for a portion of the CV-Wye. In addition, the CV-Wye extends farther west than what was evaluated in the 2012 M-F BO and RR-M has been adjusted. Therefore, this column no longer reflects the total anticipated impacts of the M-F Section and is included only for context.

<sup>b</sup> Includes all roadway improvements, overcrossings, and other related ancillary facilities, such as electrical substations and other elements

<sup>c</sup> 1,000-foot area of indirect effects on both sides of HST

## Status of the Species

### *San Joaquin kit fox*

The status of the kit fox has been assessed in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (Service 1998) (SJV Recovery Plan) and a 5-year review. For the most recent comprehensive assessment of the range-wide status of the kit fox, please refer to the *San Joaquin Kit Fox (Vulpes macrotis mutica) 5-Year Review: Summary and Evaluation* (Service 2010b). No change in the species' listing status was recommended in the 5-year review. While there has been continued loss of habitat throughout the various recovery areas identified in the 5-year review, to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the kit fox.

### *Giant kangaroo rat*

The status of the GKR has been assessed in the SJV Recovery Plan and a 5-year review. For the most recent comprehensive assessment of the range-wide status of the kit fox, please refer to the *Giant kangaroo rat (Dipodomys ingens) 5-Year Review: Summary and Evaluation* (Service 2010c). No change in the species' listing status was recommended in the 5-year review. While there has been continued loss of habitat throughout the various recovery areas identified in the 5-year review, to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the GKR.

### *Blunt-nosed leopard lizard*

The status of the lizard has been assessed in the SJV Recovery Plan and a 5-year review. For the most recent comprehensive assessment of the range-wide status of the kit fox, please refer to the *Blunt-nosed leopard lizard (Gambelia sila) 5-Year Review: Summary and Evaluation* (Service 2010d). No change in the species' listing status was recommended in the 5-year review. While there has been continued loss of habitat throughout the various recovery areas identified in the 5-year review, to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the lizard.

### *Giant gartersnake*

The status of the snake has been assessed in the *Recovery Plan for the Giant Garter Snake (Thamnophis gigas)* (Service 2017a) (GGS Recovery Plan) and 5-year reviews. For the most recent comprehensive assessment of the range-wide status of the snake, please refer to the GGS Recovery Plan and the *Giant Garter Snake (Thamnophis gigas) 5-Year Review: Summary and Evaluation* (Service 2012a). No change

in the species' listing status was recommended in the 5-year review. While there has been continued loss of habitat throughout the various recovery areas identified in the GGS Recovery Plan, to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the snake.

*Central California tiger salamander*

The status of the salamander has been assessed in the *Recovery Plan for the Central California Distinct Population Segment of the California Tiger Salamander (Ambystoma californiense)* (Service 2017b) (CTS Recovery Plan) and a 5-year review. For the most recent comprehensive assessment of the range-wide status of the salamander, please refer to the CTS Recovery Plan and the *California Tiger Salamander Central California Distinct Population Segment (Ambystoma californiense) 5-Year Review: Summary and Evaluation* (Service 2014a). No change in the species' listing status was recommended in the 5-year review. While there has been continued loss of habitat throughout the various recovery areas identified in the 5-year review, to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the salamander.

*Conservancy fairy shrimp*

The status of the Conservancy fairy shrimp has been assessed in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (Service 2005) (Vernal Pool Recovery Plan) and 5-year reviews. For the most recent comprehensive assessment of the range-wide status of the Conservancy fairy shrimp, please refer to the *Conservancy Fairy Shrimp (Branchinecta conservatio) 5-Year Review: Summary and Evaluation* (Service 2012b). No change in the species' listing status was recommended in the 5-year review. While there has been continued loss of vernal pool habitat throughout the various vernal pool regions identified in the Vernal Pool Recovery Plan, to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the Conservancy fairy shrimp.

*Vernal pool fairy shrimp*

The status of the vernal pool fairy shrimp has been assessed in the Vernal Pool Recovery Plan and a 5-year review. For the most recent comprehensive assessment of the range-wide status of the vernal pool fairy shrimp, please refer to the *Vernal Pool Fairy Shrimp (Branchinecta lynchi) 5-Year Review: Summary and Evaluation* (Service 2007a). No change in the species' listing status was recommended in the 5-year review. While there has been continued loss of vernal pool habitat throughout the various vernal pool regions identified in the Vernal Pool Recovery Plan, to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the vernal pool fairy shrimp.

*Vernal pool tadpole shrimp*

The status of the tadpole shrimp has been assessed in the Vernal Pool Recovery Plan and a 5-year review. For the most recent comprehensive assessment of the range-wide status of the tadpole shrimp, please refer to the *Vernal Pool Tadpole Shrimp (Lepidurus packardii) 5-Year Review: Summary and Evaluation* (Service 2007b). No change in the species' listing status was recommended in the 5-year review. While there has been continued loss of vernal pool habitat throughout the various vernal pool regions identified in the Vernal Pool Recovery Plan, to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the tadpole shrimp.

*Colusa grass*

The status of the Colusa grass has been assessed in the Vernal Pool Recovery Plan and a 5-year review. For the most recent comprehensive assessment of the range-wide status of the Colusa grass, please refer to the *Colusa Grass (Neostapfia colusana) 5-Year Review: Summary and Evaluation* (Service 2008). No change in the species' listing status was recommended in the 5-year review. While there has been continued loss of vernal pool habitat throughout the various vernal pool regions identified in the Vernal Pool Recovery Plan, to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the Colusa grass.

*San Joaquin Valley Orcutt grass*

The status of the San Joaquin Valley Orcutt grass has been assessed in the Vernal Pool Recovery Plan and a 5-year review. For the most recent comprehensive assessment of the range-wide status of the San Joaquin Valley Orcutt grass, please refer to the *Orcuttia inequalis (San Joaquin Valley Orcutt Grass) 5-Year Review: Summary and Evaluation* (Service 2013). No change in the species' listing status was recommended in the 5-year review. While there has been continued loss of vernal pool habitat throughout the various vernal pool regions identified in the Vernal Pool Recovery Plan, to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the San Joaquin Valley Orcutt grass.

*Hairy Orcutt grass*

The status of the hairy Orcutt grass has been assessed in the Vernal Pool Recovery Plan and a 5-year review. For the most recent comprehensive assessment of the range-wide status of the hairy Orcutt grass, please refer to the *Hairy Orcutt Grass (Orcuttia pilosa) 5-Year Review: Summary and Evaluation* (Service 2009a). No change in the species' listing status was recommended in the 5-year review. While there has been continued loss of vernal pool habitat throughout the various vernal pool regions identified in the Vernal Pool Recovery Plan, to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the hairy Orcutt grass.

*Greene's tuctoria*

The status of the Greene's tuctoria has been assessed in the Vernal Pool Recovery Plan and a 5-year review. For the most recent comprehensive assessment of the range-wide status of the Greene's tuctoria, please refer to the *Greene's tuctoria (Tuctoria greenei) 5-Year Review: Summary and Evaluation* (Service 2007c). No change in the species' listing status was recommended in the 5-year review. While there has been continued loss of vernal pool habitat throughout the various vernal pool regions identified in the Vernal Pool Recovery Plan, to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the Greene's tuctoria.

*Succulent owl's-clover*

The status of the owl's-clover has been assessed in the Vernal Pool Recovery Plan and a 5-year review. For the most recent comprehensive assessment of the range-wide status of the owl's-clover, please refer to the *Castilleja campestris ssp. succulenta (Fleshy Owl's-Clover) 5-Year Review: Summary and Evaluation* (Service 2011). No change in the species' listing status was recommended in the 5-year review. While there has been continued loss of vernal pool habitat throughout the various vernal pool regions identified in the Vernal Pool Recovery Plan, to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the owl's-clover.

*Hoover's spurge*

The status of the Hoover's spurge has been assessed in the Vernal Pool Recovery Plan and a 5-year review. For the most recent comprehensive assessment of the range-wide status of the Hoover's spurge, please refer to the *Chamaeyce hooveri* (Hoover's Spurge) 5-Year Review: Summary and Evaluation (Service 2009b). No change in the species' listing status was recommended in the 5-year review. While there has been continued loss of vernal pool habitat throughout the various vernal pool regions identified in the Vernal Pool Recovery Plan, to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the Hoover's spurge.

*Palmate-bracted bird's-beak*

The status of the bird's-beak has been assessed in the SJV Recovery Plan and a 5-year review. For the most recent comprehensive assessment of the range-wide status of the bird's-beak, please refer to the *Palmate-bracted Bird's-beak* (*Cordylanthus palmatus* = *Chloropyron palmatum*) 5-Year Review: Summary and Evaluation (Service 2009c). No change in the species' listing status was recommended in the 5-year review. While there continues to be loss of habitat throughout its range, to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the bird's-beak.

*San Joaquin woollythreads*

The status of the woollythreads has been assessed in the SJV Recovery Plan and a 5-year review. For the most recent comprehensive assessment of the range-wide status of the woollythreads, please refer to the *Monolopia* (= *Lembertina*) *congdonii* (San Joaquin woolly-threads) 5-Year Review: Summary and Evaluation (Service 2010e). No change in the species' listing status was recommended in the 5-year review. While there continues to be loss of habitat throughout its range, to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the woollythreads.

*Valley elderberry longhorn beetle*

The status of the beetle has been assessed in a 5-year review and in response to a petition to delist. For the most recent comprehensive assessment of the range-wide status of the beetle, please refer to the *Withdrawal of the Proposed Rule To Remove the Valley Elderberry Longhorn Beetle From the Federal List of Endangered and Threatened Wildlife* (Service 2014b). While there continues to be loss of beetle habitat throughout its range, to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the beetle.

**Environmental Baseline***Geography, topography, and climate*

The Merced to Fresno Section is located within the San Joaquin Valley, which is the southern half of the Great Valley ecological subregion. The San Joaquin Valley trends northwest from the Tulare Basin at the southern end to the Sacramento–San Joaquin Delta at the northern end. The eastern edge of the valley meets the western slope of the Sierra Nevada, and the western edge of the valley meets the eastern slope of the Temblor and Diablo ranges that together constitute the southern interior Coast Range ecoregion. Elevations above mean sea level in the Action Area range from 160 feet near Downtown Merced to 300 feet north of Downtown Fresno. The topography throughout

the project action area is generally flat with slopes ranging from 0 percent to 2 percent. Drainage generally flows to the west and southwest.

The San Joaquin Valley has an arid to semi-arid climate. Summers are generally hot and dry, whereas winters are cool and wet. Mean annual temperatures range from a low of 36 degrees Fahrenheit (°F) in December to a high of 98°F in July (Western Region Climate Center [WRCC] 2010). The growing season (defined as a 50 percent probability of temperatures at or above 32°F) ranges from 261 days (March 3 to November 19) for Merced to 300 days (February 5 to December 1) for Fresno (Natural Resources Conservation Service 2002). Average annual precipitation is approximately 12.5 inches in the northern part of the project action area near Merced, and approximately 11.0 inches in the southern part of the project action area near Fresno (WRCC 2010). Approximately 80 percent of the annual rainfall in the project action area occurs between November and March.

The project action area lies within the southern portion of the San Joaquin River Basin, which extends from the Sacramento-San Joaquin Delta in the north to the northerly boundary of the Tulare Lake Basin in the south, and from the crest of the Sierra Nevada Range in the east to the crest of the Coast Ranges in the west. The basin encompasses approximately 13,500 square miles and includes large areas of high elevation along the western slope of the Sierra Nevada. As a result, the San Joaquin River experiences significant snowmelt runoff during the late spring and early summer. Flood flows typically occur between April and June.

The Merced to Fresno Section is located in three watershed sub-basins: the Middle San Joaquin–Lower Chowchilla, Fresno River, and Upper Dry. Most of the project action area is located to the north of the San Joaquin River in the Middle San Joaquin–Lower Chowchilla Watershed. The portion of the project action area to the south of the San Joaquin River is located in the Tulare-Buena Vista Lakes Watershed. Prominent water features in the project action area include Bear Creek, Miles Creek, Owens Creek, Duck Slough, Deadman Creek, Dutchman Creek, the Chowchilla River, Ash Slough, Berenda Slough, Berenda Creek, Dry Creek, the Fresno River, Cottonwood Creek, and the San Joaquin River. The natural hydrology of the region has been significantly altered through the construction of dams, storage reservoirs, diversion dams, canals, and groundwater pumping associated primarily with agricultural irrigation.

#### *Land use*

Agricultural lands account for approximately 75 percent of the land use within the project action area. Orchards, vineyards, fallow fields, row crops and field crops constitute 66 percent, while dairies, pastures, and inactive agriculture constitute an additional 10 percent. Urban areas, including large cities such as Merced and Fresno and several smaller cities between, constitute the second greatest land use within the project action area.

#### *LKMS: Topography and Hydrology*

The proposed LKMS is situated on alluvial terraces adjacent to the historic floodplain of the Chowchilla River. The elevation at the site ranges from 279 to 336 feet above mean sea level (msl). The Ranch is situated on alluvial terraces adjacent to the historical floodplain of the Chowchilla River. Elevations at the site range from 268 to 366 feet above msl. The northern portion of the Ranch is fairly level with well-developed mima mound topography and a high density of vernal pools. Continuing south, the elevation drops across rolling topography to the terrace bordering the Chowchilla River floodplain. The northeastern part of the site has more weakly developed mima mound topography and more widespread, larger vernal pools typically situated within low areas along swales. Along the northwestern part of the site, there is yet another elevation drop to the

terrace that borders the Chowchilla River floodplain. This area has more weakly developed mima-mound topography and more widespread, larger vernal pools typically situated within low areas along swales. The Chowchilla River floodplain is the lowest terrace in elevation. Immediately adjacent to the Chowchilla River on the southern side, the same topographic series of terraces repeats: a terrace with rolling topography closest to the river and then the elevation increases to a terrace with well-developed mima-mounds and a high density of vernal pools. On this higher elevation terrace, there is a portion of ground that was previously leveled for agriculture, but not deep-ripped.

The proposed LKMS is within the Chowchilla River Watershed of the Middle San Joaquin-Lower Chowchilla River hydrologic unit within the San Joaquin River Basin hydrologic unit (HUC: 18040001, USGS). The Chowchilla River is a minor tributary of the San Joaquin River that originates in the lower foothills of the Sierra Nevada (approximately 5,000 feet elevation) and flows southwest through the foothills and valley floor, where it forms the border of Merced and Madera counties, until it reaches the proposed LKMS. Currently, the main flow of the Chowchilla River is diverted for irrigation water through two adjacent sloughs (Ash Slough and Berenda Slough) by an upstream diversion dam to Berenda Reservoir. As a result, flows are erratic (depending on water releases) and, except for isolated pools in the river bottom, the riverbed is often dry during the spring and fall.

Overall, surface water within the proposed LKMS drains towards the Chowchilla River, which flows from east to west towards its confluence with the San Joaquin River and ends abruptly approximately 33 miles east of this confluence. This intermittent stream was historically primarily precipitation driven, and typically became dry during the summer months. However, now more of its flows are due to upstream water releases in the summer months, which are then diverted to the two sloughs for irrigation.

The only other sources of surface hydrology within the proposed LKMS are natural rainfall and overland surface flow during and following periods of heavy rain. Vernal pools within the proposed LKMS pond continuously or intermittently from late fall through spring or early summer. Duration and timing of ponding varies according to seasonal rainfall patterns. Smaller pools are more ephemeral, remaining ponded for a few to several weeks in winter or early spring. Larger vernal pools can remain inundated continuously from late fall into early summer. There are no well-developed creeks within the proposed LKMS, although there are numerous ephemeral drainages and vernal swales. These drainages flow for only short periods (typically 1 or 2 weeks) following heavy rains. Most of the drainages have only intermittently developed beds and banks. The vernal pools and grasslands within the proposed LKMS are above the 100-year flood zone of the Chowchilla River and are not subject to flooding from the river due to elevation and upstream water control structures.

#### *LKMS: Geology*

The geologic formations within the proposed LKMS are predominantly Turlock Lake, Riverbank, Modesto, and channel fill. Approximately one million years ago, the granitic outwash of the Chowchilla River covered the site in coarse, sandy material. This Turlock Lake Formation covered large portions of the eastern San Joaquin Valley. Approximately 100,000 years ago, a second granitic outwash covered large portions of the Turlock Lake Formation (mid Pleistocene). This newer formation is known as the Riverbank Formation. Since then, approximately 50,000 years ago, a third outwash covered the immediate floodplain area in the Modesto Formation.

Over time, weathering and erosion have re-exposed sections of Turlock Lake from under its cover of Riverbank. This process has left hilly mounds of Turlock Lake interspersed between patches of Riverbank. Additionally, the Chowchilla River and Ash Slough eventually cut swaths through the Modesto Formation areas, depositing channel fill and covering areas of the floodplain in sandy silt.

These processes have resulted in a site-wide mosaic of channel fill in the Chowchilla River and Ash Slough channels. The immediate floodplain area is covered in the Modesto Formation. Upslope, the outer floodplain is exposed bluffs and hills of the Turlock Lake Formation (cut out from under the Riverbank Formation). The upper portions of the proposed LKMS remain Riverbank Formation, still covering the ancient deposits of Turlock Lake. Turlock Lake consists of hilly, sloping terrain with coarse sandy loam soils (Whitney/Rocklin and Cometa series) and typically larger vernal pools scattered within swale bottoms near the edge of the Chowchilla River floodplain. The Riverbank Formation consists of fairly level terrain with gravelly clay loam soils (Madera and San Joaquin series), well-developed mima-mound topography, and a high-density of small to medium size vernal pools. The Modesto Formation consists of fairly level terrain with fine sandy loam soils deposited as alluvium along channels and terraces, and fewer vernal pools.

#### *LKMS: Soils*

A mosaic of soils associated with these geologic formations is present within the Lazy K Mitigation Site. Soil mapping units within the LKMS include the following soil types: Madera, San Joaquin, Whitney-Rocklin, Cometa, and Borden.

#### *LKMS: Land Use*

The ICA, the Preservation Area, and the RRA have historically been used for cattle and horse grazing. These areas have remained largely unchanged since at least 1946 (Vollmar Consulting 2009). The WRA was historically irrigated and used to pasture cattle and horses as needed. The LKMS is zoned for agricultural uses and has been registered since 1970 under the California Land Conservation Act of 1965 (Williamson Act). The LKMS (including the previously irrigated WRA) is not irrigated and is used for cattle and horse grazing. One stock pond exists in the WRA. Grazing typically occurs from November to May. Existing livestock grazing uses are proposed to be continued in a manner that maintains habitat value and high diversity of special-status species. Fifteen wells scattered across the Ranch provide water for irrigation, stock tanks, and domestic use.

#### *Noise environment*

The current existing noise environment in the project action area is influenced by Highway 99, UPRR and BNSF railroad traffic, local community noise, and local roadway traffic. The lowest measured decibels (dBA) was 46 and the peak measured dBA was 75 (e.g. operating a lawnmower at 50 feet). The typical measured dBA was in the mid-sixties (e.g. sound produced by an air conditioner unit at 50 feet) (Authority and FRA 2012a; page 3.4-4). At the northern end of the alignment in Atwater, passenger and freight trains dominate the noise exposure in areas close to the UPRR and BNSF tracks. In areas within close proximity to Santa Fe Avenue, local roadway traffic dominates the noise environment. Nearing Merced from the north, traffic on Highway 99 and freight trains on the UPRR railroad dominate the noise exposure, with roadway traffic contributing more noise near the city center where Highway 99, SR 59, and SR 140 converge. (Authority and FRA 2012a; page 3.4-25).

South of Merced, noise from Highway 99 and UPRR dominate the noise environment in unincorporated areas between Merced and Chowchilla. South of Chowchilla, noise from Highway 99 and UPRR dominates the existing noise environment at scattered residences. Upon entering Madera, the HST alignment moves farther from Highway 99, and the noise environment near Madera's city center is dominated by UPRR traffic and local community noise. The Madera Municipal Airport contributes aircraft noise to the environment (Authority and FRA 2012a; page 3.4-25).

In the unincorporated area between Madera and Fresno, SR 99 and UPRR traffic dominate the noise environment. Entering Fresno, the noise environment is dominated by freight trains and local roadway traffic. The UPRR runs through Fresno east of SR 99, and the UPRR rail yard is located between Ashlan Avenue and Clinton Avenue. In this area, the rail yard contributes to the noise environment along with Highway 99 and local community noise. South of the rail yard, the noise environment is dominated by UPRR traffic and local community noise. (Authority and FRA 2012a; page 3.4-25)

Fresno is the most densely populated city within the proposed MF 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. (Authority and FRA 2012a, page 3.4-25).

### *San Joaquin kit fox*

The entire project action area occurs within the known geographic and historic range of the kit fox. The kit fox in Merced, Madera, and Fresno Counties exists among several extremely small fragmented populations that may be at or below the extinction threshold for this species (Service 2010b; B. Cypher, pers. comm., 2012). Kit fox populations exist among patches of suitable and sub-marginal habitat fragmented by highways, roads, urbanization, and agricultural land uses within these counties (Authority and FRA 2012b). The Service is aware of kit fox observations within intervening areas of suitable habitat in western Merced County between U.S. Highway 5 and State Highway 99 documented in thirteen California Natural Diversity Database (CNDDDB) records (Occurrence #'s 47, 195, 369, 372, 600, 601, 602, 872, 876, 877, 878, 881, and 882; CNDDDB 2012).

Connectivity among existing kit fox populations is limited by existing highways, roads, the BNSF rail line, urban development, and incompatible agricultural land uses (Service 2010b; Spencer et al. 2010). The proposed route for Merced to Fresno alignment will intersect with several movement corridors identified for this species (Service 2010b; Spencer et al. 2010). These corridors provide habitat to support the movement of kit fox among populations and core habitat areas that support denning and foraging for this species.

The kit fox, a wide-ranging species, has been reported throughout Merced, Madera, and Fresno Counties. Therefore, it is reasonably likely that kit fox may be present within the counties surrounding the Merced to Fresno alignment, and the species would use suitable habitats within the project action area. West of Highway 99 from the Hatfield State Recreation Area through western Fresno County, there are over 25 occurrences of kit fox recorded in the CNDDDB, 10 of which were documented from 1975 through 2000 within 12 to 15 miles of the proposed route for Merced to Fresno alignment (CNDDDB 2012). The majority of these occurrences report observations of one to two adults and/or juveniles in both natural habitat areas and agricultural lands.

The information documented in occurrence # 195 suggests the existence of a small kit fox population within dispersal range of the project action area (approximately 12 miles). Occurrence # 195 documents the results of surveys that were conducted over several days in late August, 1999, outside of the pupping season. During these surveys, several adult kit foxes, many tracks, scats, and about 67 potential dens were observed. This occurrence was located in the vicinity of Chamberlain Road south of the Merced National Wildlife Refuge within the Eastman Lake-Bear Creek corridor, identified as a critical for maintaining connectivity among kit fox populations in the SJV Recovery Plan. The remaining 15 occurrences, which were located approximately 20 to 30 miles west of the project action area were documented from 1920 to 1999. Several of these occurrences document individuals were taken for museum specimens during 1920. The occurrences recorded from 1971 through 1999 document isolated observations of only one or two adults, individual juveniles, a few dens, or road-killed individuals.

There are six documented occurrences of kit fox in the CNDDDB located east of Highway 99, near Merced. Occurrence # 89 was a recorded in 1993 as a road mortality along Highway 99 near Herndon in Fresno County within the project action area. Two adult kit foxes were observed foraging in an almond orchard within 2.5 miles of the project action area during May, 2001 (occurrence #25). A single adult was observed in an area of annual grassland located approximately 5 miles from the project action area during April, 2001 (occurrence #24). Individual adults were also observed (occurrences #'s 26 and 30) within five miles of the project action area during 1999 and 2001. The sixth occurrence (CNDDDB # 23), located approximately 5 miles northwest of Merced on private residential and agricultural lands, consisted of individual adults and juveniles observed during surveys conducted during 1999.

The Service is not aware of any recent or on-going studies in Merced, Madera, and Fresno Counties that could provide updated information regarding the current status of the kit fox within this portion of its range. Radio-telemetry studies of kit fox in these counties have not been conducted. Therefore, information regarding kit fox habitat use and movement within these counties is currently unavailable.

The kit fox has the potential to occur in areas of suitable and sub-marginal habitat throughout the project action area. Suitable foraging and breeding habitat for the kit fox in the project action area may be found in natural lands such as annual grassland, barren, and pasture and compatible-use agricultural lands. Approximately 46,448 acres of habitat highly suitable for occupancy by kit fox occurs within Merced, Madera, and Fresno counties (Table 5). Compatible-use agricultural lands constitute about 171,543 acres that provide suitable habitat for movement and foraging by this species (Table 5). Although the species may be observed using compatible-use agricultural lands throughout the Merced to Fresno Section, kit fox may have greater potential to den and breed in natural habitat found within conservation areas. Kit fox may occur within linkage areas and satellite recovery areas identified in the SJV Recovery Plan and the 5-year review which intersect with the project action area. Large blocks of natural areas identified in the California Connectivity Project linkages, within dispersal distance of the project action area, may provide high quality natal and non-natal denning habitat for the support kit fox (Spencer et al. 2010).

**Table 5. Current estimates of suitable habitat for San Joaquin kit fox (Cypher, pers. comm., 2012).**

<b>County</b>	<b>Suitable Habitat/Natural Areas*</b>	<b>Compatible-Use Agricultural Lands **</b>	<b>Total Per County</b>
Merced	10,761	80,523	91,284
Madera	3,015	33,310	36,325
Fresno	32,672	57,710	90,382
<b>Totals Per Category</b>	<b>46,448</b>	<b>171,543</b>	<b>217,991</b>

\* Highly suitable for occupancy by San Joaquin kit fox; provides habitat for denning, breeding, and foraging.

\*\* Suitable for movement of San Joaquin kit fox among areas of more suitable habitat; provides potential habitat for foraging and limited denning habitat.

Although agricultural lands may be suboptimal for kit fox breeding, individuals may use agricultural lands for foraging and dispersal. Grain crops and alfalfa, in particular, may host populations of prey species for kit fox. Agricultural lands within one mile of natural habitat may be used more frequently for foraging and dispersal than agricultural lands isolated from movement corridors and natural lands (Warrick et al 2007). Telemetry studies of kit fox in Kern County revealed use of a natural 196-foot wide grassland area within a 32 kilometer ROW along an aqueduct (Warrick et al 2007). Live trapping revealed high densities and diversity of rodents in this area and remains of murid rodents were found in 79 percent of kit fox scats. It is possible that kit fox may use similar areas, such as the ROW, and compatible-use agricultural lands within the project action area for foraging and denning. This same study also revealed that orchards were used disproportionately greater than their availability in the study area. Almond orchards are the most common agricultural crop within the project action area and may be used by local kit fox (Table 6, below).

Construction has been underway on PP1 since 2015. Since initiation of construction, additional ROW has been acquired and preconstruction surveys have been conducted prior to the start of work at all locations within suitable habitat for the kit fox. To date, no kit fox have been detected during monitoring of potential kit fox dens within PP1.

*LKMS: San Joaquin kit fox*

Kit foxes were not observed within the LKMS during extensive surveys conducted during 2001 (Vollmar Consulting 2009). However, the LKMS provides over 400 acres of upland habitat, which could support migration, denning, or foraging for this species. Kit foxes are capable of long-range dispersal, especially young foxes that are leaving their natal territories (generally from June to November). In addition, the LKMS is located within a designated kit fox migration corridor, critical for the survival and recovery of the species (Service 2010b).

*Giant kangaroo rat*

The historic range of GKR extended north to Los Banos in western Merced County (Service 1998). While the species may be extirpated in Merced County (Service 2010c), small, isolated colonies remain in Fresno County. The Panoche Junction – Oro Loma 115 kV Power Line and a portion of the Los Banos – Oro Loma – Canal 70 kV Power Line, EINU components of the CV-Wye portion

of the action area, are within the range of the GKR. Surveys have not been conducted in the action area. There are 17 known occurrences of the GKR in the CNDDDB within 10 miles of the project footprint (CNDDDB 2016). Due to the proximity of known occurrences, it is likely that GKR may be found in suitable habitat within the action area.

#### *Blunt-nosed Leopard Lizard*

The CV-Wye alignment and EINU activities are within the range of the lizard, and suitable habitat (barren, California annual grassland, valley sink scrub, and ruderal) has been mapped within the action area. Protocol-level surveys have not been conducted in the action area, as not all areas are currently accessible. There are 20 known occurrences of the lizard in the CNDDDB within 10 miles of the proposed project (CNDDDB 2019). Due to the proximity of known occurrences, it is likely that lizards may be found in suitable habitat within the action area.

#### *Giant gartersnake*

The CV-Wye alignment is within the range of the snake, and suitable aquatic (freshwater marsh, natural watercourse, open water, and palustrine forested wetlands) and upland (California annual grassland and pasture within 200 feet of aquatic) habitats have been mapped within the action area. Protocol-level surveys have not been conducted in the action area. There are 13 known occurrences of the snake in the CNDDDB within 10 miles of the project footprint (CNDDDB 2016), including one occurrence located within the construction footprint (occurrence # 161). Due to the proximity of known occurrences, it is likely that snakes may be found in suitable habitat within the action area. However, snakes are only known to persist in the San Joaquin Valley in small numbers (Service 2012a).

#### *Central California tiger salamander*

There are 80 salamander occurrences documented within portions of Merced, Madera, and Fresno counties that surround the project action area, including several within vernal pools within, and immediately adjacent to, the Great Valley Conservation Bank north of the Chowchilla River located approximately 2 to 3 miles from the project action area (occurrence #'s 307, 901, 989, 990, 991, and 1021) (CNDDDB 2012). Four occurrences have been documented within 1.25 miles of the project action area (occurrence #'s 306, 307, 309 and 684). Two occurrences located within the project action area are presumed extirpated, one located near Fresno and another close to Madera (occurrence #'s 583 and 616, respectively). Salamander larvae were identified in vernal pool habitat near the intersection of White Rock Road and Santa Fe Avenue located about 0.5 mile northwest of the Great Valley Conservation Bank during special-status plant surveys in 2011 (Authority and FRA 2011). Protocol-level surveys for this species have not been conducted within the entire project action area.

Evidence of hybridization with non-native tiger salamanders was detected in 10 central California tiger salamander larvae sampled from ponds within occurrence # 901, which is located immediately adjacent to Great Valley Conservation Bank (Fitzpatrick et al. 2010; Bielfeldt, pers. comm., 2012). Occurrence #'s 307, 989, 990, and, 991 are located within 0.25 to 0.80 mile of occurrence # 901. While it is not known whether hybrid central California tiger salamanders have spread among other breeding ponds near occurrence #901, the combination of proximity to known hybrid locations, the known dispersal distance of adult and juvenile salamanders, and the documented transmission of these hybrid alleles across the landscape make it reasonably likely that hybridization could be introduced to nearby breeding ponds.

Potentially suitable aquatic and upland habitat has been identified within the project action area. Preliminary habitat surveys identified suitable habitat for all life-history stages of the salamander, such as vernal pools and other seasonal wetlands, California annual grasslands, and some agricultural lands, such as pastures and dry land grain crops that support small burrowing mammals, throughout the project action area. However, many areas of suitable upland habitat may be fragmented and isolated from suitable breeding habitat as a result of urbanization, highways, roads, lands subjected to certain types of agricultural practices, and other areas subject to incompatible land uses and development. For example, agricultural fields may be regularly disked or turned, which may destroy burrows and potentially crush or smother salamanders. Agricultural lands may also be subject to frequent rodenticide application, which may directly kill small mammal species and reduce burrow availability for salamanders (upland refugia) in fallowed or pasture land.

During construction on PP1, salamanders have been discovered at multiple locations, including large numbers at Avenue 12 and Road 27. Due to the proximity of known occurrences, it is likely that salamanders may be found in suitable habitat in the remainder of the M-F Section.

*LKMS: central California tiger salamander*

Salamander larvae were detected within 26 pools in the LKMS during surveys conducted in 2001 (Vollmar Consulting 2009). These larvae were observed in large, deep pools (approximately 12 inches to more than 24 inches deep) that remain inundated for at least 100 days in most years. These pools occur primarily within the Turlock Lake Formation. A few of the pools within the Riverbank Formation also support this species. A stock pond within the WRA that was not surveyed for salamander larvae may provide aquatic habitat for the species.

The extensive ground squirrel burrows, predominantly on the Turlock Lake Formation, likely provide upland habitat for adult salamanders. These burrows are very common throughout grassland portions of the PA, providing easy access to breeding pools. Suitable burrows are found only intermittently along the berms in the WRA. Therefore, although suitable upland habitat for salamander is present within the WRA, it is not as prevalent as elsewhere within the LKMS.

*Conservancy fairy shrimp*

Wetland delineation surveys identified seasonal wetlands and vernal pools within the CV-Wye and RR-M portions of the project action area that could provide habitat for Conservancy fairy shrimp. However, protocol-level surveys for this species have not been conducted within the project action area. Therefore, the status of this species within the project action area is not known at this time. There are six occurrences of Conservancy fairy shrimp documented within Merced County, two of which are located with 2 to 6 miles of the project action area (occurrence #'s 34 and 35) (CNDDDB 2012). It is reasonably likely that Conservancy fairy shrimp may exist within the project action area because suitable habitat is present and CNDDDB records indicate the presence of this species within close proximity. In the May 21, 2015, amendment to the 2012 M-F BO, the Service determined that no suitable habitat for the Conservancy fairy shrimp would be lost due to the construction of PP1.

*LKMS: Conservancy fairy shrimp*

Approximately 22.70 acres of vernal pool habitat in the LKMS occur within designated core area for the Conservancy fairy shrimp. However, this species has not been observed during any of the surveys of the site conducted from 2006 to 2009 (Vollmar Consulting 2009).

*Vernal pool fairy shrimp*

Wetland delineation surveys identified other seasonal wetlands and vernal pools within the project action area that could provide habitat for vernal pool fairy shrimp. However, protocol-level surveys for this species have not been conducted within the project action area. Therefore, the status of this species within the project action area is not known at this time. There are 184 occurrences of vernal pool fairy shrimp documented within Merced, Madera, and Fresno Counties, including four occurrences located within the project action area (occurrence #'s 12, 153, 181, and 310; CNDDDB 2012). Vernal pool fairy shrimp were captured from a pool located on the south side of Avenue 13, about 0.1 mile east of the UPRR tracks in 1994 (occurrence # 12). Vernal pool fairy shrimp were observed in at least three of eight vernal pools during a 1993 survey (occurrence # 153). An adult vernal pool fairy shrimp was collected from a roadside vernal pool adjacent to railroad tracks in 1997 (occurrence # 181). Twenty-five adult and juvenile vernal pool fairy shrimp were discovered in tire tracks near a seasonal wetland that had become inundated during 1997 (occurrence # 310). It is reasonably likely that the vernal pool fairy shrimp is present within the project action area because suitable habitat is present and presence of this species within the action area has been documented in CNDDDB records.

*LKMS: vernal pool fairy shrimp*

Vernal pool fairy shrimp were observed in 37 vernal pools within LKMS during comprehensive surveys of the site conducted from 2006 to 2009 (Vollmar Consulting 2009). This species occurs primarily in the PA, but several pools in the ICA and along the southern edge of the WRA also support vernal pool fairy shrimp.

*Vernal pool tadpole shrimp*

Wetland delineation surveys identified seasonal wetlands and vernal pools within the project action area that could provide habitat for the tadpole shrimp. However, protocol-level surveys for this species have not been conducted within the project action area. Therefore, the status of the tadpole shrimp within the project action area is not known at this time. There are 34 occurrences of tadpole shrimp documented within Merced County (CNDDDB 2012). Eleven of these occurrences are located within 5 to 6 miles of the project action area (occurrence #'s 2, 3, 81, 123, 130, 187, 195, 244, 262, 263, and 264). None of these occurrences are located within the project action area. It is reasonably likely the tadpole shrimp is present within the project action area because suitable habitat is present and CNDDDB records indicate the presence of this species within close proximity.

*LKMS: vernal pool tadpole shrimp*

Tadpole shrimp were found in 53 wetlands across many geologic formations within the PA and ICA. The majority of these observations occurred within the Turlock Lake Formation. Critical Habitat Unit 15 (Merced Unit) for tadpole shrimp has been designated throughout much of the LKMS.

*Colusa grass*

Potentially suitable vernal pool habitat for Colusa grass has been identified within the project action area. 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 22 occurrences of Colusa grass documented within Merced County (CNDDDB 2012). Distances among these

occurrences range from 0.5 to 5.5 miles, and average about 2 to 3 miles. All of these occurrences are located within Merced County. The closest occurrences are located 4 to 5 miles from the project action area (occurrence #'s 39 and 42). Critical habitat for this species is located approximately 2 miles southwest of the Merced to Fresno Section. It is reasonably likely that the Colusa grass is present within the project action area because suitable habitat is present and CNDDDB records indicate the presence of this species within close proximity.

No habitat for the Colusa grass was identified on PP1 or within the CV-Wye; however, a small amount of suitable habitat was identified in the RR-M portion of the M-F Section. Colusa grass was not identified during a plant survey conducted on PP1 in 2011 on properties where permission to enter was granted. Botanical surveys conducted within vernal pool habitat on a small portion of the CV-Wye in 2015 did not detect Colusa grass.

*LKMS: Colusa Grass*

It is likely that most of the pools in the LKMS do not maintain the prolonged inundation period required for Colusa grass. However, appropriate soils are present, and it is possible that some of the larger pools may provide potential habitat for this species (Vollmar Consulting 2009). It is reasonably likely that the Colusa grass is present within the LKMS because suitable habitat is present.

*San Joaquin Valley Orcutt grass*

Potentially suitable vernal pool habitat for San Joaquin Valley Orcutt grass has been identified within the project action area. 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 over 24 occurrences of San Joaquin Valley Orcutt grass documented within several miles of the project action area, including one possibly extirpated occurrence (CNDDDB 2012). A single occurrence is located within the project action area (occurrence # 10), where San Joaquin Valley Orcutt grass was identified within dry vernal pools along Santa Fe Avenue, which appears to be isolated from the four closest occurrences of this species, which are located 2 to 4 miles away (occurrence #'s 38, 39, 51, and 62). Given the distance of occurrence # 10 from other known locations of this species, it is likely that the existing plants constitute a small, but demographically and genetically discreet population of San Joaquin Valley Orcutt grass. It is reasonably likely that the San Joaquin Valley Orcutt grass is present within the project action area because suitable habitat is present and an occurrence of this species within the action area has been documented in CNDDDB records.

San Joaquin Valley Orcutt grass was not identified during a plant survey conducted on PP1 in 2011 on properties where permission to enter was granted. San Joaquin Valley Orcutt grass is not expected to occur within the CV-Wye or RR-M portions of the proposed project due to these portions being on the margin of the known range of the species and the distance from known occurrences.

*LKMS: San Joaquin Valley Orcutt grass*

Most pools in the LKMS are smaller than the pool size typically required for this species. However, the appropriate soils are present within the LKMS, and a population of San Joaquin Valley Orcutt grass exists adjacent to the site to the north. It is possible that some of the larger pools may provide

habitat for this species (Vollmar Consulting 2009). It is reasonably likely that the San Joaquin Valley Orcutt grass is present within the LKMS because suitable habitat is present and CNDDDB records indicate the presence of this species within close proximity.

*Hairy Orcutt grass*

Potentially suitable vernal pool habitat for hairy Orcutt grass has been identified within the project action area. 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 fully known at this time. Eight occurrences of hairy Orcutt grass have been documented within 10 miles of the project action area (CNDDDB 2012), including one (occurrence #19) within the construction footprint in pools east of the BNSF Railway along Avenue 15. The nearest critical habitat unit for this species is located 2.61 miles northeast of the Merced to Fresno Section. It is reasonably likely that the hairy Orcutt grass is present within the project action area because suitable habitat is present and a population of this species within the action area has been documented in CNDDDB records.

Hairy Orcutt grass was not identified during a plant survey conducted on PP1 in 2011 on properties where permission to enter was granted; however, it has since been documented in three vernal pools within the construction footprint in May 2016 and June 2017. Hairy Orcutt grass is not expected to occur within the CV-Wye or RR-M portions of the proposed project due to these portions being on the margin of the known range of the species and the distance from known occurrences.

*LKMS: hairy Orcutt grass*

Most pools in the LKMS are smaller than the pool size typically required for hairy Orcutt grass. However, the soils within the LKMS are suitable, and it is possible that some of the larger pools may provide habitat for this species (Vollmar Consulting 2009). It is reasonably likely that the hairy Orcutt grass is present within the LKMS because suitable habitat is present.

*Greene's tuctoria*

Potentially suitable vernal pool habitat for Greene's tuctoria has been identified within the project action area. 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 occurrences of Greene's tuctoria have been documented within 10 miles of the project action area (CNDDDB 2012). Two occurrences have been reported in vernal pools near Santa Fe Avenue north of the Chowchilla River, located within 2.5 miles of the project action area (Occurrence #'s 14 and 28). An estimated population of 10,000 plants within a hectare of vernal pool habitat was observed in 1981 (occurrence # 28). However, no plants were observed during a 1986 survey. An unknown number of Greene's tuctoria plants were observed in a vernal pool in 1980, but no plants were observed during subsequent surveys conducted in 1986 (occurrence # 13). It was noted that the hydrology of the vernal pool had been altered by construction of an elevated railroad grade. There are two additional occurrences north of the Chowchilla River about 1 to 2 miles east of Santa Fe Avenue in vernal pool habitat located within the Great Valley Conservation Bank (occurrence #'s 46 and 54). Over 30 individuals were documented during a field survey conducted in 2000 (occurrence # 46). Approximately 200 plants were observed during a 2010 field survey (occurrence # 54). It is reasonably likely that the Greene's tuctoria is present within the project action area because suitable habitat is present and CNDDDB records indicate the presence of this species within close proximity.

No habitat for the Greene's tuctoria was identified on PP1 or within the CV-Wye however, a small amount of suitable habitat was identified in the RR-M portion of the M-F Section. Greene's tuctoria was not identified during a plant survey conducted on PP1 in 2011 on properties where permission to enter was granted. Botanical surveys conducted within vernal pool habitat on a small portion of the CV-Wye in 2015 did not detect Greene's tuctoria.

*LKMS: Greene's tuctoria*

Occurrences of Greene's tuctoria have been documented on adjacent property north the LKMS (CNDDDB 2014). Given the location of the LKMS, documented occurrences on adjacent property, presence of suitable soils, and the presence of numerous smaller and shallower pools, it is reasonably likely that Greene's tuctoria occurs within the LKMS.

*Succulent owl's-clover*

Potentially suitable vernal pool habitat for the owl's-clover has been identified within the project action area. The owl's-clover was not identified during a plant survey conducted on PP1 in 2011 on properties where permission to enter was granted. However, 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 59 occurrences of owl's-clover documented in the CNDDDB within 10 miles of the project action area (CNDDDB 2012). Two of these occurrences are located within 1.5 to 2 miles of the project action area (occurrence #'s 62 and 97). It is reasonably likely that the owl's-clover may exist within the project action area because suitable habitat is present and CNDDDB records indicate the presence of this species within close proximity.

*LKMS: Succulent owl's-clover*

The owl's-clover was observed in 21 vernal pools and swales within both the PA and the ICA. The occurrences were predominantly observed in pools within the Riverbank Formation.

*Palmate-bracted bird's-beak*

The CV-Wye alignment and EINU activities are within the range of the bird's-beak, and suitable habitat (California annual grassland and valley sink scrub) has been mapped within the action area. Protocol-level surveys have not been conducted in the action area, as not all areas are currently accessible. Extant occurrences in the CNDDDB are located within 10 miles of the CV-Wye alignment centerline, the Panoche Junction – Oro Loma 115 kV Power Line, and the Los Banos – Oro Loma – Canal 70 kV Power Line (CNDDDB 2016). Due to the proximity of known occurrences, it is likely that the bird's-beak may be found in suitable habitat within the action area.

*San Joaquin woollythreads*

The Los Banos – Oro Loma – Canal 70 kV Power Line is within the range of the woollythreads, and suitable habitat (annual grassland and valley sink scrub) has been mapped within this portion of the action area. Protocol-level surveys have not been conducted in the action area, as not all areas are currently accessible. Five extant occurrences in the CNDDDB are located within 10 miles of the Los Banos – Oro Loma – Canal 70 kV Power Line (CNDDDB 2016). Due to the proximity of known occurrences, it is likely that the woollythreads may be found in suitable habitat within the action area.

*Valley elderberry longhorn beetle*

The northern portion of the action area overlaps with the range of the beetle in Merced County. Surveys have not been completed; however, riparian habitat which may support the beetle is found within this portion of the action area. The entirety of PP1 is outside the range of the beetle.

*LKMS: valley elderberry longhorn beetle*

Protocol-level surveys for the beetle have not been conducted in the LKMS; however, elderberry shrubs were incidentally observed within the Riparian Restoration Area during vegetation surveys (Vollmar Consulting 2009). However, there is a documented occurrence of the beetle along the Chowchilla River less than one mile east of the LKMS (occurrence # 121; CNDDDB 2014). It is reasonably likely that the beetle is present within the project action area because suitable habitat is present and CNDDDB records indicate the presence of this species within close proximity.

**Effects of the Proposed Action**

The CHST-MF Project will result in temporary and permanent loss of habitat for the kit fox, the GKR, the lizard, the snake, the salamander, the beetle, the Conservancy fairy shrimp, the vernal pool fairy shrimp, the tadpole shrimp, the beetle, the Colusa grass, the San Joaquin Valley Orcutt grass, the hairy Orcutt grass, the Greene's tuctoria, the owl's-clover, the Hoover's spurge, the bird's-beak, and the woollythreads.

*San Joaquin kit fox**Construction-related effects*

An estimated 1,910.50 acres of suitable habitat (grassland and compatible-use agricultural lands) for the kit fox will be permanently lost as a result of the CHST-MF Project (Table 6). However, these habitats occur as fragments or patches throughout the relatively narrow, linear project action area, primarily within Merced and Madera Counties. Approximately 194.07 acres of the 1,910.50 acres (~10 percent) of suitable habitat is considered to be highly suitable for use by the kit fox. The remaining 1,716.43 acres consists primarily of compatible-use agricultural lands (Table 6). The 194.07 acres of highly suitable habitat that will be permanently lost as a result for the CHST-MF Project represents significantly less than one percent of remaining combined highly suitable habitat within Merced, Madera, and Fresno counties (Table 5; Cypher, pers. comm., 2012). 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 kit fox to predation and a reduction in prey availability.

**Table 6. Estimated permanent habitat loss for the San Joaquin kit fox.**

Habitat Type (acres)	Hybrid <sup>a</sup>	PP1	CV-Wye <sup>b</sup>	RR-M <sup>b</sup>	Total
Highly Suitable (Denning, Breeding, and Foraging)					
Annual Grassland	49.87	16.70	-	-	-
Barren	42.19	29.85	-	-	-
Pasture	13.12	1.88	-	-	-
Total	105.18	48.43	106.30	39.34	194.07
Suitable (Foraging and Movement)					
Inactive Agriculture	181.61	122.97	-	-	-
Fallow Field	236.78	86.69	-	-	-
Field Crop	257.38	37.62	-	-	-
Orchard	387.02	191.60	-	-	-
Rural Residential	111.09	43.88	-	-	-
Ruderal	-	0.27	-	-	-
Total	1,173.88	483.03	1,020.30	213.10	1,716.43
Grand Total	1,279.06	531.46	1,126.60	252.44	1,910.50
<sup>a</sup> The Hybrid Alternative included two Design Options for a portion of the CV-Wye. In addition, the CV-Wye extends farther west than what was evaluated in the 2012 M-F BO and RR-M has been adjusted. Therefore, this column no longer reflects the total anticipated impacts of the M-F Section and is included only for context. <sup>b</sup> The biological assessment for the CV-Wye did not provide values separated by habitat type. In addition to the habitat types indicated, highly suitable also includes constructed watercourse and valley sink scrub and suitable includes ruderal.					

The proposed construction activities have the potential to expose 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 kit fox individuals. 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 kit fox. Preconstruction surveys for 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.

In the event that kit fox do not vacate the project action area after passive harassment measures have been implemented, as described in the conservation measures for this species, or a kit fox has become accidentally trapped within the project action area, the Authority will contact the Service. Capture and relocation of kit fox is not currently proposed or authorized as a conservation measure for this project.

#### *Movement and connectivity*

Maintaining current connectivity among existing kit fox populations among habitats and populations is crucial for minimizing the threat of extinction. Therefore, the Authority has proposed construction of dedicated wildlife crossings to ensure connectivity for the 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 drainage structures (e.g., large-diameter culverts 60 to 120 inches) may also facilitate movement of kit foxes. Dedicated wildlife crossings for the kit fox will be spaced at approximately 0.3-mile intervals within the Eastman Lake-Bear Creek Essential Connectivity Area. Wildlife crossings in areas where adjacent land uses are relatively conducive to wildlife movement (e.g., grazing land; grain, hay, and idle pasture) will be constructed approximately every 2.5 miles. The spacing and location of

dedicated wildlife crossings for the Merced to Fresno Section was based on (1) existing land uses; (2) existing and proposed infrastructure not associated with the CHST-MF Project; (3) previously identified wildlife movement corridors; and (4) consistency with the SJV Recovery Plan.

Existing highways, roads, the BNSF rail line, urban development, and incompatible agricultural land uses may restrict movement of individuals and connectivity among existing kit fox populations (Service 2010b; Spencer et al. 2010). Greater than 75 percent of the HST (~60 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 loss and fragmentation of habitat and severely limit connectivity among 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 kit fox populations within and around the project action area.

The proposed design for all wildlife-designated crossing structures for the HST consists of box culverts and short-span slab bridges, 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 kit foxes entering the crossing to see through to the opening at the opposite end of the structure.

The Merced to Fresno alignment will also include 18 to 20 smaller hydraulic crossings. Hydraulic crossings include bridges at Miles Creek, Owens Creek, Duck Slough, Deadman Creek, Dutchman Creek, Chowchilla River, Ash Slough, Berenda Slough, Berenda Creek, Dry Creek, Schmidt Creek and Cottonwood Creek. Other viable crossings include elevated portions of track over Berenda Slough, the Fresno River, and the San Joaquin River. These small hydraulic crossings may provide opportunity for movement of kit fox under the HST.

#### *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 is likely that kit foxes may experience increased encounters with potential predators, when using the proposed crossing structures. There may be potential for mortality if 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. 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 kit fox to minimize or avoid contact with infected animals carrying transmissible infectious diseases when using the crossing structures. Raccoons, coyotes, skunks, red foxes, gray foxes, feral cats, and stray dogs may occur at higher densities than 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, Madera, Chowchilla, and Merced. 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 as well. 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 Doblak 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 kit foxes across the HST and minimize the probability of exposure to infected animals. Therefore, it is extremely unlikely for kit fox to be exposed to infected animals while using the proposed wildlife crossing structures.

#### *Exposure to increased noise levels*

Kit fox currently experience noise disturbance from Highway 99 traffic and operation of trains on the BNSF rail line. Approximately 20 to 24 trains are operated on both the UPRR and BNSF railroads. Of these, 12 are passenger Amtrak trains which operate about every hour and a half generally during daytime hours with the last train arriving into Fresno from the north at around 10:00 p.m. The remaining 10 to 12 trains operated on these railroads are freight trains. The operation of the Merced to Fresno Section 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 in each direction at least two to three times per hour from 5:00 a.m. to 12:00 a.m. (up to 57 train passages per day). However, noise disturbance from operation of the HST will not occur during nocturnal activities of kit fox in areas adjacent to the alignment from 12:00 a.m. 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 2006). It is expected that the 100 dBA SEL would 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 kit fox and their prey. However, kit fox studied in Bakersfield, California, which appear to have adapted to the urban environment, have been observed denning near major roads (Bjurlin et al. 2005). Several kit fox were also observed using culverts and other road structures as dens in this same study. Therefore, it is likely that kit fox will become quickly adapted to the increased noise disturbance generated by operation of the HST.

#### *Effects associated with rodent control programs*

The Service recognizes that rodent control programs to prevent small mammals, such as ground squirrels, from undermining the stability of the ground below the HST facilities through burrowing activity may be necessary as part of a regular maintenance program. The Authority will not use chemical rodenticides for track or alignment, particularly in rural areas. To the maximum extent

feasible, the Authority will utilize non-toxic rodent control measures to maintain HST facilities. If rodenticides are needed to maintain any buildings or structures, an integrated pest management plan that includes best management practices for avoiding and minimizing off-site impacts on kit fox and other species that might result from use of rodenticides will be prepared and implemented by the Authority and submitted to the Service for review and approval.

*Conservation measures for the San Joaquin kit fox*

The Authority has proposed to mitigate for the maximum estimated permanent habitat loss through the acquisition of permittee-responsible mitigation sites that will be protected in perpetuity through conservation easements or through the purchase of credits at a Service-approved conservation bank. These lands will be protected and managed for the conservation of the 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 MSIP, implementation of the mitigation proposal would preserve land within the Eastman Lake-Bear Creek Essential Connectivity Area, which is a terrestrial wildlife movement corridor that traverses the Merced to Fresno HST alignment (Spencer et al. 2010). Linking the natural areas in the Eastman Lake-Bear Creek Essential Connectivity Area with the natural areas east of State Route 99 is listed as a recovery action for kit fox in the SJV Recovery Plan. Two of the proposed permittee-responsible mitigation sites identified in the July 2012 Draft MSIP, both of which support potential foraging and dispersal habitat for this species, are located within this Essential Connectivity Area. Permanent protection of these lands will help maintain the geographic distribution of the species and contribute to its survival and recovery.

*LKMS: Construction Activities for Habitat Restoration*

Construction activities associated with the proposed wetland and riparian restoration will occur within 115.18 acres of the 1,555.75-acre LKMS. Noise and vibration generated by construction equipment may discourage kit fox from using these areas during restoration activities. Disturbance to kit foxes 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 kit fox within and around the LKMS. 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 kit fox.

The FRA/Authority are proposing preservation of 233.67 acres of highly suitable habitat within the LKMS and the Essential Connectivity Area as compensatory mitigation for unavoidable permanent loss of 54.29 acres of highly suitable habitat and 250.18 acres of suitable habitat (total acres = 304.47) that will occur from PP1 of the CHST-MF Project. The highly suitable habitat within the LKMS will support breeding, foraging, and denning for the kit fox, and will be protected and managed for the conservation of this species in perpetuity.

*Giant kangaroo rat*

Approximately 0.06 acre of annual grassland that provides habitat for the GKR was mapped along the Los Banos – Oro Loma – Canal 70 kV Power Line. Construction-related operation of equipment and vehicles may directly crush GKR and/or their burrows. Noise and vibrations from the equipment could disturb any GKR in the action area, causing them to leave the area and experience reduced fitness due to increased pressure from competition and/or predation. However,

the Authority has proposed conservation measures, including pre-construction surveys, avoidance of burrows, and biological monitoring that will minimize these adverse effects. Trapping and relocation of any GKR discovered within the project area may also occur in accordance with the proposed conservation measures. The 0.06 acre of habitat for the GKR will be permanently lost due to construction of the proposed project.

*Blunt-nosed Leopard Lizard*

Approximately 41.99 acres of suitable habitat (barren, California annual grassland, valley sink scrub, and ruderal) for the lizard has been mapped within the northern portions of the action area (Table 7).

**Table 7. Estimated permanent habitat loss for the blunt-nosed leopard lizard.**

Area	PP1	CV-Wye	EINU	RR-M	Total
Suitable Habitat (acres)	0	27.14	0.06	14.79	41.99

Construction-related operation of equipment and vehicles may directly crush lizards and/or their burrows. Noise and vibrations from the equipment could disturb any lizards in the action area, causing them to leave the area and experience reduced fitness due to increased pressure from competition and/or predation. However, the Authority has proposed conservation measures, including pre-construction surveys, seasonal avoidance, and biological monitoring that will minimize these adverse effects.

The 41.99 acres of habitat for the lizard will be permanently lost due to construction of the proposed project. However, the Authority has proposed to provide habitat to compensate for this loss through the acquisition of permittee-responsible mitigation sites that will be protected in perpetuity with conservation easements. These lands will be protected and managed for the conservation of the lizard 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.

*Giant gartersnake*

Approximately 14.80 acres of suitable habitat for the snake has been mapped within the CV-Wye portion of the action area, including 5.53 acres of aquatic habitat and 9.27 acres of upland habitat.

Construction-related operation of equipment and vehicles may directly crush snakes and/or burrows in which snakes are sheltering. Vibrations from the equipment could disturb any snakes in the action area, causing them to leave the area and experience reduced fitness due to increased pressure from competition and/or predation. However, the Authority has proposed conservation measures, including pre-construction surveys, work during the active season, and biological monitoring that will minimize these adverse effects.

The 14.80 acres of habitat for the snake will be lost due to construction of the proposed project. However, the Authority has proposed to provide habitat to compensate for this loss through the acquisition of permittee-responsible mitigation sites that will be protected in perpetuity with conservation easements. These lands will be protected and managed for the conservation of the lizard 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.

*Vernal pool habitat for central California tiger salamander, Conservancy fairy shrimp, vernal pool fairy shrimp, vernal pool tadpole shrimp, Colusa grass, San Joaquin Valley Orcutt grass, hairy Orcutt grass, Greene's tuctoria, succulent owl's-clover, 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 may 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 would 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, altered hydrology of seasonally inundated depressions such as vernal pools that provide seasonal breeding habitat for the salamander, Conservancy fairy shrimp, vernal pool fairy shrimp, tadpole shrimp, Colusa grass, San Joaquin Valley Orcutt grass, hairy Orcutt grass, Greene's tuctoria, owl's-clover, and 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 minimize and help to 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.

*Central California tiger salamander*

*Effects associated with construction activities*

We do not anticipate significant mortality or injury of salamanders to occur, because upland and aquatic habitat for this species occurs intermittently throughout the long, linear project footprint and

conservation measures have been proposed by the Authority, including exclusion fencing and relocation. 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. 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. 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 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.

Access to suitable upland dispersal and refugia habitat such as grasslands and pastures will become restricted or permanently lost due to permanent structures associated with the CHST-MF Project. Migration and breeding behavior of the salamander within the project action may be altered as a result of these effects.

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

Operation of the Merced to Fresno Section may result in injury or mortality to salamanders within the right-of-way. Security fencing along at-grade tracks will not prohibit salamanders from accessing the right-of-way. Salamanders may access at-grade tracks or track ballast during seasonal migrations between aquatic and upland habitats. This may allow some salamanders to gain access across the tracks to upland and wetland habitats, and potential mates. However, operation of the train and routine maintenance activities on the right-of-way may occur during nocturnal rain events when salamanders are known to be most active.

Implementation of the proposed conservation measures will significantly reduce adverse effects to salamanders during project construction, maintenance, and operational activities. However, some salamanders may still occur because they may be difficult for operators of maintenance equipment and vehicles to observe.

The CHST-MF Project will result in the permanent loss of up to 9.27 acres of aquatic breeding habitat and 269.90 acres of upland habitat for the salamander (Table 8). In addition, 87.49 acres of upland habitat will be temporarily lost during construction. However, the Authority has proposed to provide habitat to compensate for this loss through the acquisition of permittee-responsible mitigation sites that will be protected in perpetuity with conservation easements or the purchase of credits at a Service-approved conservation bank. These lands will be protected and managed for the conservation of the salamander 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.

**Table 8. Estimated habitat loss for the central California tiger salamander.**

Habitat Type - Impact Type (acres)	Hybrid <sup>a</sup>	PP1	CV-Wye	RR-M	Total
Aquatic – Direct	15.34	5.79	0.69	0.09	6.57
Aquatic – Indirect	9.87	2.70	0	0	2.70
Aquatic – Total	25.21	8.49	0.69	0.09	9.27
Upland – Direct	63.24	123.29	106.54	40.07	269.90
Upland – Temporary	-	-	44.03	43.46	87.49
Upland – Total	179.84	123.29	150.57	83.53	357.39

<sup>a</sup> The Hybrid Alternative included two Design Options for a portion of the CV-Wye. In addition, the CV-Wye extends farther west than what was evaluated in the 2012 M-F BO and RR-M has been adjusted. Therefore, this column no longer reflects the total anticipated impacts of the M-F Section and is included only for context.

*LKMS: Construction Activities for Habitat Restoration:*

Construction activities associated with the proposed wetland and riparian restoration will occur within 115.18 acres of the 1,555.75-acre LKMS. Disturbance to upland habitat during construction activities is expected to be minimal within the PA because established routes for movement of equipment will be designated and monitored by the Service-approved biologist. Pre-construction surveys for potentially occupied burrows will be used to designate acres to be avoided by construction equipment and workers. Some salamanders may be relocated from occupied burrows within upland habitat that will be disturbed by construction activities. Salamanders that are not detected during pre-construction surveys may be crushed within their burrows by construction equipment.

Disturbance to salamanders 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. 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 salamanders.

*Conservancy fairy shrimp, vernal pool fairy shrimp, and vernal pool tadpole shrimp*

Vernal pool habitat occurs within the project action area that may be suitable for Conservancy fairy shrimp, vernal pool fairy shrimp, and 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 Merced to Fresno Section of the HST (Table 9). The construction and operation of the Merced to Fresno Section may result in direct effects on populations of Conservancy fairy shrimp, vernal pool fairy shrimp, and 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 Merced to Fresno alignment. Construction of the Merced to Fresno Section may result in disruption of upland areas surrounding vernal pool branchiopod habitat that may 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.

**Table 9. Estimated permanent habitat loss for Conservancy fairy shrimp, vernal pool fairy shrimp, and vernal pool tadpole shrimp.**

Species Impact (acres)	Hybrid <sup>a</sup>			PP1			CV-Wye			RR-M	Total
	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	Total	Direct	
Conservancy Fairy Shrimp	12.90	6.69	19.59	0	0	0	0.69	1.18	1.87	0.05	1.92
Vernal Pool Fairy Shrimp	16.08	11.22	27.30	8.83	7.60	16.43	0.69	1.18	1.87	0.05	18.35
Vernal Pool Tadpole Shrimp	16.08	11.22	27.30	8.83	7.60	16.43	0.69	1.18	1.87	0.05	18.35

<sup>a</sup>The Hybrid Alternative included two Design Options for a portion of the CV-Wye. In addition, the CV-Wye extends farther west than what was evaluated in the 2012 M-F BO and RR-M has been adjusted. Therefore, this column no longer reflects the total anticipated impacts of the M-F Section and is included only for context.

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

Implementation of the proposed conservation measure, such as installation of exclusion fencing around vernal pool habitat and use of erosion control materials, will reduce adverse effects to Conservancy fairy shrimp, vernal pool fairy shrimp, and tadpole shrimp during project construction, maintenance, and operations.

It is expected that all vernal pool and wetland habitat for the Conservancy fairy shrimp, the vernal pool fairy shrimp, and the 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 18.35 acres of suitable vernal pools for the vernal pool fairy shrimp and the vernal pool tadpole shrimp may be permanently lost as a result of the proposed CHST-MF Project (Table 9). A 1.92-acre subset of this total is suitable vernal pool habitat for the Conservancy fairy shrimp.

The Authority has proposed to mitigate for the direct effects to habitat for the Conservancy fairy shrimp, the vernal pool fairy shrimp, and the tadpole shrimp through acquisition of permittee-responsible mitigation sites within Merced, Madera, and Fresno 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 Conservancy fairy shrimp, the vernal pool fairy shrimp, and the tadpole shrimp and provide habitat for breeding, feeding, or sheltering commensurate with or better than habitat lost as a result of the proposed project.

Three of the proposed permittee-responsible mitigation sites identified in the July 2012 Draft MSIP, including the LKMS, are located within designated critical habitat for one or more of these species; the acquisition of this designated critical habitat would protect habitat that Service has deemed critical for the survival and recovery of these species. Three of the proposed permittee-responsible mitigation sites identified in the July 2012 Draft MSIP, including the LKMS, are also located within core areas identified in the Vernal Pool Recovery Plan. Vernal pool regions are discrete units that identify areas targeted for the recovery and conservation objectives of vernal pool species; core areas are distinct areas within each vernal pool region that provide the features, populations, and distinct geographic and/or genetic diversity necessary for the recovery of a species. 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 July 2012 Draft MSIP would preserve and restore vernal pool habitat in the same recovery area affected by constructing and operating the Merced to Fresno Section, and permanently protect

designated critical habitat for two of the listed wildlife species. Permanent protection of these lands will help maintain the geographic distribution of the species and contribute to the survival and recovery of these species.

*Colusa grass, San Joaquin Valley Orcutt grass, hairy Orcutt grass, Greene's tuctoria, succulent owl's-clover, and Hoover's spurge*

Direct and indirect effects to Colusa grass, San Joaquin Valley Orcutt grass, hairy Orcutt grass, Greene's tuctoria, owl's-clover, and Hoover's spurge will be presumed where vernal pool habitat occurs within the project action area. Effects to each of these listed plant 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 plant species within specific USGS 7.5-minute quadrangles as they occur within the Merced to Fresno Section of the HST (Table 10). The proposed project will result in the permanent loss of vernal pool for Colusa grass, San Joaquin Valley Orcutt grass, hairy Orcutt grass, Greene's tuctoria, succulent owl's-clover, and Hoover's spurge.

#### *Effects associated with construction*

Construction and operation of the Merced to Fresno Section may result in adverse effects to small, isolated populations of vernal pool plants that occur within the project action area (Table 10). Vernal pool 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 Colusa grass, the San Joaquin Valley Orcutt grass, the hairy Orcutt grass, the Greene's tuctoria, the owl's-clover, and the Hoover's spurge and negatively affect the fitness of populations that occur within the project action area.

#### *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 Colusa grass, San Joaquin Valley Orcutt grass, hairy Orcutt grass, Greene's tuctoria, owl's-clover, and Hoover's spurge 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, Colusa grass, San Joaquin Valley Orcutt grass, hairy Orcutt grass, Greene's tuctoria, owl's-clover, Hoover's spurge, 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 Colusa grass, San Joaquin Valley Orcutt grass, hairy Orcutt grass, Greene's tuctoria, and succulent owl's-clover*

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 Colusa grass, San Joaquin Valley Orcutt grass, hairy Orcutt grass, Greene’s tuctoria, owl’s-clover, and Hoover’s spurge during project construction, maintenance, and operations.

It is expected that all vernal pool and wetland habitat for the Colusa grass, San Joaquin Valley Orcutt grass, hairy Orcutt grass, Greene’s tuctoria, owl’s-clover, and Hoover’s spurge 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. Acreages of suitable vernal pool and wetland habitat for these species that may be permanently lost as a result of the proposed CHST-MF Project are presented in Table 10.

**Table 10. Estimated permanent habitat loss for vernal pool plant species.**

Species	Hybrid <sup>a</sup>			PP1			CV-Wye			RR-M	Total
	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	Total	Direct	
Colusa grass	0.14	0.07	0.21	0	0	0	0	0	0	0.05	0.05
Greene’s tuctoria	12.07	2.19	14.26	0	0	0	0	0	0	0.05	0.05
Hairy Orcutt grass	13.35	7.46	20.81	0.44	0.53	0.97	0	0	0	0.05	1.02
San Joaquin Valley Orcutt grass	12.39	7.85	20.24	0	0.11	0.11	0	0	0	0.05	0.16
Succulent owl’s-clover	7.11	6.33	13.44	-	-	0.18	0.19	0.04	0.23	0.05	0.46
Hoover’s spurge	0	0	0	0	0	0	0.19	0.04	0.23	0.05	0.28

<sup>a</sup> The Hybrid Alternative included two Design Options for a portion of the CV-Wye. In addition, the CV-Wye extends farther west than what was evaluated in the 2012 M-F BO and RR-M has been adjusted. Therefore, this column no longer reflects the total anticipated impacts of the M-F Section and is included only for context.

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 Merced, Madera, and Fresno 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 Colusa grass, San Joaquin Valley Orcutt grass, hairy Orcutt grass, Greene’s tuctoria, owl’s-clover, and Hoover’s spurge and provide habitat for breeding, feeding, or sheltering commensurate with or better than habitat lost as a result of the proposed project.

Two of the proposed permittee-responsible mitigation sites identified in the July 2012 Draft MSIP, including the LKMS, are located within designated critical habitat for two of these species; the acquisition of this designated critical habitat would protect habitat that the Service has deemed critical for the survival and recovery of these species. Three of the proposed permittee-responsible mitigation sites identified in the July 2012 Draft MSIP, including the LKMS, are also located within core areas identified in the Vernal Pool Recovery Plan. Vernal pool regions are discrete units that identify areas targeted for the recovery and conservation objectives of vernal pool species; core areas are distinct areas within each vernal pool region that provide the features, populations, and distinct geographic and/or genetic diversity necessary for the recovery of a species. 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 July 2012 Draft MSIP would preserve and restore vernal pool habitat in the same recovery area affected by constructing and operating the Merced to Fresno Section, and permanently protect designated critical habitat for two of the listed wildlife species. Permanent protection of these lands

will help maintain the geographic distribution of the species and contribute to the survival and recovery of these species.

*Palmate-bracted bird's-beak*

Approximately 78.72 acres of suitable habitat (California annual grassland and valley sink scrub) for the bird's-beak has been mapped within the CV-Wye portion of the action area and 5.94 acres in the RR-M portion of the action area, for a total of 84.66 acres.

Construction-related operation of equipment and vehicles may directly remove bird's-beak plants and smother their seeds. However, the Authority has proposed conservation measures, including pre-construction surveys and a rare plant salvage and relocation plan that will minimize these adverse effects.

Of the 84.66 acres of habitat for the bird's-beak, 16.78 acres will be temporarily disturbed and 67.88 acres will be permanently lost due to construction of the proposed project. However, the Authority has proposed to provide habitat to compensate for this loss through the acquisition of permittee-responsible mitigation sites that will be protected in perpetuity with conservation easements. These lands will be protected and managed for the conservation of the bird's-beak in perpetuity. These protected lands will provide habitat for reproduction and nutrition commensurate with or better than habitat lost as a result of the proposed project.

*San Joaquin woollythreads*

Approximately 4.32 acres of suitable habitat (California annual grassland and valley sink scrub) for the woollythreads has been mapped within the footprint of the EINU activities of the CV-Wye portion of the action area. Construction-related operation of equipment and vehicles may directly remove woollythreads plants and smother their seeds. However, the Authority has proposed conservation measures, including pre-construction surveys and a rare plant salvage and relocation plan that will minimize these adverse effects. The 4.32 acres will be temporarily disturbed and restored to pre-disturbance conditions following construction.

*Valley elderberry longhorn beetle*

Approximately 11.55 acres of suitable riparian habitat that could support elderberry shrubs and the beetle will be permanently affected as a result of the CHST-MF Project. At least, three elderberry shrubs have been identified within the project footprint that may be lost and could be subject to Service transplantation guidelines. Other elderberry stands that may be identified within the project action area may be subject to removal or damage during construction activities. Indirect adverse effects to beetles and their habitat may extend up to 100 feet from both sides of the project footprint during construction of the HST. Surveys for the beetle and suitable habitat for this species have not been completed throughout most of the project action area because of limited access.

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 beetle. However, the extent of effect to beetle habitat will be determined through the amount of elderberry shrubs and stems that will be directly or indirectly affected.

Negative effects to elderberry shrubs may directly affect the survival of the beetle because they are host-specific to this plant species. 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 the beetle through the removal or partial destruction of elderberry shrubs within the project action area. Permanent installation of impermeable surfaces (e.g. concrete) may alter site hydrology (e.g. alterations in water flow patterns, inundation patterns, ground water, or water quality), which can negatively affect plant survival and result in subsequent loss of habitat for the beetle. Beetle mortality may occur from collisions or crushing by vehicles and equipment; human destruction or disturbance of occupied elderberry shrubs; or destruction of native riparian habitat

Implementation of the proposed conservation measures will significantly reduce adverse effects to the beetle during project construction, maintenance, and operations. All disturbed areas will be restored and revegetated with native plants and seeds following construction under the guidance of the RRP. The Authority will follow compensatory mitigation measures provided within the *Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle (Desmocerus californicus dimorphus)* (Service 2017c). The Authority has proposed to implement compensatory mitigation for this species at mitigation sites identified in the July 2012 Draft MSIP. These sites include conservation banks located in Sacramento or San Joaquin Counties or other permittee-responsible sites, if available. These sites will be acquired, protected in perpetuity through conservation easements, protected and managed for the conservation of the 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 beetle.

### **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.

Habitat loss, fragmentation, as a result of increased agriculture, development, and urbanization pose the greatest conservation threats to the kit fox, the salamander, the Conservancy fairy shrimp, the vernal pool fairy shrimp, the tadpole shrimp, the beetle, the Colusa grass, the San Joaquin Valley Orcutt grass, the hairy Orcutt grass, the Greene's tuctoria, the owl's-clover, and the Hoover's spurge. 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.

Encroachment from residential developments and infrastructure to support increased population expansion could result in further habitat loss and fragmentation for the kit fox, the GKR, the lizard, the snake, the salamander, the beetle, the Conservancy fairy shrimp, the vernal pool fairy shrimp, the tadpole shrimp, the beetle, the Colusa grass, the San Joaquin Valley Orcutt grass, the hairy Orcutt grass, the Greene's tuctoria, the owl's-clover, the Hoover's spurge, the bird's-beak, and the woollythreads.

## Conclusion

### *San Joaquin kit fox*

Even with the implementation of the proposed Conservation Measures, the Service still believes that there is a likelihood of adverse effects to the kit fox from the proposed project. However, after reviewing the current status of the kit fox, the environmental baseline for the project area, the effects of the proposed project, and the cumulative effects, it is the Service's biological opinion that the CHST-MF Project, as proposed, is not likely to jeopardize the continued existence of this listed species. This is because the FRA and Authority have proposed to install dedicated wildlife crossings and other structures to maintain current levels of connectivity among populations of this species and the amount of anticipated habitat loss will occur primarily in compatible-use agricultural lands. Protection of habitats within the permittee-responsible mitigation sites as identified in the July 2012 Draft MSIP would preserve and restore suitable habitat for the kit fox. Permanent protection of these lands through conservation easements will provide beneficial effects for this species and contribute to its survival and recovery.

### *Giant kangaroo rat*

After reviewing the current status of the GKR, 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-MF Project, as proposed, is not likely to jeopardize the continued existence of the GKR. The Service reached this conclusion because the project-related effects to the GKR, when added to the environmental baseline and analyzed in consideration of the lack of cumulative effects, will not rise to the level of precluding recovery or reducing the likelihood of survival of the species. The habitat that will be lost represents a very small proportion of habitat available throughout the full range of the GKR.

### *Central California tiger salamander, Conservancy fairy shrimp, vernal pool fairy shrimp, vernal pool tadpole shrimp, and valley elderberry longhorn beetle*

Even with the implementation of the proposed Conservation Measures, the Service still believes that there is a likelihood of adverse effects to the salamander, Conservancy fairy shrimp, vernal pool fairy shrimp, tadpole shrimp, and beetle from the proposed project. However, after reviewing the current status of these species, the environmental baseline for the project area, the effects of the proposed project, and the cumulative effects, it is the Service's biological opinion that the CHST-MF Project, as proposed, is not likely to jeopardize the continued existence of any of these listed species. This is because the amount of anticipated habitat loss is of such a limited scale relative to the status of these species in and around the action area and range-wide. Protection of habitats within the permittee-responsible mitigation sites identified in the July 2012 Draft MSIP would preserve and restore vernal pool habitat in the same recovery area affected by constructing and operating the Merced to Fresno Section, and permanently protect designated critical habitat for two of the listed wildlife species. Permanent protection of these lands through conservation easements will provide beneficial effects for these species and contribute to their survival and recovery.

### *Colusa grass, San Joaquin Valley Orcutt grass, hairy Orcutt grass, Greene's tuctoria, succulent owl's-clover, and Hoover's spurge*

Even with the implementation of the proposed Conservation Measures, the Service still believes that there will be adverse effects to the Colusa grass, the San Joaquin Valley Orcutt grass, the hairy

Orcutt grass, the Greene's tuctoria, the succulent owl's-clover, and the Hoover's spurge. After reviewing the current status of these species, the environmental baseline for the project area, the effects of the proposed project, and the cumulative effects, it is the Service's biological opinion that the CHST-MF Project, as proposed, is not likely to jeopardize the continued existence of any of these listed species. This is because only a very small proportion of habitat for the species will be permanently lost as a result of the project, relative to the status of the species in and around the action area and range-wide. Protection of habitats within the permittee-responsible mitigation sites identified in the July 2012 Draft MSIP would preserve and restore vernal pool habitat in the same recovery area affected by constructing and operating the Merced to Fresno Section, and permanently protect designated critical habitat for two of the listed plant species. Permanent protection of these lands through conservation easements will provide beneficial effects for these species and contribute to their survival and recovery.

#### *Palmate-bracted Bird's-beak*

After reviewing the current status of the bird's-beak, 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-MF Project, as proposed, is not likely to jeopardize the continued existence of the bird's-beak. The Service reached this conclusion because the project-related effects to the bird's-beak, when added to the environmental baseline and analyzed in consideration of the lack of cumulative effects, will not rise to the level of precluding recovery or reducing the likelihood of survival of the species. The habitat that will be lost represents a very small proportion of habitat available throughout the full range of the bird's-beak. In addition, the compensatory habitat proposed will ensure that habitat for the species will be protected and managed in perpetuity.

#### *San Joaquin woollythreads*

After reviewing the current status of the woollythreads, 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-MF Project, as proposed, is not likely to jeopardize the continued existence of the woollythreads. The Service reached this conclusion because the project-related effects to the woollythreads, when added to the environmental baseline and analyzed in consideration of the lack of cumulative effects, will not rise to the level of precluding recovery or reducing the likelihood of survival of the species. The habitat that will be temporarily disturbed represents a very small proportion of habitat available throughout the full range of the woollythread and will not be permanently lost.

### INCIDENTAL TAKE STATEMENT

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

is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

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

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.

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

#### *San Joaquin kit fox*

The Service anticipates that incidental take of individual kit foxes will be difficult to detect or quantify due to the fact that the species is nocturnal and spends much of its time in underground dens. Surveys have not been conducted within the entirety of the action area. Therefore, the amount of habitat for this species that will be impacted as a result of the proposed project will be used as a surrogate for quantifying take. The Service anticipates that all kit foxes inhabiting the 1,910.50 acres of suitable habitat inside the construction footprint and within 1,000 feet of the project will be subject to incidental take in the form of harm as construction activities progress for PP1, the CV-Wye, RR-M, and the LKMS. Because of the conservation measures proposed by the Authority, the Service believes that harm of individual kit fox within the action area will be low.

Kit fox are highly mobile and may use the action area for foraging, sheltering, reproducing, or a combination of those activities. This makes it difficult to estimate the number of individuals that may be taken within the 1,910.50 acres of habitat within the construction footprint. Therefore, the Service is providing a mechanism to quantify when we would consider take exceeded as a result of the proposed project. Because we expect that the proposed conservation measures will detect known dens and that kit foxes will be allowed to vacate the construction footprint, we will use the detection of one (1) individual injured or killed as a measurable threshold that indicates that the kit fox is being affected at a level where conservation measures and project implementation need to be evaluated and possibly modified.

Upon implementation of the Reasonable and Prudent Measures, this level of incidental take will be exempt from the prohibitions described under section 9 of the Act. Accordingly, the Service concludes that incidental take of the kit fox will be considered exceeded if one or more of the following conditions are met: (1) more than one individual kit fox is injured or killed at any time during construction of the proposed project; or (2) more than 1,910.50 acres of suitable habitat is

permanently impacted by the proposed project. Under these circumstances, as provided in 50 CFR §402.16, reinitiation of formal consultation would be required.

*Giant kangaroo rat*

The Service anticipates that incidental take of the GKR will be difficult to detect or quantify due to the fact that the species is nocturnal and spends almost all of its time in underground burrow systems. Surveys have not been conducted within the CV-Wye portion of the action area where the GKR is expected to occur. Therefore, the amount of habitat for this species that will be impacted as a result of the proposed project will be used as a surrogate for quantifying take. The Service anticipates that all GKR inhabiting the 0.06 acre of habitat within the action area will be subject to incidental take in the form of capture and harm due to trapping and construction-related activities. Because of the conservation measures proposed by the Authority, the Service believes that harm of individual GKR within the action area will be low.

Due to the fact that densities of the GKR may fluctuate annually (Service 1989), making it difficult to estimate the number of individuals that may be taken within the 0.06 acre of habitat, the Service is providing a mechanism to quantify when we would consider take exceeded as a result of the proposed project. We will use the capture of ten (10) individuals or the mortality of one (1) individual as a measurable threshold that indicates that the GKR is being affected at a level where conservation measures and project implementation need to be evaluated and possibly modified. Upon implementation of the Reasonable and Prudent Measures, this level of incidental take will be exempt from the prohibitions described under section 9 of the Act. Accordingly, the Service concludes that incidental take of the GKR will be considered exceeded if one or more of the following conditions are met: (1) more than ten individual GKR are captured during Service-approved trapping and relocation; (2) more than one individual GKR is killed at any time during construction of the proposed project; or (3) more than 0.06 acre of suitable habitat is permanently impacted by the proposed project. Under these circumstances, as provided in 50 CFR §402.16, reinitiation of formal consultation would be required.

*Blunt-nosed leopard lizard*

The Service anticipates that incidental take of the lizard will be difficult to detect or quantify due to the fact that lizards spend much of the year underground, they can be difficult to locate due to their cryptic appearance, and finding a dead or injured individual is unlikely due to their relatively small size. Surveys have not been conducted within the CV-Wye or RR-M portions of the action area where the lizard is expected to occur. Therefore, the amount of habitat for this species that will be impacted as a result of the proposed project will be used as a surrogate for quantifying take. The Service anticipates that all lizards inhabiting the 41.99 acres of habitat within the action area will be subject to incidental take in the form of harm due to construction-related activities. Because of the conservation measures proposed by the Authority, the Service believes that harm of individual lizards within the action area will be low.

Due to the fact that densities of the lizard may fluctuate annually and vary among sites (Service 1998), making it difficult to estimate the number of individuals that may be taken within the 41.99 acres of habitat, the Service is providing a mechanism to quantify when we would consider take exceeded as a result of the proposed project. We will use the observed injury or mortality of ten (10) individuals as a measurable threshold that indicates that the lizard is being affected at a level where conservation measures and project implementation need to be evaluated and possibly modified.

Upon implementation of the Reasonable and Prudent Measures, this level of incidental take will be exempt from the prohibitions described under section 9 of the Act. Accordingly, the Service concludes that incidental take of the lizard will be considered exceeded if one or more of the following conditions are met: (1) more than ten individual lizards is killed at any time during construction of the proposed project; or (2) more than 41.99 acres of suitable habitat is permanently impacted by the proposed project. Under these circumstances, as provided in 50 CFR §402.16, reinitiation of formal consultation would be required.

*Giant gartersnake*

The Service anticipates that incidental take of the snake will be difficult to detect or quantify due to the fact that snakes are particularly skittish and spend much of their time underground when not in the water. Surveys have not been conducted within the CV-Wye portion of the action area where the snake is expected to occur. Therefore, the amount of habitat for this species that will be impacted as a result of the proposed project will be used as a surrogate for quantifying take. The Service anticipates that all snakes inhabiting the 14.80 acres of habitat within the action area will be subject to incidental take in the form of harm due to construction-related activities. Because of the conservation measures proposed by the Authority, the Service believes that harm of individual snakes within the action area will be low.

Due to the fact that snake population densities are unknown in the action area, making it difficult to estimate the number of individuals that may be taken within the 14.80 acres of habitat, the Service is providing a mechanism to quantify when we would consider take exceeded as a result of the proposed project. Snakes persist in low numbers in the San Joaquin Valley (Service 2012a); therefore, we will use the observed injury or mortality of two (2) individuals as a measurable threshold that indicates that the snake is being affected at a level where conservation measures and project implementation need to be evaluated and possibly modified.

Upon implementation of the Reasonable and Prudent Measures, this level of incidental take will be exempt from the prohibitions described under section 9 of the Act. Accordingly, the Service concludes that incidental take of the snake will be considered exceeded if one or more of the following conditions are met: (1) more than two individual snakes are injured or killed at any time during construction of the proposed project; or (2) more than 14.80 acres of suitable habitat is permanently impacted by the proposed project. Under these circumstances, as provided in 50 CFR §402.16, reinitiation of formal consultation would be required.

*Central California tiger salamander*

It is not possible to quantify the number of individual salamanders that will be impacted as a result of PP1 of the CHST-MF the proposed project. Specifically, when salamanders are not in their breeding ponds, they inhabit the burrows of ground squirrels or other rodents or may be moving from one location to another, and may be difficult to locate due to their cryptic appearance and behavior; they may be located a distance from the breeding ponds; and the finding of an injured or dead individual is unlikely because of their relatively small body size. Loss of these species also may be difficult to quantify due to seasonal fluctuations in their numbers, random environmental events, changes in water regime at their breeding ponds, or additional environmental disturbances. Therefore, the amount of habitat for this species impacted by the project will be used as a surrogate for quantifying take. The Service anticipates that all salamanders within 9.27 acres of suitable aquatic breeding habitat and 357.39 acres of suitable upland habitat that will be permanently or temporarily lost will be subject to incidental take in the form of capture or harm.

Upon implementation of the Reasonable and Prudent Measures, this level of incidental take will be exempt from the prohibitions described under section 9 of the Act. Accordingly, the Service concludes that incidental take of the salamander will be considered exceeded the following condition is met: (1) more than 9.27 acres of aquatic habitat or 3557.39 acres of upland habitat is impacted by the proposed project. Under these circumstances, as provided in 50 CFR §402.16, reinitiation of formal consultation would be required.

*Conservancy fairy shrimp*

The Service anticipates that incidental take of the Conservancy fairy shrimp will be difficult to quantify due to the fact that it is not possible to know how many individuals occupy any wetland feature, how many eggs are in the soil of any wetland feature, or how many individuals or eggs will occupy any wetland feature later in time. Surveys have not been conducted throughout the action area. Therefore, the amount of habitat for this species will be used as a surrogate for quantifying take. The Service anticipates that all Conservancy fairy shrimp and their eggs within 1.92 acre of wetland features within the action area will be subject to incidental take in the form of capture and harm.

Upon implementation of the Reasonable and Prudent Measures, this level of incidental take will be exempt from the prohibitions described under section 9 of the Act. Accordingly, the Service concludes that incidental take of the Conservancy fairy shrimp will be considered exceeded if more than 1.92 acre of suitable habitat is permanently impacted by the proposed project. Under these circumstances, as provided in 50 CFR §402.16, reinitiation of formal consultation would be required.

*Vernal pool fairy shrimp and vernal pool tadpole shrimp*

The Service anticipates that incidental take of the vernal pool fairy shrimp and tadpole shrimp will be difficult to quantify due to the fact that it is not possible to know how many individuals occupy any wetland feature, how many eggs are in the soil of any wetland feature, or how many individuals or eggs will occupy any wetland feature later in time. Surveys have not been conducted throughout the action area. Therefore, the amount of habitat for these species will be used as a surrogate for quantifying take. The Service anticipates that all vernal pool fairy shrimp and tadpole shrimp and their eggs within 18.35 acres of wetland features within the action area will be subject to incidental take in the form of capture and harm.

Upon implementation of the Reasonable and Prudent Measures, this level of incidental take will be exempt from the prohibitions described under section 9 of the Act. Accordingly, the Service concludes that incidental take of the vernal pool fairy shrimp and the tadpole shrimp will be considered exceeded if more than 18.35 acres of suitable habitat is permanently impacted by the proposed project. Under these circumstances, as provided in 50 CFR §402.16, reinitiation of formal consultation would be required.

*Valley elderberry longhorn beetle*

The Service anticipates that incidental take of the beetle will be difficult to detect due to the fact that it is not possible to know how many larvae inhabit any one elderberry shrub providing habitat for the beetle. The beetle spends most of its time in the larval stage living within the stems of the elderberry shrub, and the life cycle of the beetle takes one or two years to complete. Beetle larval use of an elderberry shrub is not readily apparent, and in early stages of development beetle larvae can

be present in stems that have no evidence of exit holes. The removal of the elderberry shrubs could result in harm to all larvae inhabiting the stems.

Following the *Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle (Desmocerus californicus dimorphus)* (Service 2017c), any elderberry shrubs discovered within the 11.55 acres of riparian habitat in the action area will be transplanted. The survival rate of transplanted elderberry shrubs is estimated to be 72.8% in the first year following shrub relocation (Holyoak et al. 2010). The Service anticipates that 27.2% of any elderberry shrubs transplanted may not survive, and that the remaining shrubs may experience damage to stems either accidentally or from targeted trimming. Therefore, the Service anticipates that all beetle larvae in the shrubs that do not survive, as well as any beetle larvae in stems greater or equal to 1-inch in diameter in the remaining shrubs that may be trimmed or damage, will be subject to incidental take in the form of harm.

Upon implementation of the Reasonable and Prudent Measures, this level of incidental take will be exempt from the prohibitions described under section 9 of the Act. Accordingly, the Service concludes that incidental take of the beetle will be considered exceeded the following condition is met: (1) more than 11.55 acres of riparian habitat containing elderberry shrubs is impacted by the proposed project. Under these circumstances, as provided in 50 CFR §402.16, reinitiation of formal consultation would be required.

### **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 giant kangaroo rat, the blunt-nosed leopard lizard, the giant gartersnake, the Central California distinct population segment of the salamander, the Conservancy fairy shrimp, the vernal pool fairy shrimp, the vernal pool tadpole shrimp, or the valley elderberry longhorn beetle.

### **Reasonable and Prudent Measure**

All necessary and appropriate measures to avoid or minimize effects on the kit fox, the GKR, the lizard, the snake, the salamander, the Conservancy fairy shrimp, the vernal pool fairy shrimp, the tadpole shrimp, and the beetle resulting from implementation of this project have been incorporated into the project's proposed conservation measures. Therefore, the Service believes the following reasonable and prudent measure is necessary and appropriate to minimize incidental take of these species:

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

### **Terms and Conditions**

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

1. The Authority shall ensure that it 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 Authority shall adhere to the following reporting requirements. Should this anticipated amount or extent of incidental take be exceeded, the Authority must immediately reinstate formal consultation as per 50 CFR 402.16.
  - a. For those components of the action that will result in habitat degradation or modification whereby incidental take in the form of harm is anticipated, the Authority shall provide weekly updates to the Service with a precise accounting of the total acreage when the following habitats are impacted: (1) natural grasslands (Table 6); (2) compatible-use agricultural lands (Table 6); (3) upland habitat for the California tiger salamander (Table 8); (4) vernal pool habitat for vernal pool species (Tables 9 to 10); and (5) riparian habitat for the beetle. 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 harm, injury, or death is anticipated, the Authority shall immediately contact the Service's Sacramento Fish and Wildlife Office (SFWO) at (916) 414-6600, to report the encounter. If an encounter occurs after normal working hours, the Authority 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 Authority 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. Before construction for any phase begins, the Authority will provide a phase-specific final mitigation plan that implements mitigation consistent with the draft MSIP and that 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 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.
4. The Authority shall follow all compensatory mitigation measures provided within the *Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*)* (Service 2017c).
5. The Authority shall require the use of appropriate California native species in vegetation and habitat enhancement efforts.
6. The Authority will submit the LTMP to the Service for review and approval prior to its implementation. The LTMP will provide details regarding maintenance, management of invasive plant species, cattle grazing, monitoring for Federally-listed species, and pesticide use.
7. The LTMP will include long-term monitoring and reporting requirements for the preserved vernal pools, as well as the restored vernal pools once the performance standards required by

SWRCB and USACE for the restored vernal pools have been met. Long-term monitoring will provide data to inform adaptive management actions to ensure the Conservation Values of the LKMS, including the preserved vernal pool/grassland complex, are maintained.

### Salvage and Disposition of Individuals

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

### CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities 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 Authority develop and implement the appropriate restoration measures in areas designated in the *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 2005).
2. 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 CNDDB 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 California High-Speed Train System: Merced to Fresno Section Project. As provided in 50 CFR §402.16, reinitiation of formal consultation is required and shall be requested by the federal agency or by the Service where discretionary federal agency involvement or control over the action has been retained or is authorized by law and:

- (a) If the amount or extent of taking specified in the incidental take statement is exceeded;
- (b) If new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered;

- (c) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion; or
- (d) If a new species is listed or critical habitat designated that may be affected by the identified action.

If you have any questions regarding this biological opinion, please contact Nina Bicknese, Senior Fish and Wildlife Biologist ([nina\\_bicknese@fws.gov](mailto:nina_bicknese@fws.gov)) or Patricia Cole, Chief, San Joaquin Valley Division, at the letterhead address, (916) 414-6544, or by email ([patricia\\_cole@fws.gov](mailto:patricia_cole@fws.gov)).

Sincerely,



Jennifer M. Norris, Ph.D.  
Field Supervisor

ec:

Stephanie Perez, Federal Railroad Administration, Washington, D.C.  
Katie Schmidt, National Marine Fisheries Service, Sacramento, CA  
Julie Vance, California Department of Fish and Wildlife, Fresno, CA  
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