CALIFORNIA HIGH-SPEED TRAIN

Merced to Fresno Section Project

Checkpoint C

Summary Report

Volume 1

February 2012

CALIFORNIA
High-Speed Rail Authority

U.S. Department of Transportation
Federal Railroad Administration

CALIFORNIA HIGH-SPEED TRAIN PROJECT

Checkpoint C Summary Report

Merced to Fresno Section

PERMIT APPLICATION NUMBER:
SPK-2009-01483

APPLICANTS:
California High-Speed Rail Authority (Authority) and
Federal Railroad Administration (FRA)

PROJECT
California High-Speed Train Project
Merced to Fresno Section

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B Watershed Evaluation Report (including CRAM Report as Appendix B) (CRAM Report Appendix H provided on DVD)
C Section 404 Individual Permit Application (Volume II provided on DVD)
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1.0 Project Purpose and Need; Scope of Analysis

This Checkpoint C Summary Report (Summary) for the proposed California High-Speed Train (HST) Project for the Merced to Fresno Section was prepared under the Memorandum of Understanding (MOU) between the California High-Speed Rail Authority (Authority), Federal Railroad Administration (FRA), U.S. Army Corps of Engineers (USACE), and U.S. Environmental Protection Agency (EPA) (2010) for the proposed California HST System. This Summary Report complies with the Checkpoint C requirements as laid out in the MOU and subsequent refinements of the requirements provided by USACE and EPA (Attachments 1 and 2). The Hybrid Alternative is the Applicants' preferred alternative and is evaluated herein based on the administrative draft Merced to Fresno Final Environmental Impact Report/Environmental Impact Statement (EIR/EIS) (February 2012) and the technical studies and other information as listed in Table 1-1. Figure 1-1 shows the alignment of the Hybrid Alternative.

1.1 Overall Project Purpose and Need

1.1.1 Background

The Authority and FRA prepared a Statewide Program (Statewide Program EIR/EIS) evaluating the HST's ability to meet the existing and future capacity demands on California's intercity transportation system. The Authority and FRA completed a Final Statewide Program EIR/EIS in August 2005 as the first phase of a tiered environmental review process (Tier 1) for the proposed California HST System. The Authority and FRA completed a second Program EIR/EIS in July 2008 to identify a preferred alignment for the Bay Area to Central Valley. The Bay Area to Central Valley HST Program EIR/EIS resulted in a decision by the Authority and FRA to connect the Bay Area and the Central Valley through the Pacheco Pass and to proceed along the Caltrain rail right-of-way from San Francisco to San Jose.

Since adoption of the 2008 document, two legal challenges have been filed. In each instance, the Court has upheld the selection of the Pacheco Pass alignment. However, in response to several technical issues, the Authority has prepared and submitted to the Court additional environmental analysis and documentation. Most recently, the Authority released a Partially Revised Draft Program EIR. The 45-day public comment period began January 6, 2012, and is to conclude on February 21, 2012.

1.1.1.1 Merced to Fresno HST Project

In 2008, the Authority initiated work on preparation of project level (Tier 2) engineering, design and environmental work for all the HST project sections. The site-specific effort is to provide a complete assessment of the direct, indirect, and cumulative effects of the proposed action, considers public and agency participation in the scoping process, and is to occur in consultation with resource and regulatory agencies, including EPA and USACE.

Table 1-1
EPA/USACE Data Needs for Checkpoint C

NEPA 404/408 MOU and EPA/USACE Data Needs	Source of Data	Section, Attachment, or Appendix	Request Status
Checkpoint C: Preliminary LEDPA Determination			
Data Request 1: Response to Comments			
FRA/Authority responses to substantive public comments on Draft EIR/EIS.	Comments Summary Report	Appendix I	Summary of comments is attached and all responses will be included in the administrative draft Final EIR/EIS.
FRA/Authority responses to comments on USACE Public Notice.	Response to comments received on the USACE Public Notice	Attachment 3	Data request completed.
Data Request 2: Updated Project Activities Description			
Updated project description and/or plans for alternatives, including a draft operations and maintenance plan (if changed).	15% and 30% Engineering Design Plans Operations and Service Plan	Volume III of EIR/EIS Appendix A	Data request to be completed.
Data Request 3: Functional/Condition Assessment of Aquatic Resources			
Report of findings and application of the results from the Functional/Condition Assessment of Aquatic Resources occurring within the project area.	Merced to Fresno Section Draft WER, including the Draft CRAM	Appendix B	Data request completed.
Data Request 4: Final Draft 404 (b)(1) alternatives analysis			
Final Draft 404(b)(1) alternatives analysis (compliance evaluation with 404(b)(1) Guidelines), if it is a separate and distinct document from the NEPA alternatives analysis.	Checkpoint C Summary Report	Not applicable	Data request completed.

NEPA 404/408 MOU and EPA/USACE Data Needs	Source of Data	Section, Attachment, or Appendix	Request Status
Data Request 5: Documentation of Avoidance/Minimization Measures in Project Design			
Documentation of any avoidance and minimization measures incorporated into the project design. Documentation should consist of a quantification and qualification of the acres of impacts on waters of the U.S. avoided for each alternative (as applicable).	Site-specific avoidance information	Section 5, Attachment 4	Data request completed.
Data Request 6: Waters of U.S./Special Aquatic Resources Impacts Summary (Permanent)			
Based on engineering plans/drawings, a written description and quantification of the ***permanent impacts*** (direct, indirect, and cumulative) on waters of the U.S., including special aquatic sites. The impacts must be clearly depicted and accurately characterized by providing a quantification of the impacts (acres and/or linear feet) and an assessment of the losses and gains in functions and services.	Section 404 Individual Permit Application; Wetland Delineation Report	Appendix C	Data request completed.
Data Request 7: Waters of U.S./Special Aquatic Resources Impacts Summary (Temporary)			
Based on engineering plans/drawings, a written description and quantification of the ***temporary impacts*** (direct, indirect, and cumulative) on waters of the U.S., including special aquatic sites. The impacts must be clearly depicted and accurately characterized by providing a quantification of the impacts (acres and/or linear feet) and a qualitative and quantitative assessment of the losses and gains in functions and services.	Section 404 Individual Permit Application; Wetland Delineation Report	Appendix C	Data request completed.

NEPA 404/408 MOU and EPA/USACE Data Needs	Source of Data	Section, Attachment, or Appendix	Request Status
Data Request 8: Long-Term Operational Impacts			
Based on the draft Operations and Maintenance Plan, a written description detailing ***long-term operational impacts*** (direct, indirect, and cumulative) to waters of the U.S., including special aquatic sites.	Operations and Maintenance Plan	Appendix A	Data request completed.
Data Request 9: Updated Environmental Summary Table/Maps			
Refinement and expansion of the environmental summary table and environmental constraints map(s) developed during Checkpoint B, incorporating data from the jurisdictional determination, functional/condition assessment, and other pertinent data stemming from the Draft EIR/EIS.	Environmental Constraint Maps	Appendix F	Data request completed. Data previously provided in the Section 404(b)(1) summary table are included in the Checkpoint C Summary Report.
Compliance with federal and state laws.	Merced Fresno Section EIR/EIS	Attachment 5	Data request completed.
Data Request 11: Draft Biological Assessment Report			
Quantification of direct, indirect, and cumulative impacts on biological resources, including federally listed, endangered, and threatened species and designated critical habitat, and other wildlife and habitat resource concerns.	Draft Biological Assessment; San Joaquin River Crossing Design Refinement – Merced to Fresno Section Technical Memorandum	Appendices G1 and G2	Data request completed.
Data Request 12: Cultural Resources Impacts			
Consideration of temporary, permanent, and cumulative impacts on cultural resources, including sites listed on the National Register of Historic Places or National Historic Landmarks.	Historic Properties Survey Report (HPSR); and Archaeological Survey Report (ASR)	Appendix J	Data request completed.

NEPA 404/408 MOU and EPA/USACE Data Needs	Source of Data	Section, Attachment, or Appendix	Request Status
Data Request 13: Draft Mitigation Plan			
A description of FRA's and Authority's proposed compensatory mitigation for losses of aquatic resources that specifies the amount, type, and location of compensatory mitigation. The proposal should indicate whether FRA and Authority intend to pursue permittee-responsible mitigation or use a USACE-approved mitigation bank or in-lieu fee program.	Compensatory Mitigation Plan (CMP) and Mitigation Strategy and Implementation Plan (MSIP) (partial draft)	Appendices D and E	Data request completed. MSIP being prepared in support of the Section 7 process.
Data Request 14: 408 Permit Compliance			
Process for obtaining the 408 permit.	Approach to and milestones to process the 408 Permit	Appendix H	Data request completed.
ADDITIONAL INFORMATION			
Effects Illustration	Methodology	Attachment 6	Data request completed.
Impact Category and Effects Definition	Methodology	Attachment 7	Data request completed.
Community Disruption Impacts That Differentiate Among North-South HST Alternatives and Design Options	Not applicable.	Attachment 8	Attachment to Section 7.
Capital Cost Estimate Report, Merced to Fresno Section High-Speed Train Project EIR/EIS (February 2012)	Cost information.	Attachment 9	Data request completed.

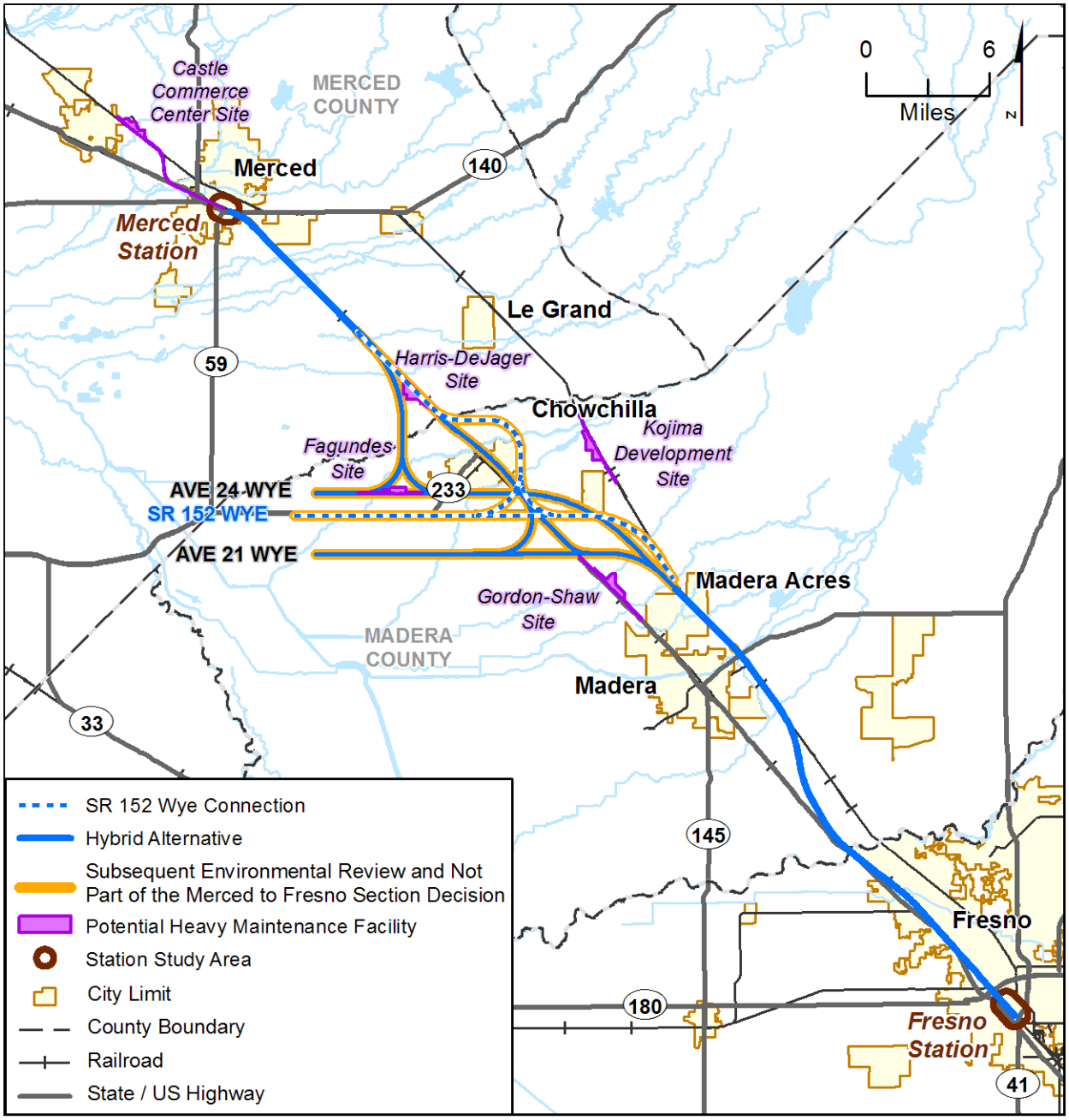


Figure 1-1
Preferred Alternative - Hybrid

1.1.1.2 Project Purpose

The *purpose of this project* is to implement the Merced to Fresno Section of the California HST System to provide the public with electric-powered high-speed rail service that provides predictable and consistent travel times between major urban centers and connectivity to airports, mass transit systems, and the highway network in the south San Joaquin Valley, and to connect the northern and southern portions of the system.

For Clean Water Act Section 404(b)(1) compliance, USACE must take into consideration the applicant's needs in the context of the geographic area of the proposed action and the type of project being proposed. The USACE has determined that the overall project purpose (as stated above) allows for a reasonable range of practicable alternatives to be analyzed as the basis for the USACE 404(b)(1) alternatives analysis.

1.1.1.3 Project Objectives

The Authority's statutory mandate is to plan, build, and operate an HST system coordinated with California's existing transportation network, particularly intercity rail and bus lines, commuter rail lines, urban rail lines, highways, and airports. The Authority has responded to this mandate by adopting the following objectives and policies for the proposed HST System:

- Provide intercity travel capacity to supplement critically overused interstate highways and commercial airports.
- Meet future intercity travel demand that will be unmet by present transportation systems and increase capacity for intercity mobility.
- Maximize intermodal transportation opportunities by locating stations to connect with local transit systems, airports, and highways.
- Improve the intercity travel experience for Californians by providing comfortable, safe, frequent, and reliable high-speed travel.
- Provide a sustainable reduction in travel time between major urban centers.
- Increase the efficiency of the intercity transportation system.
- Maximize the use of existing transportation corridors and rights-of-way, to the extent feasible.
- Develop a practical and economically viable transportation system that can be implemented in phases by 2020 and generate revenues in excess of operations and maintenance costs.
- Provide intercity travel in a manner sensitive to and protective of the region's natural and agricultural resources and reduce emissions and vehicle miles traveled for intercity trips.

The approximately 65-mile-long corridor between Merced and Fresno is an essential part of the statewide HST System. The Merced to Fresno Section is the location where the HST would intersect and connect with the Bay Area and Sacramento branches of the HST System; it would provide a potential location for the heavy maintenance facility (HMF) where the HSTs would be assembled and maintained as well as a test track for the trains; it would provide Merced and Fresno access to a new transportation mode and would contribute to increased mobility throughout California.

1.1.1.4 Project Need

The *need for the HST system exists statewide, with regional areas contributing to this need*. The Merced to Fresno Section is an essential component of the statewide HST System.

The capacity of California's intercity transportation system, including the central part of the San Joaquin Valley region, is insufficient to meet existing and future travel demands. The current and projected future system congestion will continue to result in deteriorating air quality, reduced reliability, and increased travel times. The current transportation system has not kept pace with the increase in population, economic activity, and tourism within the state, including that in the central part of the San Joaquin Valley region. The interstate highway system, commercial airports, and conventional passenger rail system serving the intercity travel market are operating at or near capacity and will require large public investments for maintenance and expansion to meet existing demand and future growth over the next 25 years and beyond. Moreover, the feasibility of expanding many major highways and key airports is uncertain; some needed expansions might be impractical or are constrained by physical, political, and other factors.

The need for improvements to intercity travel in California, including intercity travel between the central part of the San Joaquin Valley, the Bay Area, Sacramento, and Southern California relates to the following issues:

- Future growth in demand for intercity travel, including the growth in demand within the central part of the San Joaquin Valley region.
- Capacity constraints that will result in increasing congestion and travel delays, including those in the central part of the San Joaquin Valley region.
- Unreliability of travel stemming from congestion and delays, weather conditions, accidents, and other factors that affect the quality of life and economic well-being of residents, businesses, and tourism in California, including the central part of the San Joaquin Valley region.
- Reduced mobility as a result of increasing demand on limited modal connections between major airports, transit systems, and passenger rail in the state, including the central part of the San Joaquin Valley region.
- Poor and deteriorating air quality and pressure on natural resources and agricultural lands as a result of expanded highways and airports and urban development pressures, including those within the central part of the San Joaquin Valley region.

More detailed information regarding the purpose and need for the HST System and the Merced to Fresno HST Section can be found in Chapter 1.0, Project Purpose, Need, and Objectives, contained in the Draft Merced to Fresno Section HST Project EIR/EIS (hereafter referred to as "Draft EIR/EIS").

1.2 Water Dependency

While construction of the HST Project for the Merced to Fresno Section will require the crossing of streams (e.g., the San Joaquin River), irrigation systems, and drainage canals, and will encroach on other surface and groundwater resources, the project is primarily a terrestrial form of transportation. As a result, it is not water dependent and will not have an aquatic aspect to operate. More detailed information regarding the project and its potential impact on hydrology and water resources can be found in Chapter 3.8, Hydrology and Water Resources, contained in the Draft Merced to Fresno Section HST Project EIR/EIS.

1.3 Scope of Analysis under NEPA and Clean Water Act Section 404(b)(1) (33 CFR §320.4) Environmental Factors

This Checkpoint C package supports preliminary identification of the Least Environmentally Damaging Practicable Alternative (LEDPA) for specific components of the Merced to Fresno Section that the Authority plans to decide now. These components include the following:

- The north/south alignment (e.g., UPRR/SR 99, BNSF, or Hybrid alternatives)
- Station locations in Downtown Merced and Downtown Fresno

As explained in Chapter 2, Alternatives, of the Draft EIR/EIS (August 2011), the Authority will not make decisions now on the following project components:

- East/west alignments connecting to the San Jose to Merced Section
- Wye connection to the San Jose to Merced Section
- HMF

This Checkpoint C package includes information about the wyes. The Authority and FRA are not, however, requesting a preliminary LEDPA determination for the wyes at this time. Instead, the east-west alignment connection, wye, and HMF project components will be carried forward for additional study and consideration as part of the San Jose to Merced Section HST Project Draft EIR/EIS. The Authority and FRA anticipate seeking preliminary LEDPA identification for these components in conjunction with the San Jose to Merced EIR/EIS process. Accordingly, all potential options will be carried forward for consideration and identification of the LEDPA at a later time.

1.3.1 North/South Alignment

For the Merced to Fresno north/south alignment, the scope of the analysis encompasses potential adverse primary direct and indirect effects associated with proposed permit and fill, secondary effects of proposed permit and fill, and cumulative affects proposed permit and fill on:

- The riparian, wetland, and aquatic environment, including water quality, water supply, fisheries, and riparian and aquatic species and habitats (including water quality standards, riparian habitats, vernal pools, seasonal pools, wildlife habitats and species, sensitive plants, and other aquatic resources) as described in EIR/EIS Section 3.7, Appendices 3.7A and 3.7B, and Biological Resources and Wetlands Technical Report (Authority and FRA 2011). Also see the Watershed Evaluation Report (WER) Appendix B) and Biological Assessment appended to this Summary Report in Appendix G.

- Upland habitats and species.

- Other environmental resources and attributes (e.g., agricultural resources, noise, cultural resources, and parks) as described in the EIR/EIS and associated technical reports.

1.3.2 Station Locations

There is only one station considered for Merced, the Downtown Merced Station (see Figure 1-2). Developed through multiple meetings and discussions with the City of Merced, this station is consistent with the City's future land use plans for the downtown area and the intent to strengthen connectivity with the City's transit center. The Downtown Merced Station would be between Martin Luther King Jr. Way to the northwest and G Street to the southeast. The station would be accessible from both sides of the UPRR, but the primary station house would front 16th Street. The closest access to the parking facility from the SR 99 freeway would be R Street, which has a full interchange with the freeway. The site proposal includes a parking structure that would have the potential for up to six levels with a capacity of approximately 2,250 cars and an approximate height of 50 feet.

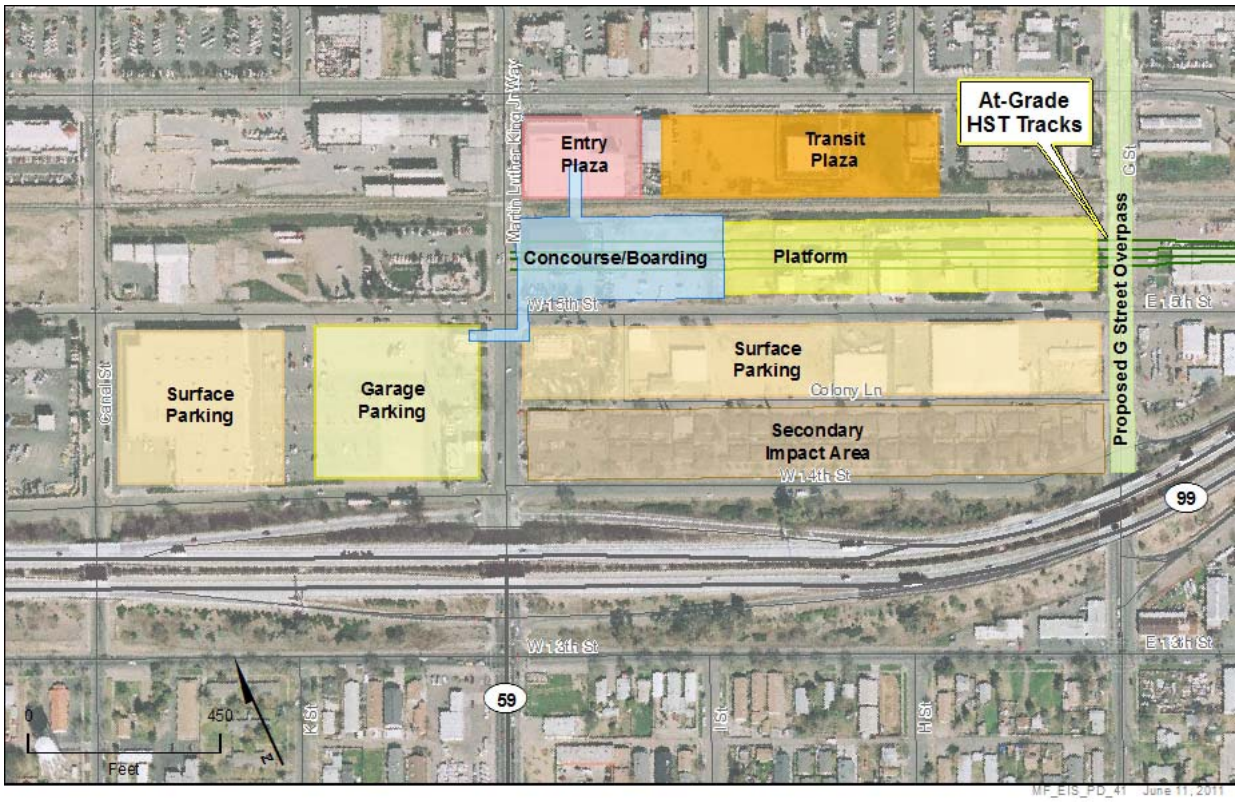


Figure 1-2
Downtown Merced Station Location

There are two station considerations for the Fresno Station, the Mariposa Street and the Kern Street alternatives (see Figures 1-3 and 1-4, respectively). The Mariposa Street Station would 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. Landmarks in the vicinity of the station include the Fulton Mall and Chukchansi Park to the east and Historic Chinatown to the west. The majority of station facilities would be located east of the existing UPRR tracks. The station site includes the station, bus transit center, surface parking lots, and kiss-and-ride accommodations. A new intermodal facility would be included in the station footprint. Among other uses, the intermodal facility would accommodate the Greyhound facilities and services that would be relocated and integrated into the site plan. The site proposal includes the potential for up to three parking structures and surface parking with a capacity of approximately 4,800 cars.

The City of Fresno prepared the draft *Fulton Corridor Specific Plan* and the draft *Downtown Neighborhoods Plan* (City of Fresno 2010a,b, respectively), both of which cover the area surrounding the HST station. The plans were developed to revitalize the downtown area through higher densities and infill development. The plans reference the Downtown Fresno Station centered at Mariposa Street. The City of Fresno views the HST station centered along Mariposa Street as an important element acting as a gateway to the downtown area by connecting the civic plaza, which contains county and city buildings as well as Fulton Mall. The *Fulton Corridor Specific Plan* includes the following references to the HST station:

- Create a seamless connection between HST station and Downtown Fresno.
- Establish a stronger axial connection between the County Courthouse and the proposed HST station along the Mariposa corridor/Plaza.

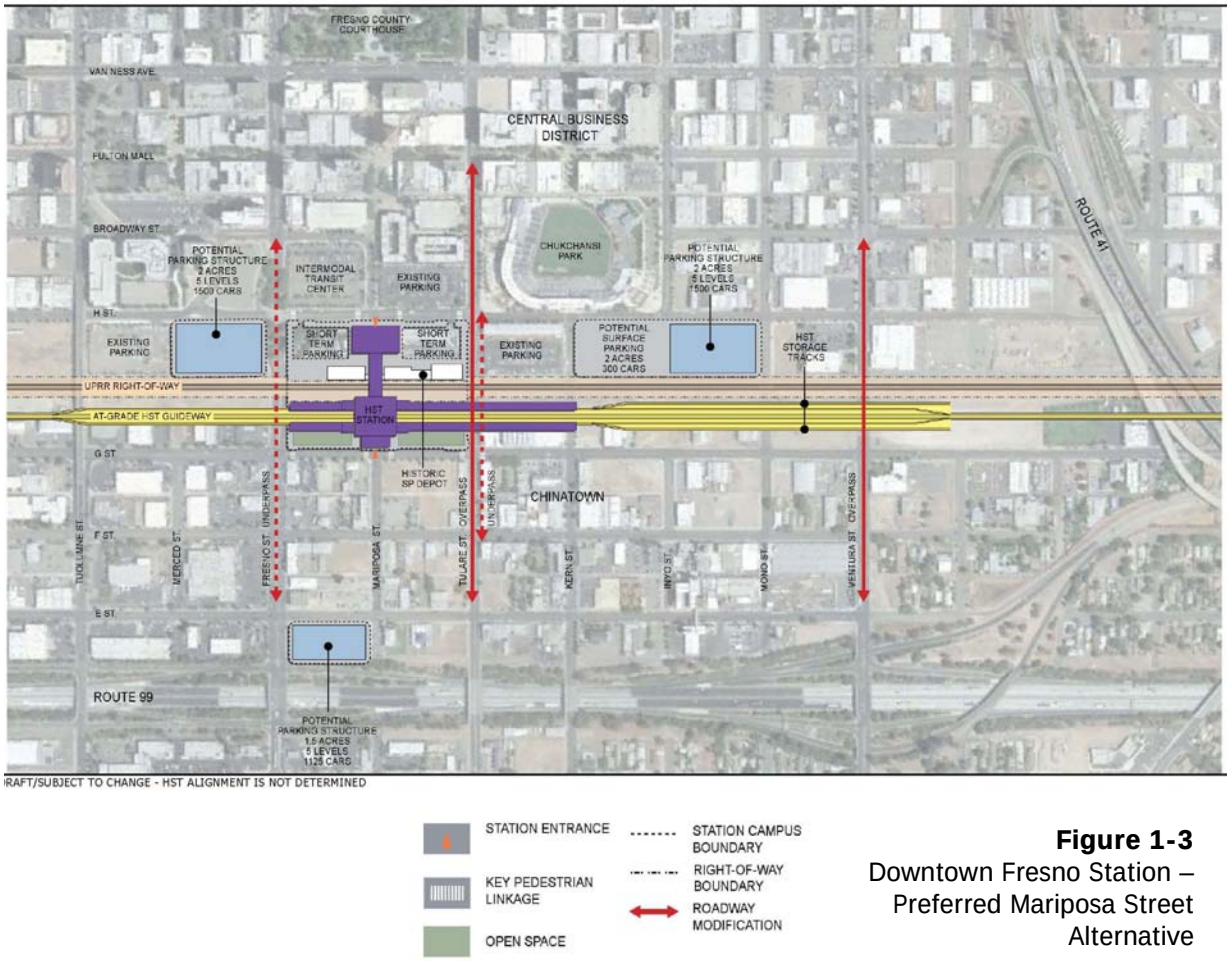


Figure 1-3
Downtown Fresno Station – Preferred Mariposa Street Alternative

- Align with the proposed Mariposa Plaza open space.

The plans describe the proposed Mariposa Street HST station location, noting that "The terminal building (would) function as the western terminus of a City Hall to HST station axis. The station (would) terminate at Mariposa Street and be designed as a 'front door' to the Downtown with a façade that can be seen from the County Courthouse." Additionally, City of Fresno's Transportation Master Plan includes relocating the city's transit center across from the Downtown Fresno HST Station and specifies that the Mariposa Street Station Alternative would better serve the planned transit improvements for the downtown area.

The Kern Street Station Alternative for the HST station is also situated in Downtown Fresno and would be centered on Kern Street between Tulare Street and Inyo Street. The station building would be approximately 75,000 square feet, with a maximum height of approximately 64 feet. The station building would have two levels housing the same facilities as the Mariposa Street Station Alternative (i.e., UPRR tracks, HST tracks, mezzanine, and station office). The approximately 18.5-acre site would include 13 acres dedicated to the station, bus transit center, short-term parking, and kiss-and-ride accommodations. Two of the 3 potential parking structures would each sit on 2 acres and each would have a capacity of approximately 1,500 cars. The third structure would have a slightly smaller footprint (1.5 acres) and a capacity of approximately 1,100 cars. Like the Mariposa Street Station Alternative, the majority of station facilities under the Kern Street Station Alternative would be sited east of the existing UPRR tracks.

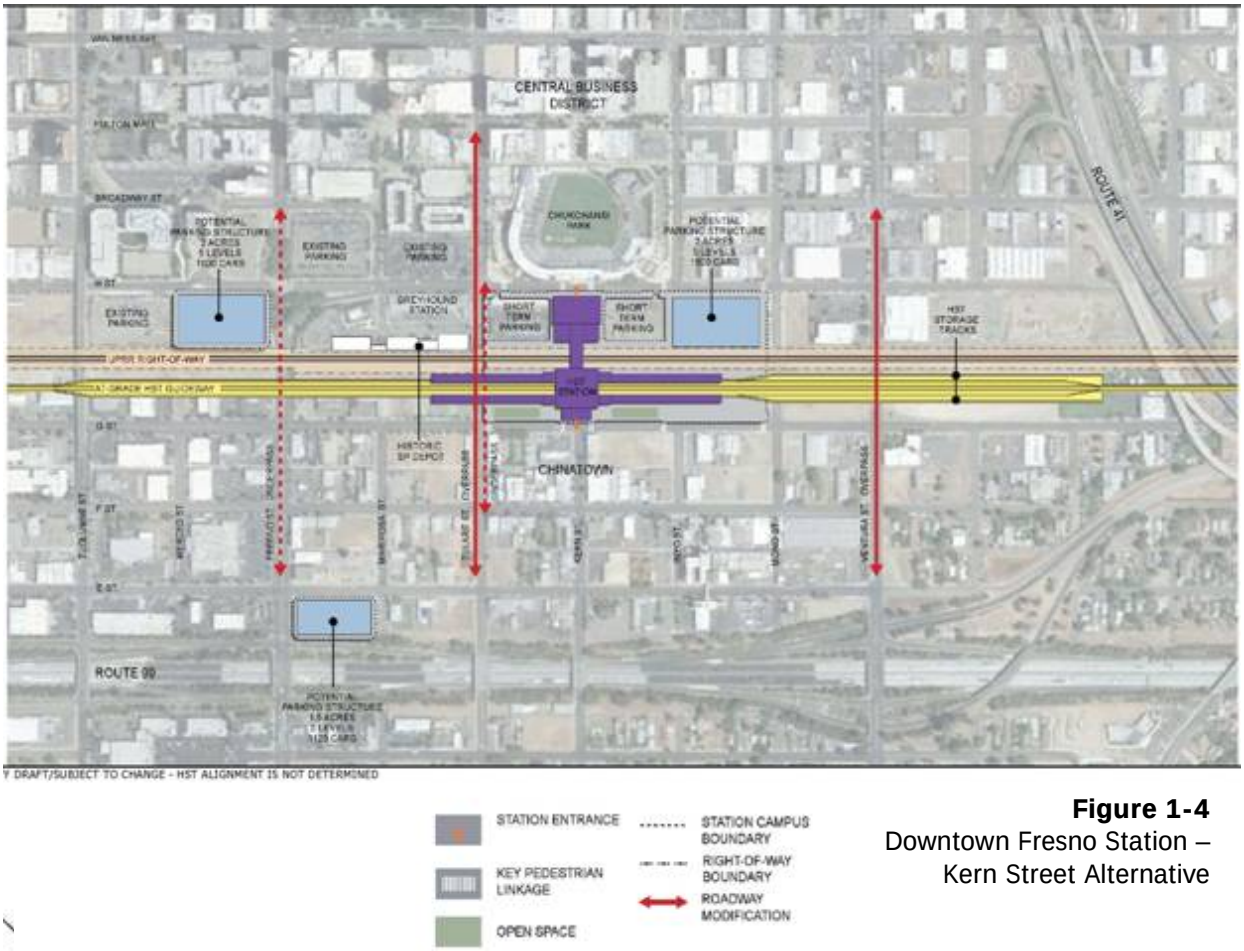


Figure 1-4
Downtown Fresno Station – Kern Street Alternative

In the environmental evaluation for the Fresno station alternatives, the environmental impacts were similar. Both stations would affect a historic structure eligible or already on the National Register of Historic Places. Other effects include noise that would be mitigated, as well as temporary impacts on businesses and transportation circulation during construction. However, due to the City's planning and the orientation of the Downtown Fresno City Center, the Mariposa Street Station Alternative offers substantially more opportunities for transit-oriented development.

2.0 Existing Conditions Proposed Project/Preferred Alternative Area

2.1 Land Area Requirements and Habitat Conditions of Project Area

Table 2-1 provides information on the estimated acreage for each land use that the Hybrid Alternative would likely convert for project purposes. The ranges in the table are due to the differences associated with design options, wyes, and the Downtown Fresno Station. Most of the land that would be converted is agricultural, followed by industrial, commercial and residential uses. Within each of these larger land use classes, there can be additional upland vegetation communities described below or wetland types as described in Section B below.

Table 2-1
Land Area Requirements of the Hybrid Alternative (acres)

Single-family	Multi-family	Commercial	Industrial	Institutional	Agricultural	Parks & Open Space	Total Acres[a]
75 to 93	70 to 77	88 to 111	174 to 196	59	1,187 to 1,414	35 to 37	1,807 to 2,087
[a] Total of all acres required for the project							

The categories of terrestrial plant communities and land cover types that occur in the habitat study area are discussed below. The plant communities and land cover types identified in the habitat study area include agricultural lands, developed areas, and natural and semi-natural areas.

2.1.1 Agricultural Lands

Agricultural areas are characterized by various types of cover, including high-value crops (i.e., orchards, vineyards), fallow fields, row crops, field crops, dairies, pastures, inactive agriculture, and rural residential areas (most of the pastureland in the habitat study area is associated with rural residential areas). Field and row crops, such as alfalfa (*Medicago sativa*), provide foraging habitat for raptors, particularly Swainson's hawks (*Buteo swainsonii*). Fallow fields and inactive farmland may provide nesting habitat for several wildlife species including northern harrier (*Circus cyaneus*) and western burrowing owl (*Athene cunicularia*). These and other agricultural lands may provide foraging or dispersal habitat for loggerhead shrike (*Lanius ludovicianus*), white-tailed kite (*Elanus leucurus*), and American badger (*Taxidea taxus*).

2.1.2 Developed Areas

Developed areas are characterized by various types of cover, including barren, commercial/industrial, urban, and transportation corridors. Institutional, industrial, commercial, and multi-and single-family residential areas can be combined into the larger category of developed areas. The developed category would encompass from 466 to 536 acres or approximately 26% of the total land area requirement for the Hybrid Alternative. These areas generally include landscaped areas, yards, and various outbuildings and provide low-quality resources for wildlife. However, certain species, such as the American peregrine falcon (*Falco peregrinus anatum*) and western mastiff bat (*Eumops perotis*) have adapted to developed areas and may use these areas for nesting or roosting habitat.

2.1.3 Natural and Semi-natural Areas

The terms natural and semi-natural areas are used within this section to distinguish the land uses and plant communities described in the subsequent sections where current human influences substantially influence the plant composition and structure. While the natural and semi-natural plant communities have been altered to some extent by past and present human activities, the composition and structure of these communities is generally not actively managed or controlled. A distinction is also made between those habitats that are largely characterized by native plants and those in which the dominant plants comprise introduced species.

Natural and semi-natural areas are characterized by various types of cover, including California annual grassland, Great Valley mixed riparian forest, other riparian, eucalyptus woodlands, and ruderal vegetation.

California Annual Grassland

California annual grassland within the habitat study area is best classified as annual brome grassland (Sawyer et al. 2009) and nonnative grassland (Holland 1986). California annual grassland in the habitat study area is characterized by nonnative annual grasses such as ripgut brome (*Bromus diandrus*), soft chess (*Bromus hordeaceous*), smooth barley (*Hordeum murinum*), medusahead (*Taeniatherum caput-medusae*), and wild oat (*Avena barbata*). Common nonnative herbaceous species include yellow star thistle (*Centaurea melitensis*), Italian thistle (*Carduus pycnocephalus*), prickly lettuce (*Lactuca serriola*), mustards (*Brassica* spp.), and wild radish (*Raphanus sativa*). Many native annual and perennial herbaceous species may also be present within this plant community, but these species were not evident or readily identifiable during the reconnaissance-level field surveys. Vernal pools and other seasonal wetlands observed in the habitat study area are typically associated with California annual grassland as both occur on clay soils.

Riparian Communities

Riparian communities within the habitat study area include Great Valley mixed riparian forest, Central Coast arroyo willow riparian forest, Great Valley riparian scrub, and Great Valley oak riparian forest as defined by Holland (1986). Riparian communities are generally located on the banks of natural waterways including streams, sloughs, and rivers and, in some cases, constructed watercourses. Riparian plant communities consist of overstory species that are facultative wetland species (having a 67% to 99% estimated probability of occurring in wetlands); however, soils, hydrology, and/or understory vegetation are not representative of wetland plant communities. Therefore, these communities are classified as upland habitats. Riparian plant communities can be found throughout the habitat study area. Riparian areas form transition zones between terrestrial and aquatic ecosystems, and provide essential habitat for a large variety of terrestrial and aquatic wildlife species.

Great Valley Mixed Riparian Forest. Great Valley mixed riparian forest, as defined by Holland (1986), most closely resembles the Juglans hindsii (Hind's black walnut) and semi-natural woodland stands described by Sawyer et al. (2009).

Other Riparian. Other riparian communities include Valley oak woodland, Valley and Foothill riparian, willow riparian forest and woodland, cottonwood willow riparian, and black walnut riparian.

Eucalyptus Woodlands

Eucalyptus woodlands (*Eucalyptus. globulus* and *E. camaldulensis*) are seminatural woodland stands or groves characterized by open to relatively dense stands of eucalyptus trees. Eucalyptus woodlands are dominated by exotic, nonnative species, but they provide suitable nesting habitat for special-status bird species such as Swainson's hawk.

Ruderal Vegetation

Vegetation that occurs in areas where the natural vegetation has been removed or significantly degraded by past or current human activity is referred to as ruderal. Ruderal vegetation is generally dominated by nonnative, seasonal plant species. This type of vegetation is often associated with vacant lots, roadsides, and other highly disturbed areas. Vegetation in these areas is highly variable but often includes a mix of nonnative annual grasses such as ripgut brome, soft chess, wild oat, Italian ryegrass (*Lolium multiflorum*), smooth barley, and weedy forbs such as bur clover (*Medicago polymorpha*), redstem filaree (*Erodium cicutarium*), yellow star thistle, Italian thistle, milk thistle (*Silybum marianum*), Russian thistle (*Salsola tragus*), and many others.

2.2 Jurisdictional Waters and Features within Proposed Project Area

The aquatic plant communities identified in the habitat study area include vernal pools, other seasonal wetlands, coastal and valley freshwater marsh, and open water. Of the aquatic plant communities and identified in the habitat study area, the following fall under the jurisdiction of the USACE, Regional Water Quality Control Board (RWQCB), and California Department of Fish and Game (CDFG): vernal pools, other seasonal wetlands, Fremont cottonwood forested wetland, coastal and valley freshwater marsh, open waters, natural watercourses and constructed watercourses and basins. A general description of each of these feature types is provided below.

2.2.1 Vernal Pools

Vernal pools are a type of seasonal wetland characterized by a herbaceous community dominated by annual herbs and grasses. Vernal pools are individual features that fill during winter precipitation months received and are dry or moist during summer months with no standing water. These pools are associated with certain types of soils. Hardpan soil layers frequently form in the horizons of clay soils, leading to the formation of vernal pools with clay soils. Once formed, these vernal pools have specific flora and fauna associated with their seasonal water cycle. The standing water that forms in vernal pools is ideal breeding habitat for several special-status species such as vernal pool fairy shrimp, Conservancy fairy shrimp, vernal pool tadpole shrimp (Lepidurus packardi), California tiger salamander (Ambystoma californiense), and western spadefoot toad (Spea hammondii).

2.2.2 Other Seasonal Wetlands

Seasonal wetlands are a broader wetland class characterized by seasonal inundation. Vernal pools are a category of seasonal wetlands. The primary distinctions between vernal pools and other seasonal wetlands are the characteristic native flora of vernal pools, the typical scarcity of nonnative plant species within vernal pools, and the association with landscapes that are characterized by mound and inter-mound topography and some form of restrictive layer that result in a seasonally perched water table in a vernal pool environment. Seasonal wetlands support a wide variety of both native and nonnative wetland plant species and may occur in a variety of landforms where there is seasonal saturation or inundation. In the study area, seasonal wetlands are generally considered somewhat degraded based on the extent of nonnative plant species and land management modifications (cultivation, grading, etc.) in the project area.

2.2.2.1 Coastal and Valley Freshwater Marsh

Coastal and valley freshwater marsh is classified as several different alliances (uniform group of plant associations sharing one or more dominant species) by Sawyer et al. (2009) including the *Typha* (*T. angustifolia, T. domingensis, T. latifolia*) alliance (cattail marshes), *Schoenoplectus acutus* alliance (hardstem bulrush marsh), and *Schoenoplectus californicus* alliance (California bulrush marsh). It is classified as freshwater emergent wetland as described in *A Guide to the Wildlife Habitats of California*

(Mayer and Laudenslayer 1988). Coastal and valley freshwater marsh is characterized by emergent herbaceous hydrophytes (water-adapted plants). All emergent wetlands are flooded frequently so that the roots of vegetation are saturated or submerged in water for a significant portion of the growing season. Vegetation is generally about 6 feet tall and may vary from small clumps of vegetation to large areas. Coastal and valley freshwater marsh in the habitat study area is generally associated with rivers, streams, sloughs, and irrigation drainages. This community is characterized by bulrush and hardstem bulrush marsh and cattail marsh alliances, including broadleaf cattail (*T. latifolia*), hardstem bulrush (*S. acutus*), and California bulrush (*S. californicus*). This plant type is a CDFG special-status plant community.

2.2.2.2 Fremont Cottonwood (Palustrine) Forested Wetland

Fremont cottonwood forested wetlands occur on soils that are intermittently or seasonally flooded or saturated. Frequently, these communities are found along riparian corridors, floodplains subject to high-intensity flooding, or on low-gradient depositions along rivers and streams. These communities are described as typically containing an overstory dominated by Fremont cottonwood (*Populus fremontii*) or mixed with other tree species including box elder (*Acer negundo*), Oregon ash (*Fraxinus latifolia*), California walnut (*Juglans californica*), or California sycamore (*Platanus racemosa*). The shrub layer within this community type is typically dominated by willow species (*Salix* spp.) and California wild grape (*Vitis californica*). The understory of Fremont cottonwood forested wetland may support emergent perennial vegetation such as cattails, sedges, and rushes.

2.2.3 Other Waters

Other waters include perennial rivers and creeks, intermittent watercourses, and intermittent to ephemeral sloughs and creeks (watercourses). Two categories of watercourses occur within the wetland study area, natural and constructed. These communities are described below.

2.2.3.1 Natural Watercourses

Natural watercourses with perennial flow within the study area include the San Joaquin River and Bear Creek. The majority of the natural waters in the wetland study area have intermittent or ephemeral flow regimes either because of their small watershed size or because they have been impounded or diverted upstream into other watercourses for agricultural purposes. Natural watercourses in the wetland study area have been influenced by the anthropogenic stressors affecting streams elsewhere in the Central Valley, such as agricultural land conversions, associated water diversions, and exotic fish and invertebrate introductions.

2.2.3.2 Constructed Watercourses and Basins

Constructed watercourses include irrigation canals and drainage ditches; constructed basins include retention basins, stock ponds, and agricultural tail water ponds. Constructed watercourses have the potential to support emergent vegetation, as well as ruderal wetland species. A number of constructed watercourses within the wetland study area divert water from or discharge into natural watercourses. Constructed watercourses potentially support special-status species such as Sanford's arrowhead (*Sagittaria sanfordii*) and western pond turtle (*Actinemys marmorata*), but these watercourses usually do not provide native fishes with the aquatic habitat necessary to survive and grow, and are typically dominated by predatory or competitive nonnative fishes. Constructed watercourses routinely undergo vegetation management regimes (e.g., mechanical clearing or herbicide application), which greatly limits their potential as aquatic habitat. Constructed basins on average do not retain perennial water sources. They have the potential to support special-status species that rely on ephemeral inundation cycles such as vernal pool branchiopods and California tiger salamanders.

2.2.4 Open Waters

Open waters are characterized by shallow depressions such as incidental scrapes, tire ruts, and artificial hardpans that have an ephemeral hydroperiod. The features are typically bare or sparsely vegetated. Inundation is not of a sufficient duration to produce hydric soils and/or defined wetland vegetation under normal hydrological cycles. Therefore, these features are not identified as wetlands. Inundation may nevertheless be of sufficient duration to provide marginal breeding habitat for special-status vernal pool species, such as vernal pool branchiopods and western spadefoot toad.

2.3 General Quality of Habitats Within Jurisdictional Waters

The general quality of wetland habitats within the wetland study area are based on CRAM scores obtained from sampling selected wetland features for each alternative. Based on the distribution of project CRAM scores from 46 assessment areas, jurisdictional waters were organized into categories of poor, fair, and good quality where 25-49 is poor quality, 50-74 is fair quality, and 75-100 is good quality. Table 2-2 summarizes the CRAM scores for each jurisdictional wetland and other water type by watershed. The table also provides the estimated extent of permanent direct impact that would occur to each type of jurisdictional feature. As shown by the table, most wetlands and waters that were able to be classified during the CRAM analysis were classified either as "Fair" or "Poor." All assessed vernal pools, seasonal wetlands, constructed watercourses, and constructed basins that were assessed within the Hybrid alignment were classified as "fair" or "poor."

The watershed evaluation was another source of quality information, as shown in Table 2-2. The Hybrid Alternative construction footprint covers a very minor amount of the project watershed area. As with the data in Table 2-3, several of the watersheds contain wetlands/waters of "poor" to "fair" quality.

Table 2-2
CRAM Ratings for Wetlands and Other Waters Impacted by the Hybrid Alternative by Watershed

Watershed	Middle San Joaquin-Lower Chowchilla (North)	Upper Chowchilla-Upper Fresno (Fresno River)	Middle San Joaquin-Lower Chowchilla (South)	Tulare-Buena Vista Lakes/Upper Dry
Wetlands (acres)				
Vernal Pools	60.88 [2]	22.57	3.72	0.05
Direct Permanent Impact (Acres)	0.83	2.31	0.98	0
Condition Rating[1]	Poor	Fair	ND	ND
Seasonal Wetlands	1.46	4.31	1.19	--
Direct Permanent Impact (Acres)	0	1.1	0.35	0
Condition Rating	ND	Fair to Poor	ND	ND

Watershed	Middle San Joaquin-Lower Chowchilla (North)	Upper Chowchilla-Upper Fresno (Fresno River)	Middle San Joaquin-Lower Chowchilla (South)	Tulare-Buena Vista Lakes/Upper Dry
Freshwater Marsh	0.81	4.22	--	--
Direct Permanent Impact (Acres)	0	0.04	0	0
Condition Rating	NA	NA	NA	NA
Palustrine Forested Wetland	29.30	2.02	0.83	--
Direct Permanent Impact (Acres)	3.64	0.05	0	0
Condition Rating	Fair	Fair	Good-Fair	ND
Total Wetland (acres)	**92.45**	**33.12**	**5.74**	**0.05**
Total Direct Permanent Impact for Wetlands (Acres)	4.47	3.5	1.33	0
Natural Watercourse	48.26	66.72	10.70	--
Direct Permanent Impact (Acres)	1.29	3.13	0.91	0
Condition Rating	ND	Fair	Good -Fair	ND
Constructed Watercourse	48.61	59.12	8.15	2.87
Direct Permanent Impact (Acres)	5.01	3.47	1.34	0.81
Condition Rating	Poor	ND	Poor	Poor
Constructed Basin	17.21	29.81	5.62	17.25
Direct Permanent Impact (Acres)	0.28	0.89	0.1	3.48
Condition Rating	Poor	ND	ND	ND
Open Water	2.32	4.51	1.24	3.20

Watershed	Middle San Joaquin-Lower Chowchilla (North)	Upper Chowchilla-Upper Fresno (Fresno River)	Middle San Joaquin-Lower Chowchilla (South)	Tulare-Buena Vista Lakes/Upper Dry
Direct Permanent Impact (Acres)	0.33	0.41	0.43	0.42
Condition Rating	NA	NA	NA	NA
Total Other Waters (acres)	**116.4**	**160.16**	**25.71**	**23.32**
Total Direct Permanent Impact for Other Waters (Acres)	**6.91**	**7.9**	**2.78**	**4.71**

Source: AECOM and CH2MHILL (2012); January 1012 Construction Footprint.

[1] Condition is based on the CRAM evaluation, a Level II analysis (WER Appendix B – CRAM Report), which is utilized with the Preliminary Jurisdictional Determination (PJD) data. NA refers to wetland types that were not directly assessed in the field using CRAM (freshwater marsh, open water); ND refers to "no data" and represents areas where no wetlands or waters of a particular type were found (or were within accessible parcels for the CRAM evaluation).

[2] Wetlands and Other Waters (PJD Data) Located Within the Four Main Watersheds and Impacts from the Hybrid Alternative. Aquatic Resources within the Wetland Study Area (250-foot buffer) and MF Construction Footprint, CF - Direct Permanent Impact, DPI, only; Hybrid Alternative.

Table 2-3
Watershed Evaluation Ratings for Wetlands (NWI, Holland) and Other Waters (NHD) Impacted by the Hybrid Alternative by Watershed

Watershed	Middle San Joaquin-Lower Chowchilla (North)	Upper Chowchilla-Upper Fresno (Fresno River)	Middle San Joaquin-Lower Chowchilla (South)	Tulare-Buena Vista Lakes/Upper Dry
Wetlands (acres)				
Holland Vernal Pool Complexes [1]	274,282.70	34,840.73	111,830.38	5719.33
CF-DPI acres	46.21[2]	0	8.57	0
Condition Rating [3]	Good	Fair	Good	Poor
Vernal Pools; Seasonal Wetlands; Freshwater Wetlands (Freshwater Emergent Marsh per NWI)	93,553.44	2,746.30	23,214.75	446.99
CF-DPI acres	0	0.04	0	0.4
Condition Rating	Good	Poor	Good	Poor

Watershed	Middle San Joaquin-Lower Chowchilla (North)	Upper Chowchilla-Upper Fresno (Fresno River)	Middle San Joaquin-Lower Chowchilla (South)	Tulare-Buena Vista Lakes/Upper Dry
Palustrine Forested Wetland (Freshwater Forested/Shrub Wetland per NWI)	2,891.99	445.96	7,726.16	244.77
CF-DPI acres	2.28	0	0	0
Condition Rating	Fair	Fair	Poor	Poor
Natural Watercourse (Riverine per NWI)	3,443.35	1,051.04	2,042.32	130.36
CF-DPI acres	0	1.69	0.92	0
Condition Rating	Fair	Poor	Poor	Poor
Total Wetland (acres)	99,888.78	4,243.30	32,983.23	822,12
Total CF-DPI Impact Acreage	48.49	1.73	9.49	0.4
Other Waters (linear miles)				
Natural Watercourse (Stream per NHD)	1,999.66	431.00	787.49	67.41
CF-DPI linear miles	0.24	0.36	0.02	0
Condition Rating	Good	Fair	Good	Poor
Constructed Watercourse (Canal per NHD)	2,250.20	399.79	1,433.88	694.55
CF-DPI linear miles	2.7	1.41	0.61	0.33
Condition Rating	Poor	Poor	Poor	Poor
Total Other Waters (linear miles)	4,249.86	830.79	2,221.37	761.96
Total CF-DPI Impacts (linear miles)	2.94	1.77	0.63	0.33

Source: AECOM and CH2MHILL (2012); MF Footprint, January 2012.

[1] The Holland data set includes areas of high vernal pool density across the landscape; it does not represent acres of specific wetland polygons (such as for FEM, a NWI wetland type). The total wetland acreage calculated in this table does not include the Holland acreages.

[2] Wetlands and Other Waters (NWI, NHD, Holland Data) Located Within the Project Watershed Area within the Four Main Watersheds and Impacts from the Hybrid Alternative. Aquatic Resources within the Project Watershed Area and the MF Construction Footprint, CF - Direct Permanent Impact, DPI, only; Hybrid Alternative.

[3] Condition is based on the watershed analysis, a Level 1 analysis; see also WER Tables 6-2 and 6-3, as well as WER Appendix C.

2.4 High-Quality Habitats within Jurisdictional Waters

As shown in Table 2-2, 0.83 acre of palustrine forested wetland was classified as "Good-Fair" within the Middle San Joaquin-Lower Chowchilla (South) watershed. However, this acreage is not expected to be directly impacted by the Hybrid Alternative. There are 10.70 acres of natural watercourses within the Middle San Joaquin-Lower Chowchilla (South) watershed. These features, on average, within the watershed are classified as good-fair. Of this acreage 0.91 acre of impact that would occur. Therefore, the total extent of impacts to jurisdictional features that of relatively high quality is limited to 0.91 acre of natural watercourses.

The watershed evaluation data in Table 2-3 show avoidance of higher quality wetlands. For the Middle San Joaquin-Lower Chowchilla (North and South portions), the data show that there are no impacts expected to freshwater emergent marsh located in "good" quality habitats. The Hybrid Alternative contains elements of both the UPRR/SR 99 and BNSF alternatives; thus, portions of the construction footprint overlap with the other two alternatives. The Hybrid Alternative, along the northern portion of MF, is distinct from the BNSF; along the southern portion, it is distinct from the UPRR/SR 99 alternative. One distinction of the Hybrid Alternative is that along the southerly portion it impacts a lower (in quantity) amount of palustrine forested and other riparian polygons (Table 2-4). Although the CRAM scores are not necessarily that different between the Hybrid and the UPRR/SR 99 alternative in this particular case, a total of 16 additional polygons are impacted by the UPRR/SR 99 alternative.

Table 2-4
Selected Riverine Assessment Areas (Natural Watercourses, Palustrine Forested Wetlands); Hybrid Alternative

Drainage (Watershed)	UPRR/SR 99		Hybrid	
	PFO, OR Polygons	CRAM Score	PFO, OR Polygons	CRAM Score(s)
Berenda Creek (UC-UF)	6, 3	56	0	66
Dry Creek (UC-UF)	2, 1	57	0	61
Schmidt Creek (UC-UF)	0	--	0	44, 49, 51
Cottonwood Creek (MSJ-LC South)	3, 1	64	0	64
Source: AECOM and CH2MHILL (2012); January 1012 Construction Footprint.				

3.0 Description of Proposed Project (Authority/FRA Preferred Hybrid Alternative)

3.1 Project Description

This section describes the rail line, rail corridor improvements, crossings and crossing improvements, bridges, elevated rail sections, station improvements, intermodal connections, and maintenance facilities. Further details on ridership and the Hybrid Alternative project description are contained in Chapter 1, Purpose and Need, and Chapter 2, Alternatives, of the Merced to Fresno Section Environmental Impact Report/Environmental Impact Statement (EIR/EIS). The Hybrid Alternative and its design options are shown in Figure 3-1. The composition of the construction footprint is described in Section 3.1.3 of the EIR/EIS and is shown in detail in the map book appended to Chapter 2 of the EIR/EIS. All alternatives must be able to transport passengers between San Francisco and Los Angeles in no more than 2 hours and 40 minutes. Ridership is projected based on assumptions of a ticket price relative to air fare and is forecast to be similar for all alternatives in the Merced to Fresno Section. The Hybrid Alternative offers the second best travel time, taking only 30 seconds longer between San Francisco and Los Angeles, a minute more between Merced and Fresno, and the same amount of time between San Francisco and Merced, compared to the UPRR/SR 99 Alternative.

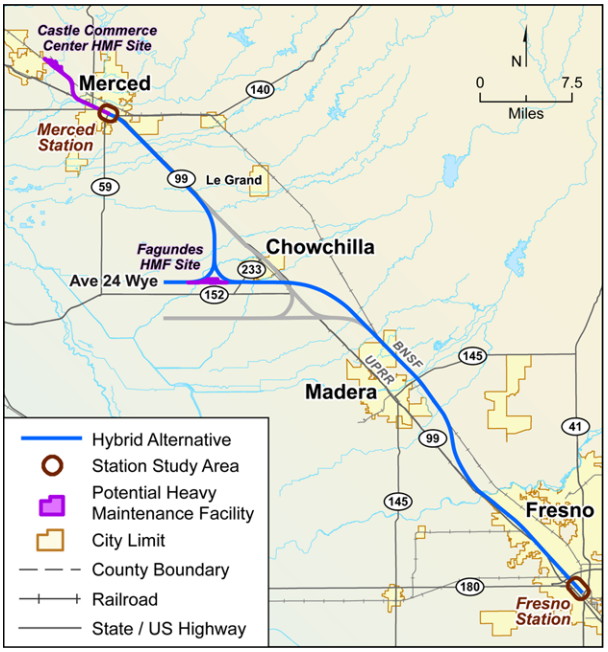


Figure 3-1a
Hybrid Alternative with Ave 24 Wye

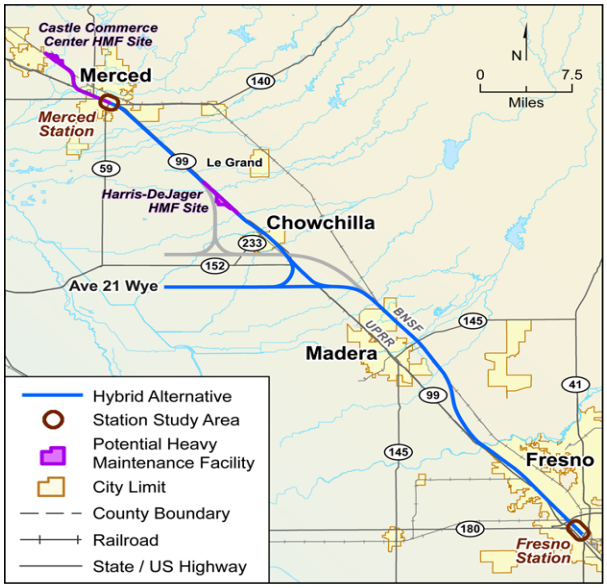


Figure 3-1b
Hybrid Alternative with Ave 21 Wye

3.1.1 North-South Alignment

From north to south, generally, the Hybrid Alternative would follow the UPRR/SR 99 Alignment with either the West Chowchilla design option with the Ave 24 Wye or the East Chowchilla design option with the Ave 21 Wye. Approaching the Chowchilla city limits, the Hybrid Alternative would follow one of two options:

- In conjunction with the Ave 24 Wye, the high-speed train (HST) alignment would veer due south from Sandy Mush Road along a curve and would continue at-grade for 4 miles parallel to and on the west side of Road 11¾. The Hybrid Alternative would then curve to a corridor on the south side of Avenue 24 and would travel parallel for the next 4.3 miles. Along this curve, the

southbound HST track would become an elevated structure for approximately 9,000 feet to cross over the Ave 24 Wye connection tracks and Ash Slough, while the northbound HST track would remain at-grade. Continuing east on the south side of Avenue 24, the HST alignment would become identical to the Ave 24 Wye connection for the BNSF Alternative and would follow the alignment of the BNSF Alternative until Madera.

- In conjunction with the Ave 21 Wye connection, the HST alignment would transition from the west side of UPRR and SR 99 to an elevated structure as it crosses the UPRR and N Chowchilla Boulevard just north of Avenue 27, continuing on an elevated structure along the west side of and parallel to SR 99 away from the UPRR corridor while it crosses Berenda Slough. Toward the south side of Chowchilla, the alignment (with the Ave 21 Wye) would cross over SR 99 north of the SR 99/SR 152 interchange near Avenue 23½ south of Chowchilla. It would continue to follow along the east side of SR 99 until reaching Avenue 21, where it would curve east and run parallel to Avenue 21, briefly. The alignment would then follow a path similar to the Ave 21 Wye connection for the BNSF Alternative, but with a tighter 220-mile-per-hour (mph) curve. The alternative would then follow the BNSF Alternative alignment until Madera.

Through Madera and until reaching the San Joaquin River, the Hybrid Alternative is the same as the BNSF Alternative. Once crossing the San Joaquin River, the alignment of the Hybrid Alternative becomes the same as for the UPRR/SR 99 Alternative, including the westward realignments of Golden State Boulevard and SR 99.

The dedicated, fully grade-separated right-of-way needed to operate HSTs has more stringent alignment requirements than those of lower-speed trains. The HST would use four different track profiles: at-grade, where tracks are near the ground; retained fill, where higher tracks are elevated on retained earth; retained cut, where the HST crosses under existing roads or highways; and elevated, where the HST travels over existing roadways and railroads on structures supported by piers.. Types of bridges that might be built include full channel spans, large box culverts, or, for some larger river crossings, piers within the ordinary high-water channel.

3.1.2 Wye Design Options

Another component of HST tracks is how the tracks are configured to change directions. The transition to a wye would require splitting two tracks into four tracks crossing over one another before the wye legs can diverge in opposite directions to allow bidirectional travel. Based on HST design criteria, this transition would require approximately 2 miles, with an estimated 120-foot-wide right-of-way for the transition before the tracks have fully diverged from each other. The wye connections for the Hybrid Alternative follow Avenue 24 and Avenue 21, similar to those of the UPRR/SR 99 and BNSF alternatives. Additional features of the Hybrid Alternative and wye design options are shown below in Table 3-1.

Table 3-1
Design Features of Hybrid Alternative

Wye	Ave 24	Ave 21
Total length[a] (linear miles)	75	76
At-grade profile[a] (linear miles)	60	59
Elevated profile[a] (linear miles) (including retained fill)	15	17
Number of Straddle Bents [b]	55	40

Wye	Ave 24	Ave 21
Number of Railroad Crossings	6	4
Number of Water Crossings	113	113
Approximate Number of Roadway Closures [c]	49	37
Number of Roadway Overcrossings	48	45

[a] 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.

[b] 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 to be determined during design.

[c] Includes public and private road closures.

3.1.3 Stations

The preferred stations have been identified as the Downtown Merced Station and the Mariposa Street Station Alternative for the Downtown Fresno Station. The City of Merced worked closely with the project team and, as such, there is only one preferred location for the Downtown Merced Station. The preferred station for the City of Fresno is the Mariposa Street Station Alternative. Based on cooperation with the City of Fresno, the Mariposa Street Station Alternative provides the best opportunity for enhancement of land use densities consistent with the City's current planning for transit-oriented development in the draft Fulton Corridor Specific Plan and the draft Downtown Neighborhoods Plan (City of Fresno 2010a, b, respectively). The design of the station areas will provide intermodal connectivity, drop-off facilities, an entry plaza, a station house area for ticketing and support services, a station box where passengers wait and access the HST, and parking facilities. Stations are also described in Section 1 of this Summary Report.

3.2 Summary of Impacts on Jurisdictional Waters for Proposed Project

The Hybrid Alternative has two design option combinations: East Chowchilla Ave 21 and West Chowchilla Ave 24. The WSA for the Hybrid Alternative supports a total of approximately 138 acres of jurisdictional waters with the East Chowchilla Ave 21 design option combination and approximately 147 acres with West Chowchilla Ave 24 design option combination.

The proposed project would require placement of fill within, and permanent impacts to, approximately 38.97 to 41.44 acres of water features within USACE jurisdiction depending on design option. Table 3-2 provides a summary of all anticipated impacts to jurisdictional features. The proposed project results in a total of 11.54 to 11.99 acres of temporary impacts to jurisdictional waters, depending on the design option.

The proposed project impacts jurisdictional areas of poor to high quality habitat per CRAM. The mean CRAM score for the Hybrid Alternatives impacts on non-riverine aquatic features is 50. The mean CRAM score for impacts on riverine aquatic features is 54. Both of these scores are well below the state average of 74.

Table 3-2
Impacts on Jurisdictional Waters Under the Hybrid Alternative

North-South Alignment Isolated and with Wye Design Option	East Chowchilla Design Option (Ave 21)	West Chowchilla Design Option (Ave 24)
Vernal Pools		
Direct Permanent Effects (acres)		
North-South Alignment	4.12	3.78
Ave 24 Wye	NA	0.03
Ave 21 Wye	0.04	NA
Total Direct Permanent Effects (acres)	**4.16**	**3.81**
Indirect Permanent Effects (acres)		
North-South Alignment	11.27	6.92
Ave 24 Wye	NA	0.00
Ave 21 Wye	0.35	NA
Total Indirect Permanent Effects (acres)	**11.62**	**6.92**
Seasonal Wetlands		
Direct Permanent (acres)		
North-South Alignment	1.45	1.45
With Ave 24	NA	0.00
With Ave 21	0.00	NA
Total Direct Permanent Effects (acres)	**1.45**	**1.45**
Indirect Permanent Effects (acres)		
North-South Alignment	1.46	1.46
With Ave 24	NA	0.00
With Ave 21	0.00	NA
Total Indirect Permanent Effects (acres)	**1.46**	**1.46**
Freshwater Marsh		
Direct Permanent Effects (acres)		
North-South Alignment	0.04	0.00
With Ave 24	NA	0.00
With Ave 21	0.00	NA
Total Direct Permanent Effects (acres)	**0.04**	**0.00**

North-South Alignment Isolated and with Wye Design Option	East Chowchilla Design Option (Ave 21)	West Chowchilla Design Option (Ave 24)
Direct Temporary Effects (acres)		
North-South Alignment	0.00	0.00
With Ave 24	NA	0.00
With Ave 21	0.00	NA
Total Direct Temporary Effects (acres)	**0.00**	**0.00**
Indirect Permanent (acres)		
North-South Alignment	0.22	0.00
With Ave 24	NA	0.00
With Ave 21	0.00	NA
Total Indirect Permanent Effects (acres)	**0.22**	**0.00**
Palustrine Forested Wetlands		
Direct Permanent Effects (acres)		
North-South Alignment	3.59	3.64
With Ave 24	NA	0.00
With Ave 21	0.00	NA
Total Direct Permanent Effects (acres)	**3.59**	**3.64**
Direct Temporary Effects (acres)		
North-South Alignment	1.64	1.50
With Ave 24	NA	0.00
With Ave 21	0.00	NA
Total Direct Temporary Effects (acres)	**1.64**	**1.50**
Indirect Permanent Effects (acres)		
North-South Alignment	3.08	3.37
With Ave 24	NA	0.00
With Ave 21	0.00	NA
Total Indirect Permanent Effects (acres)	**3.08**	**3.37**
Natural Watercourses		
Direct Permanent Effects (acres)		
North-South Alignment	3.86	5.32
With Ave 24	NA	2.41

North-South Alignment Isolated and with Wye Design Option	East Chowchilla Design Option (Ave 21)	West Chowchilla Design Option (Ave 24)
With Ave 21	0.93	NA
Total Direct Permanent Effects (acres)	**4.79**	**7.74**
Direct Temporary Effects (acres)		
North-South Alignment	5.98	5.81
With Ave 24	NA	0.18
With Ave 21	0.04	NA
Total Direct Temporary Effects (acres)	**6.02**	**6.00**
Indirect Permanent Effects (acres)		
North-South Alignment	17.45	19.27
With Ave 24	NA	8.51
With Ave 21	6.65	NA
Total Indirect Permanent Effects (acres)	**24.10**	**27.78**
Constructed Watercourses		
Direct Permanent Effects (acres)		
North-South Alignment	6.37	10.64
With Ave 24	NA	6.01
With Ave 21	12.75	NA
Total Direct Permanent Effects (acres)	**19.12**	**16.65**
Direct Temporary Effects (acres)		
North-South Alignment	3.52	2.77
With Ave 24	NA	0.04
With Ave 21	0.34	NA
Total Direct Temporary Effects (acres)	**3.86**	**2.82**
Indirect Permanent Effects (acres)		
North-South Alignment	12.05	22.05
With Ave 24	NA	4.77
With Ave 21	8.84	NA
Total Indirect Permanent Effects (acres)	**20.89**	**26.82**
Constructed Basins		
Direct Permanent Effects (acres)		

North-South Alignment Isolated and with Wye Design Option	East Chowchilla Design Option (Ave 21)	West Chowchilla Design Option (Ave 24)
North-South Alignment	3.71	4.74
With Ave 24	NA	1.83
With Ave 21	0.36	NA
Total Direct Permanent Effects (acres)	**4.07**	**6.56**
Direct Temporary Effects (acres)		
North-South Alignment	0.42	0.87
With Ave 24	NA	0.36
With Ave 21	0.04	NA
Total Direct Temporary Effects (acres)	**0.47**	**1.22**
Indirect Permanent Effects (acres)		
North-South Alignment	19.61	23.03
With Ave 24	NA	1.75
With Ave 21	2.36	NA
Total Indirect Permanent Effects (acres)	**21.97**	**24.78**
Open Water		
Direct Permanent Effects (acres)		
North-South Alignment	1.59	1.21
With Ave 24	NA	0.38
With Ave 21	0.16	NA
Total Direct Permanent Effects (acres)	**1.75**	**1.59**
Indirect Permanent Effects (acres)		
North-South Alignment	3.68	3.37
With Ave 24	NA	0.04
With Ave 21	0.18	NA
Total Indirect Permanent Effects	**3.86**	**3.41**
Summary of Total Effects on all Waters		
Total Direct Permanent Effects (acres)	**38.97**	**41.44**
Total Direct Temporary Effects (acres)	**11.99**	**11.54**
Total Indirect Permanent Effects (acres)	**87.20**	**94.54**

3.3 Summary of Avoidance of Impacts on Jurisdictional Waters for Project Alternative

The Merced to Fresno Section takes into account opportunities to avoid and minimize effects on biological resources and other resources. Avoidance and minimization measures may be characterized as occurring as a part of the design process, prior to site preparation, and/or during construction. Approaches and measures to avoid and minimize impacts on biological resources, community impacts, farmland, and displacement of residential properties were incorporated into the alignment selection during the preliminary design stages. Additional avoidance opportunities are described in Section 5 of this Summary Report. Further refinements and procedures could avoid and minimize impacts on natural resources during final design and construction. These include commitments listed as mitigation measures in the EIR/EIS.

3.3.1 Design

The HST Project in the Central Valley is designed to operate at speeds of up to 220 mph. To achieve these speeds safely, the track alignments are engineered to be mostly straight (tangent alignment) and, when required, to use a large curve radius of up to 5 miles. This engineering requirement results in a rigid system (i.e., the design of the track alignments cannot easily and frequently accommodate vertical or horizontal deviations to avoid specific resources), while meeting the design criteria. A change in the track alignment to avoid one location can result in a shift in track alignment over a distance of 2 to 4 miles and thus, has the potential to affect other resources and facilities.

The Authority and FRA established a project objective to route tracks adjacent to existing transportation corridors to the extent practicable to minimize community disruption and environmental impacts pursuant to Streets & Highways Code section 2407.09(g). While this objective cannot always be met, in general the introduction of new greenfield alternatives has been avoided. Staying near existing transportation corridors consolidates transportation facilities and associated effects such as noise and visual effects from transportation infrastructure. Additionally, the Authority has considered a range of alternatives so that the various impacts can be compared and balanced to identify the Preferred Alternative.

The Hybrid Alternative was developed by combining the UPRR/SR99 and the BNSF alternatives. It represents the best balance of technology, cost, and logistics, and presents the least number of overall significant environmental consequences. The options include the following:

- Routing the Hybrid Alternative (and UPRR/SR99) either through Chowchilla (to avoid impacts on biological resources and farmland) or west of Chowchilla (to avoid community impacts).
- The Hybrid Alternative was developed to avoid community impacts in Downtown Madera without a substantial difference in impacts on biological resources (compared to the UPRR/SR 99 Alternative).

Project design measures to reduce effects on these resources are listed in Section 5 and Attachment 4 of this Summary Report.

Proposed mitigation for the Merced to Fresno Section also includes compensation for impacts on sensitive biological resources. Compensatory mitigation options are addressed in Appendix D. A detailed compensatory mitigation proposal will be presented in a Mitigation Strategy Implementation Plan (MSIP) (partial draft included in Appendix E) that the Authority will submit to the U. S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) in support of the Biological Assessment (Appendix G.1), which will be revised to reflect the Preferred Alternative.

3.3.2 General Design Approach to Avoid and Minimize Impacts at Water Crossings

While significant effort has been made to produce a preliminary design (15% north of the San Joaquin River; 30% from the San Joaquin River to the Downtown Fresno Station) that avoids and/or limits impacts on waters of the U.S., it is acknowledged that the actual configuration of the various crossings will not be known until a design-build team is on board and has prepared its first design submittal.

The Authority and FRA will coordinate with resource agencies to provide cross-sectional and profile data of the proposed crossings as further refinement of the planning and design process continues. The milestones will include specific product deliverables and data that could then be used to conduct hydraulic modeling to demonstrate how crossing designs might influence in-stream processes such as scour, etc. These analyses will address velocity, turbidity, and fluvial processes, including sediment scour and deposition. The Authority will work with the design-build contractor to develop bridge designs in coordination with the resource agencies. The Authority and FRA will continue to refine designs to reduce impacts to the maximum extent practicable. The design process is further described in Appendix C.

The Authority, in partnership with the design-build team, will design and conduct a hydrology/hydraulics analysis with appropriate modeling tools and incorporate site-specific data, including the needed geotechnical investigations to ensure that the design, sizing, location, and construction techniques are compatible with habitat conditions within the area impacted by the proposed HST crossing.

The stormwater runoff from all new or reconstructed roads and bridges resulting from the HST Project will receive water quality treatment to remove suspended sediments and associated pollutants in the runoff. Where suitable conditions exist, stormwater treatment could be achieved through the use of low impact development (LID) measures. Local ground slopes less than 5% and moderately to highly infiltrative soils (defined as including soils classified as Hydrologic Soil Groups A, B, or C) would generally constitute suitable conditions for LID. Applicable LID measures would include local infiltration, bioretention swales, rain gardens, and local flow dispersion (where available right-of-way permits). Where steeper slopes or poorly infiltrating soils preclude LID measures, stormwater treatment could be accomplished through the use of biofiltration swales or water quality ponds, among other approaches. The design concepts for avoidance of waters of the U.S. at road modifications (see Section 5) include annotations regarding the possibility for LID at these specific sites.

3.3.3 Construction

The Mitigation, Monitoring, and Reporting Program (MMRP) developed from requirements of the California Environmental Quality Act (CEQA) and the terms and conditions that are derived from the regulatory permitting processes will form the framework and responsibilities to be assigned to the design-build contractor, construction manager, and the Authority. The mitigation responsibilities will be represented in the design-build contract bid documents. The pre-construction surveys itemized in these documents, such as for plant and wildlife, will provide the basis for establishing Environmentally Sensitive Areas (ESAs), Environmentally Restricted Areas (ERAs), and exclusion fencing to minimize or avoid biological impacts. The Contractor will be responsible for establishing the ESAs and ERAs under the supervision of the Project Biologist and consistent with the permits and design. By incorporating provisions such as these, the avoidance and minimization measures will be identified, assigned, monitored, and reported on.

3.3.3.1 Minimizing Impacts on Waters of the U.S.

Avoidance and minimization measures are itemized in this section and are organized consistent with the EIR/EIS. The avoidance/minimization measures presented are identified exclusively for waters of the U.S., including wetlands.

Bio-MM#7: Delineate Environmentally Sensitive Areas and Environmentally Restricted Areas (on plans and in-field) (Avoidance/Minimization). Prior to ground-disturbing activities, to the extent practicable, verify that ESAs and ERAs are delineated as appropriate. ESAs are areas within the construction zones containing suitable habitat for special-status species and habitats of concern (i.e., wetlands, waters of the U.S, riparian communities, etc.) that may allow construction activities, but have restrictions based on the presence of special-status species or habitats of concern at the time of construction. ERAs are areas outside the construction footprint that must be protected in-place during all construction activities.

Prior to ground-disturbing activities, the designer will include all ESAs and ERAs on final construction plans (including grading and landscape plans). Prepare, review, and approve the map of all ESAs and ERAs on the design drawings and work to update the map as necessary.

Prior to ground-disturbing activities, the Contractor will mark ESAs and ERAs with high-visibility temporary fencing to prevent encroachment of construction personnel and equipment onto sensitive areas. Designate the two categories, ESA and ERA, differently in the field (e.g., different colored flagging/fencing). Use sub-meter accurate global positioning system (GPS) equipment to delineate all ESAs and ERAs. Remove ESA and ERA fencing when construction is complete or the resource has been cleared according to agency permit conditions in the MMRP and construction drawings and specifications. The Project Biologist will submit memoranda regarding the field delineation of all ESAs/ERAs to the Mitigation Manager.

Result – This measure specifically fences resources to protect in-place and seasonally sensitive resources or permanently protect through restrictive/exclusion fencing throughout the construction period.

Bio-MM#8: Equipment Staging Areas (Avoidance). Prior to ground-disturbing activities, locate staging areas for construction equipment outside sensitive biological resources, including habitat for special-status species, habitats of concern (i.e. wetlands, Waters of the U.S., riparian communities, etc.), and wildlife movement corridors, to the maximum extent possible. The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance.

Result - This measure provides an opportunity to avoid sensitive resources through proactive coordination efforts.

Bio-MM#10: Vehicle Traffic (Avoidance). During ground-disturbing activities, restrict project-related vehicle traffic, within the construction area, to established roads, construction areas, and other designated areas. Establish vehicle traffic locations disturbed by previous activities to prevent further adverse effects. Observe a 20-mph speed limit for construction areas with potential special-status species habitat. Clearly flag and mark access routes and prohibit off-road traffic. The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance.

Result – This measure can avoid, among other things, unnecessary use and compaction of the construction footprint and manage vehicular speeds to reduce fugitive dust. The speed limit will minimize vehicular mortality of wildlife by reducing speed within the construction footprint.

Bio-MM#20: Seasonal Vernal Pool Work Restriction (Avoidance). For seasonal avoidance of special-status vernal pool branchiopods and vernal pool-dependent species (e.g., California tiger salamander), do not work within 250 feet of aquatic habitats suitable for these species (e.g., vernal pools and other seasonal wetlands) from October 15 to June 1 (corresponding to the rainy season), or as determined through informal or formal consultation with the USFWS or USACE. Ground-disturbing activities may begin once the habitat is no longer inundated for the season. If any work remains to be completed after October 15, exclusion fencing and erosion control measures will be placed as a buffer between ground-disturbing activities and the vernal pools and other seasonal wetlands as determined through consultations with the USFWS or USACE.

Result - This measure avoids effects on vernal pool habitat while inundated by seasonal precipitation.

Bio-MM#44: Monitor Construction Activities Within Jurisdictional Waters (Minimization). During ground-disturbing activities, conduct monitoring within and adjacent to jurisdictional waters, including monitoring of the installation of protective devices (silt fencing, sandbags, fencing, etc.), installation and/or removal of creek crossing fill, construction of access roads, vegetation removal, and other associated construction activities. Conduct biological monitoring to document adherence to habitat avoidance and minimization measures addressed in the project mitigation measures and as listed in the USFWS, California Department of Fish and Game (CDFG), Regional Water Quality Control Board, and USACE permits conditions.

Result – This measure provides monitoring for the installation of runoff management devices to ensure avoidance and minimization of unnecessary discharges.

This section represents examples of avoidance and minimization measures to avoid and minimize impacts on water quality and biological resources associated with construction.

During construction, temporary water quality impacts could result from erosion, sedimentation, polluted stormwater runoff, and other construction debris entering onsite and adjacent drainages, and ultimately area waterways. To minimize these impacts, the following measures will be implemented:

- The Authority will avoid or minimize potential construction-related water quality impacts through compliance with the State Water Quality Control Board (SWQCB) National Pollutant Discharge Elimination System (NPDES) General Permit for construction activities. The Authority will be responsible for filing a Notice of Intent with the SWQCB and the contractor will prepare a stormwater pollution prevention plan (SWPPP), developed by a qualified SWPPP practitioner, and implement an appropriate suite of temporary construction best management practices (BMPs).
- Standard sediment control measures such as silt fencing, straw bale barriers, sediment traps, or other measures could directly reduce the offsite transport of sediment from disturbed slopes.
- Vegetation that can be preserved will be identified and flagged or fenced to avoid disturbance.
- Erosion in construction areas will be controlled through the use of grading operations that eliminate direct routes for conveying runoff to drainage channels and use of soil stabilization BMPs such as mulching, erosion control fabrics, and/or reseeding with grass or other plants where necessary.
- Temporary concentrated flow conveyance systems, such as berms, ditches, and outlet-flow-velocity-dissipation devices to reduce erosion from newly disturbed slopes, will be implemented.
- A qualified SWPPP practitioner will identify, construct, regularly inspect, and maintain the BMPs in good working order.
- Development and implementation of coordinated drainage features with permanent post-construction BMPs will minimize potential water quality impacts associated with roadway runoff. The contractor will be responsible for constructing permanent post-construction stormwater BMPs in accordance with Authority standards, which will be identified and incorporated into the SWPPP. The SWPPP requirements will accommodate the additional drainage discharges generated by the project to avoid adverse effects such as offsite erosion, sedimentation, and water quality impairments. The Authority will be responsible for long-term inspection and maintenance of the permanent BMPs within its jurisdictional right-of-way to ensure that the BMPs are maintained in good working order.

Construction activities typically include the refueling of construction equipment on location. As a result, minor fuel and oil spills may occur, with a risk of larger releases. Without rapid containment and cleanup, these materials could be potentially toxic, depending on the location of the spill in proximity to water features. Oils, fuels, and other contaminants could directly affect aquatic organisms, including special-status species that inhabit the creek on and off the project site. Accidental spills within the project work

site and into waterways could result in adverse impacts on the aquatic environment. The avoidance and minimization measures will reduce effects from erosion, sedimentation, runoff, and accidental spills. Construction specifications will include the following measures to reduce potential impacts associated with accidental spills of pollutants (i.e., fuel, oil, grease, etc.) to vegetation and aquatic habitat resources.

- The construction contractor will implement appropriate hazardous materials management practices to reduce the possibility of chemical spills or releases of contaminants, including any non-stormwater discharge. Standard hazardous materials management and spill control and response measures will minimize the potential for surface water and groundwater contamination.
- Standard staging area practices for sediment-tracking reduction will also be identified where necessary, including vehicle washing and street sweeping.

3.3.3.2 Minimizing Impacts on Biological Resources

Construction would result in effects on biological resources. In addition to the measures listed above, these effects could be avoided or minimized using the measures listed below. It is recognized that other avoidance/minimization measures address a variety of other resources such as special-status species (such as vernal pool branchiopods, California tiger salamander, vernal pool special-status plant species), wildlife connectivity, etc.; these avoidance/minimization measures are included in Sections 6 and 7 of this document.

- The construction footprint is generally 100 feet wide and provides sufficient area for construction. If pre-construction surveys determine that sensitive resources occur at the edge of the construction footprint, the construction area may be narrowed such that construction activities will not directly affect the resource. These areas will be fenced as ERAs and will be designed with exclusion fencing as well if required to minimize impacts on the resource.
- During construction, work window restrictions will be implemented during which certain activities such as initial site preparation will be phased to minimize effects on resources. For example, scheduling construction activities in consideration of the breeding season at or near a stream crossing that includes riparian vegetation with breeding bird habitat could avoid impacts on breeding species. These areas will be fenced as ESAs. Pre-construction surveys will be completed to determine the presence of species prior to site preparation to determine the need for avoidance or minimization of effects to the species. This is particularly relevant for breeding bird habitat and for California tiger salamander because there is considerable breeding habitat for these species. Construction would be phased, as described in the construction work window restriction item above, or timed to allow the surveys to proceed without the need for relocation.
- Biological monitors will be present throughout construction to support the design/build team with implementation of proper avoidance and minimization measures.
- ESA and ERA fencing will be installed with some placement of exclusion fencing to ensure that resources are not affected during the breeding season; are protected in-place; or are funneled/directed away from site preparation activities, grading, and operation of the project. This is particularly relevant to the portions of the project that incorporate riparian areas and/or are within the Essential Connectivity Area (ECA). This is both a minimization and avoidance measure.
- Select areas that have native riparian or wetland vegetation may be restored in the temporary impact areas as dictated by site and project constraints where aligned with key riparian or wetland features. Prior to construction, cuttings, duff, and other genetic or biomass materials may be salvaged to assist the re-establishment of the landscape. This is a minimization and repair technique.
- Dewatering and flow diversion may take place in riverine or creek conditions as dictated by site and project constraints where flowing water is present. Flows will be diverted either into temporary

culvert pipes that bypass the embankment or work pad to help ensure that the discharge is not materially affected by construction activities and minimize the potential for downstream sediment deposition. Any diversion of water necessary for project implementation will require the contractor to prepare a water diversion plan that complies with all regulatory permits and agreements.

- Project area vehicle speed limits will be integrated into the construction operation to minimize dust, erosion, noise, and startle effects during the site preparation and construction periods.
- Portions of the construction area may encompass remnant areas of properties that are too small to continue current operations due to the placement of the project on the property. For example, if the majority of a farmland parcel of 40 acres is affected by construction, the remaining unaffected area might be too small to continue farming. This area will be included in the accounting of the impact acreages in the EIR/EIS and in the relevant permit applications. These areas may become available as staging or laydown areas during construction, thus minimizing and avoiding impacts on more sensitive areas elsewhere. Pre-construction surveys will be carried out to determine that the remnant areas do not support sensitive resources and that the remnant areas could be excluded from use during construction.

3.3.4 Summary of Other Important Environmental Design Features of Proposed Project

All project alternatives and design options incorporate measures for flood protection and stormwater management and treatment. Project design features will contribute to the minimization of pollutant discharges to adjacent uplands, wetlands, streambeds, and major watercourses such as the San Joaquin River. For example, any bridge structures would control the stormwater and discharges from the structures with BMPs and runoff management required to meet Section 401 requirements. In addition, some of the project design features such as bridges, culverts, and some pipes would allow local wildlife movement through the project right-of-way.

The Authority and FRA have considered avoidance and minimization measures consistent with the programmatic EIR/EIS and the Final Merced to Fresno Section EIR/EIS. During project design and construction, the Authority and FRA will implement measures to reduce or avoid effects on water resources, special-status fish, and essential fish habitat. Additionally, the Individual Section 404 Permit will have conditions to further minimize water quality effects and will fully mitigate for effects on the functions and values of jurisdictional wetlands and other waters.

The project design incorporates a preferred design option to minimize impacts to the San Joaquin River and designated essential fish habitat (Appendix G.2). This design option has not been finalized, but the Authority and FRA are working with NMFS to avoid or minimize impacts to aquatic habitats in the San Joaquin River, including designated essential fish habitat.

The Merced to Fresno Section is within the action area for the Pacific Gas and Electric (PG&E) San Joaquin Valley Habitat Conservation Plan (HCP). The HCP covers incidental take of special-status plants and animals resulting from operation of existing PG&E facilities, maintenance activities (e.g., repairing and replacing existing facilities, existing structures, access roads, emergency repair, vegetation management and fire breaks), and minor construction. The goal of the PG&E San Joaquin Valley HCP is to contribute to the conservation of natural communities and covered plant and wildlife species associated with those communities within the plan area covered by the HCP.

The following are the overall objectives of the HCP:

- Objective 1: Acquire, protect, manage, and maintain lands for the benefit of covered species to achieve compensation for project habitat effects.

- Objective 2: Locate compensation lands with the plan regions (north, central, and south San Joaquin Valley) where project effects occur.
- Objective 3: Purchase or dedicate land near other preserved areas to maximize the conservation values of the land and assist in meeting land protection goals of existing recovery plans.

The project would be consistent with these goals and objectives. The mitigation identified in the MSIP for the Merced to Fresno section would complement or contribute the HCP by placing conservation easements on mitigation parcels that would protect similar resources as those being protected by the HCP including jurisdictional wetlands, habitat for special-status plants and wildlife, and riparian communities. Construction and operation of the Merced to Fresno Section would not interfere with the goals and objectives of the HCP because the HCP covers only existing PG&E facilities which would not be affected by the Merced to Fresno Section.

There are no other HCPs or Natural Community Conservation Plans (NCCPs) in the project area.

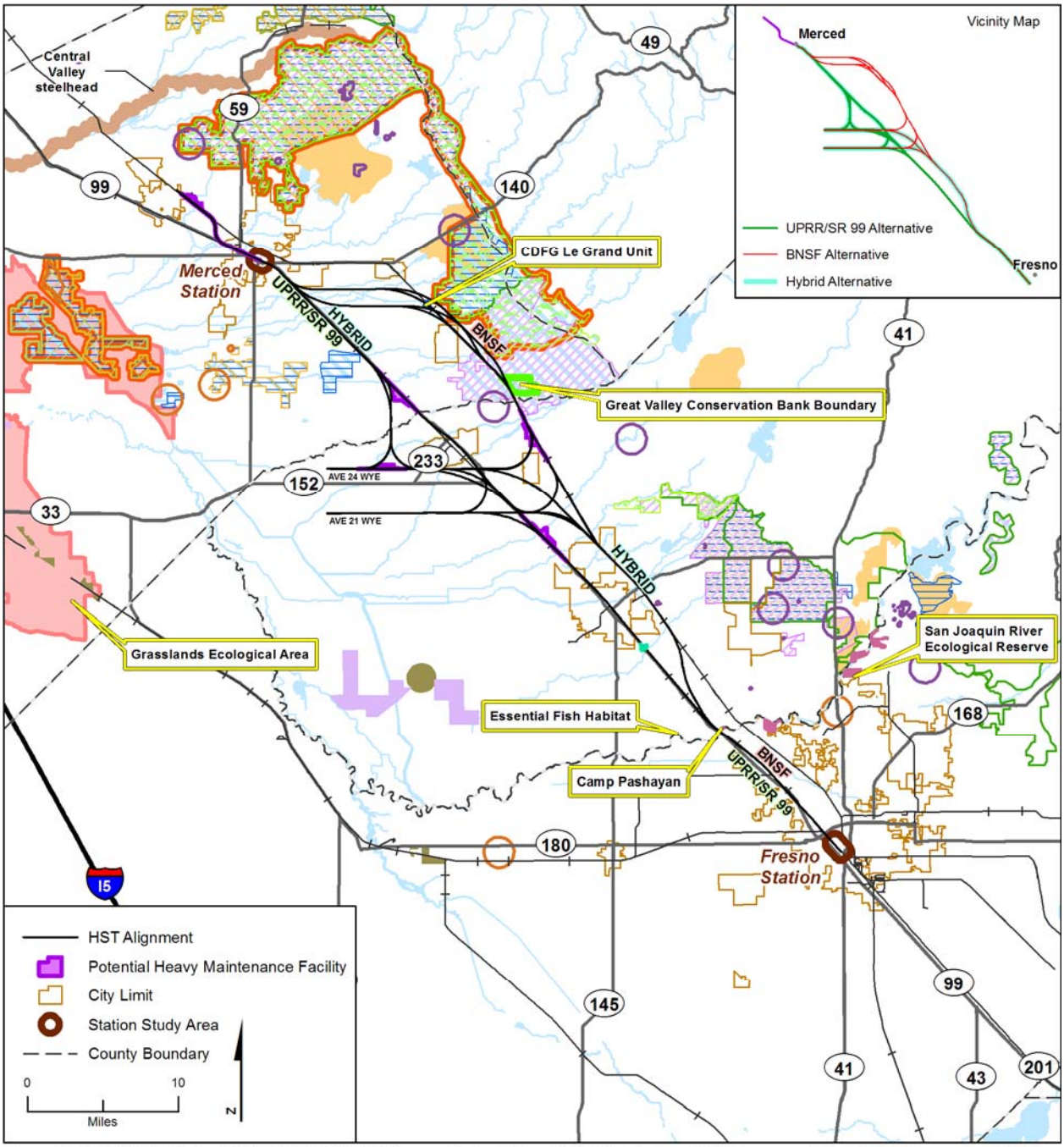
The UPRR/SR 99 and Hybrid alternatives would avoid impacts to the CDFG Le Grand Preserve and the Great Valley Conservation Bank. The BNSF Alternative would result in minor impacts to the Le Grand Preserve and the Great Valley Conservation Bank (Figure 3-2). The UPRR/SR 99 and Hybrid alternatives would avoid all impacts to designated critical habitat.

Table 3-3 from the EIR/EIS summarizes linear distances of each alternative within cross-designated ECAs and modeled wildlife corridors. It also tabulates the total number of crossings for each alternative and design option. As shown in Table 3-3, the BNSF Alternative crosses the greatest linear distance of ECAs and modeled wildlife corridors. The UPRR/SR 99 Alternative and the Hybrid Alternative cross approximately the same distance of mapped ECAs. The Hybrid Alternative crosses the least amount of designated modeled wildlife corridors. ECAs and modeled wildlife corridors are areas that the wildlife agencies have determined are vital to maintain for connectivity between blocks of preserved habitat. Therefore, the alternatives with the least degree of impacts to these areas would be preferable with regard to maintaining connectivity and local wildlife movement corridors.

Table 3-3
Summary of Wildlife Crossings within Essential Connectivity Areas and Modeled Wildlife Corridors by Alternative

Alternative, Design Option, and Wye Combination	Greatest Linear Distance Across ECA	Total Crossings within ECA			Greatest Linear Distance Across Modeled Wildlife Corridor	Total Crossings within Modeled Wildlife Corridor		
		High	Moderate	Low		High	Moderate	Low
UPRR/SR 99 Alternative								
West Chowchilla with Ave 24 Wye	3.6	2	1	1	5.25	0	0	1
East Chowchilla with Ave 24 Wye	4.1	2	2	0	5.25	0	0	0
East Chowchilla with Ave 21 Wye	4.1	0	2	0	7.75	0	0	5
Total	**3.6-4.1**	**0-2**	**1-2**	**0-1**	**5.25-7.75**	**0**	**0**	**0-5**
BNSF Alternative								
Mission Avenue with Ave 24 Wye	6.8	5	2	0	3.6	0	0	4

Alternative, Design Option, and Wye Combination	Greatest Linear Distance Across ECA	Total Crossings within ECA			Greatest Linear Distance Across Modeled Wildlife Corridor	Total Crossings within Modeled Wildlife Corridor		
		High	Moderate	Low		High	Moderate	Low
Mission Avenue East of Le Grand with Ave 24 Wye	6.4	5	0	0	3.6	0	0	4
Mariposa Way with Ave 24 Wye	6.8	5	2	0	3.6	0	0	4
Mariposa Way East of Le Grand with Ave 24 Wye	6.1	8	1	0	3.6	0	0	4
Mission Avenue with Ave 21 Wye	6.8	5	2	0	9.1	0	0	8
Mission Avenue East of Le Grand with Ave 21 Wye	6.4	5	0	0	9.1	0	0	8
Mariposa Way with Ave 21 Wye	6.8	5	2	0	9.1	0	0	8
Mariposa Way East of Le Grand with Ave 21 Wye	6.1	8	1	0	9.1	0	0	8
Total	**6.1-6.8**	**5-8**	**0-2**	**0**	**3.6-9.1**	**0**	**0**	**4-8**
Hybrid Alternative								
Hybrid Alternative with Ave 24 Wye	3.6	2	1	0	3.6	0	0	2
Hybrid Alternative with Ave 21 Wye	4.1	1	1	0	5.3	0	0	8
Total	**3.6-4.1**	**1-2**	**1**	**0**	**3.6-5.3**	**0**	**0**	**2-8**



Source: U.S Fish & Wildlife Service, ESRP 2009, CNDDB 2010, Conservation Land Group, 2010, Wildlands, Inc., 2010, Caltrans. MF_EIS_BIO_05 Jun 02, 2011

Critical Habitat

- Hoover's spurge
- San Joaquin Valley Orcutt grass
- hairy Orcutt grass
- succulent owl's-clover
- Greene's tuctoria
- Conservancy fairy shrimp
- vernal pool fairy shrimp
- vernal pool tadpole shrimp
- Colusa grass
- Central Valley steelhead
- California tiger salamander

Caltrans Observed Data

- vernal pool

Mitigation Banks/Reserves

- San Joaquin River Ecological Reserve
- CDFG Le Grand Unit
- Great Valley Conservation Bank Boundary
- Grasslands Ecological Area

Special-Status Plant Communities

- Northern Claypan Vernal Pool
- Northern Hardpan Vernal Pool
- Valley Sacaton Grassland
- Valley Sink Scrub

Figure 3-2
Habitats of Concern

4.0 Proposed Mitigation for Proposed Project/Preferred Alternative Jurisdictional Impacts

Final mitigation acreage for jurisdictional impacts will be determined in consultation with the USACE and will be determined in part through the assessment of functions and values that would be lost or impaired through construction and operation of the Merced to Fresno Section and the proposed functions and values that will be preserved, created, restored, and enhanced by the proposed mitigation package for the Merced to Fresno Section. The Construction Management Plan (CMP) is included in Appendix D and a partial draft of the Mitigation Strategy and Implementation Plan (MSIP) is included in Appendix E.

- The total acreage of jurisdictional resources to be preserved has not been finalized. The MSIP proposes jurisdictional wetlands to be preserved according Table 4-1. The estimated preservation acreage included in Table 4-1 is preliminary at this point and the preservation component of the mitigation proposal will require review and approval by the USACE.
- The total acreage of jurisdictional resources to be enhanced has not been finalized. The MSIP proposes jurisdictional wetlands to be enhanced according to Table 4-1. The estimated enhancement acreage is preliminary at this point and the enhancement component of the mitigation proposal will require review and approval by the USACE.
- The total acreage of jurisdictional resources to be restored has not been finalized. The MSIP proposes jurisdictional wetlands to be restored according to Table 4-1. The restoration acreage is preliminary at this point and the restoration component of the mitigation proposal will require review and approval by the USACE and U.S. Fish and Wildlife Service.
- Final mitigation ratios for wetland preservation, creation, and enhancement have not been determined. The results of the California Rapid Assessment Method (CRAM) analysis on proposed mitigation sites will be necessary to determine final mitigation ratios required by the USACE. The CRAM scores on the proposed mitigation sites will be balanced against the CRAM scores for the affected features to help determine the final mitigation ratio for affected features. Fieldwork to obtain CRAM scores is anticipated to occur in the spring of 2012.

The Final EIR/EIS will provide the following suggested mitigation ratios for jurisdictional features and sensitive habitat types (riparian): 2:1 for project-related impacts to riparian habitat, a 2:1 preservation ratio and a 1:1 creation ratio for impacts to vernal pools and other seasonal wetlands, 1:1 for coastal and valley freshwater marsh, and between 1.1:1 and 1.5:1 (1:1 onsite and 0.1 to 0.5:1 offsite) for other jurisdictional wetlands depending on function and values temporarily lost. However, as stated above, final mitigation ratios will be subject to comparison of CRAM scores of the affected wetlands and wetlands to preserved or enhanced on the mitigation properties. If mitigation efforts can be accomplished ahead of impacts, ratios will also be adjusted based on reduction in temporal losses. Consult Chapter 5 of the MSIP for a summary of proposed mitigation for jurisdictional features. The Authority will work with the USACE to develop methodologies that maintain net functions and values after construction and initiation of operations and to enhance them after completion of mitigation as compared to pre-construction conditions. Functions and values that are impaired or eliminated by project construction and operations will be compared to net functions and value after completion of proposed restoration of temporary impacts, preservation of functions and values within approved mitigation properties, and creation, restoration and/or enhancement of existing wetland resources within approved mitigation properties.

Table 4-1
Proposed Jurisdictional Wetlands to be Preserved

Affected Feature	Type of Impact	Construction Package 1 of Initial Construction Segment				Remainder of Merced to Fresno Section			
		Effects of Ave 21/24 Design Alternatives (acres)	Proposed Mitigation (acres) – Grasslands and Lazy K			Effects of Ave 21/24 (acres)	Proposed Mitigation (acres) – Dutchman Creek		
			Preservation	Restoration/ Establishment	Enhancement		Preservation	Restoration/ /Establishment	Enhancement
Vernal Pools	Direct Permanent	0.98/0.98	71	28		3.14/2.81	34.71		
	Indirect Permanent	2.73/2.73				8.54/4.19			
Seasonal Wetlands	Direct Permanent	0.35/0.35		47		1.10/1.10			
	Indirect Permanent	0.79/0.79				0.66/0.66			
Freshwater Marsh (Coastal and Valley)	Direct Permanent	0.00/0.00		111*		0.04/0.00			2.2
	Direct Temporary	0.00/0.00				0.00/0.00			
	Indirect Permanent	0.00/0.00				0.22/0.00			
Palustrine Forested Wetlands (Fremont Cottonwood)	Direct Permanent	0.00/0.00				3.59/3.64			
	Direct Temporary	0.00/0.00				1.64/1.50			
	Indirect Permanent	0.00/0.00				3.08/3.37			
Natural Watercourse (Perennial / Intermittent)	Direct Permanent	2.16/2.14	23			1.70/3.19			2.2
	Direct Temporary	4.29/4.28				1.70/1.54			

Affected Feature	Type of Impact	Construction Package 1 of Initial Construction Segment				Remainder of Merced to Fresno Section			
		Effects of Ave 21/24 Design Alternatives (acres)	Proposed Mitigation (acres) – Grasslands and Lazy K			Effects of Ave 21/24 (acres)	Proposed Mitigation (acres) – Dutchman Creek		
			Preservation	Restoration/ Establishment	Enhancement		Preservation	Restoration/ /Establishment	Enhancement
	Indirect Permanent	9.55/6.50				7.90/12.77			
Constructed Watercourse	Direct Permanent	1.35/1.35				5.01/9.29			
	Direct Temporary	0.16/0.16				3.36/2.61			
	Indirect Permanent	3.90/3.90				8.15/18.21			
Constructed Basin	Direct Permanent	0.10/0.10				3.61/4.64			
	Direct Temporary	0.00/0.00				0.42/0.87			
	Indirect Permanent	2.47/2.47				17.15/20.56			
Open Water	Direct Permanent	0.43/0.43		55		1.16/0.78			
	Indirect Permanent	0.10/0.10				3.58/3.27			
Riparian, mixed	Direct Permanent	1.12/1.12	8.3	22		1.77/3.85	2.05		
	Direct Temporary	1.62/1.62				2.46/1.83			
	Indirect Permanent	6.00/3.91				8.34/16.22			
Riparian, other	Direct Permanent	0.00/0.00				0.99/1.23			
	Direct Temporary	0.00/0.00				0.22/0.08			
	Indirect Permanent	0.01/0.01				2.97/6.09			
California tiger salamander –	Direct Permanent	3.89/3.89	21	TBD		21.87/14.70	6.79		

Affected Feature	Type of Impact	Construction Package 1 of Initial Construction Segment				Remainder of Merced to Fresno Section			
		Effects of Ave 21/24 Design Alternatives (acres)	Proposed Mitigation (acres) – Grasslands and Lazy K			Effects of Ave 21/24 (acres)	Proposed Mitigation (acres) – Dutchman Creek		
			Preservation	Restoration/ Establishment	Enhancement		Preservation	Restoration/ /Establishment	Enhancement
aquatic									
	Indirect Permanent	3.85/3.85				6.63/4.87			
California tiger salamander – upland	Direct	38.25/38.25	977			43.88/33.95	466.1		
	Indirect	73.00/73.00				94.66/56.17			
Colusa grass	Direct	0.00/0.00				0.14/0.14			
	Indirect	0.00/0.00				0.07/0.07			
Conservancy fairy shrimp	Direct Permanent	2.79/2.79				20.00/13.36	34.71		
	Indirect Permanent	3.36/3.36				2.25/1.98			
Greene's tuctoria	Direct	0.00/0.00				3.94/3.47			
	Indirect	0.00/0.00				3.12/2.58			
Hairy Orcutt grass	Direct	1.76/1.76				3.84/3.70			
	Indirect	1.79/1.79				3.07/2.36			
San Joaquin Kit Fox	Direct Permanent	70.42/70.36	1,127			42.80/41.12	466.1		
	Indirect Permanent	773.68/773.74				335.48/293.11			
San Joaquin Valley Orcutt grass	Direct	0.93/0.93	DCH			4.48/3.77			

Affected Feature	Type of Impact	Construction Package 1 of Initial Construction Segment				Remainder of Merced to Fresno Section			
		Effects of Ave 21/24 Design Alternatives (acres)	Proposed Mitigation (acres) – Grasslands and Lazy K			Effects of Ave 21/24 (acres)	Proposed Mitigation (acres) – Dutchman Creek		
			Preservation	Restoration/ Establishment	Enhancement		Preservation	Restoration/ /Establishment	Enhancement
	Indirect	1.60/1.60				3.93/3.07			
Swainson's hawk	Direct	330.61/333.51	1,127	94		671.37/885.25	466.1		
	Indirect	2,838.86/ 2,835.83				6,540.19/ 8,163.52			
Succulent owl's-clover	Direct	0.93/0.93	7.6			1.70/1.12			
	Indirect	1.60/1.60				1.22/1.08			
Vernal pool fairy shrimp	Direct Permanent	3.89/3.89	71			21.87/14.70	34.71		
	Indirect Permanent	3.85/3.85				6.63/4.87			
Vernal pool tadpole shrimp	Direct Permanent	0.00/0.00	16; DCH			20.00/13.36	34.71		
	Indirect Permanent	0.00/0.00				2.25/1.98			
Valley elderberry longhorn beetle	Direct Permanent	0.00/0.00	TBD	TBD		1.22/1.31	TBD		
	Indirect Permanent	0.00/0.00				1.15/2.39			

Notes: * = 111 acres of freshwater marsh would be restored at Grasslands, and would include 55 acres of open water. Freshwater marsh is suitable mitigation for giant garter snake, but may not satisfy mitigation requirements for USACE.

5.0 Changes to Proposed Project since Public Review Draft EIR/EIS and Preliminary Agency Review of Proposed Project

After completion of the preliminary design, the alternative alignments were reviewed for additional avoidance opportunities. With the alignment fixed, these occur mostly at areas where grade separations and road modifications are planned. Concepts for these design refinements are presented here, along with quantification of the additional reduction in impacts that they would achieve. The Authority is preparing 15% designs that will be incorporated into the Final EIR/EIS.

5.1 Changes since Publication of the Draft EIR/EIS

Several changes to the design were made since publication of the Draft EIR/EIS in August 2011. All of them minimally affect the project design, practicability of alternatives, their cost, and resulting impacts to any of the resource areas analyzed in the EIR/EIS, including aquatic resources. The design refinements were primarily developed to address public and agency comments. Where the Hybrid Alternative overlaps with other alternatives, those alternatives also benefit from these modifications. Changes that affect the construction footprint are as follows:

- **Merced Station footprint refinement.** The station foot print was adjusted to provide an additional fire safety lane next to the station, without affecting any additional development in the downtown area.
- Add overcrossing for Road 20 in Madera Acres. Instead of closing Road 20, it would remain open and cross over the HST tracks. This change was requested by the County of Madera.
- **Modify overcrossing at Ave 25 in the wye area.** The refinement was introduced to maintain local traffic operations, while avoiding impact to structures at a dairy farm.
- **Elevate the track higher over State Route 145.** The HST track crosses SR145 just south of the Fresno River. The original design included 1) an overcrossing for Raymond Road over the HST and existing BNSF tracks and 2) extending an existing SR145 undercrossing under existing BNSF tracks, to also undercross the HST tracks. The design refinement raised the approaching profiles of HST tracks so that they will cross over Raymond Road, thereby eliminating the need for an overcrossing, and provide adequate vertical and horizontal clearance over existing SR145, without extending the existing undercrossing.
- **Refinement of horizontal HST track alignment.** The track was realigned south of Madera Acres to reduce effects on a Church & Dwight facility. The alignment adjustment resulted in track alignment refinement over a distance of approximately 4 miles.
- Advance project design to 30% south of the San Joaquin River.

5.2 Identification of Additional Opportunities to Avoid Jurisdictional Waters for the Preferred Alternative

The construction footprint for the Hybrid Alternative associated with the current design (January 2011) was evaluated for further opportunities to reduce impacts on jurisdictional waters. The design standards for tracks that can accommodate a high-speed train traveling at 250 mph (design speed) allow little flexibility to create curves that avoid certain resources (the curve radius is a minimum of approximately 5 miles). Section 3 addresses opportunities to avoid resources within the construction footprint during final design or construction (see Section 3.0 of this Summary Report).

5.2.1 Horizontal (Footprint) Revisions

Because of the limited opportunity to modify the track design for a high-speed rail, a design review was conducted to identify sites with avoidance potential at road modifications, such as overcrossings and associated roadways. The construction footprint was evaluated for further opportunities to reduce impacts on jurisdictional waters. The review process employed GIS-generated data and kmz files to identify the following:

- The largest acreages of direct permanent impacts. Avoidance of direct permanent impacts could transfer impacts to the indirect permanent category. Sites with only indirect permanent impacts were not considered because avoidance would require moving the construction footprint by a distance of up to 250 feet, which is rarely feasible from an engineering perspective. For example, in some cases, the project would require paving of a currently unpaved agricultural road to accommodate a future increase in traffic. It would not be prudent to move the existing road into an adjacent agricultural field to avoid indirect impacts on nearby jurisdictional waters.

- Clusters of smaller jurisdictional waters associated with road modifications. The search for clusters of visual imagery supplements the numeric data search.

The resulting preliminary list of sites was reviewed to determine whether feasible engineering solutions exist for avoiding jurisdictional waters. Typical solutions include shrinking the construction footprint, relocating roads or HST-associated facilities (including cases where additional property might need to be acquired), and replacing engineered slopes with retaining walls. Where soil conditions and slopes are favorable, low-impact design for routing of stormwater is addressed. The design refinements and acreages of direct and indirect impacts avoided at each site are provided in Attachment 4.

5.2.2 Vertical (Profile) Revisions

The Authority also reviewed opportunities for avoidance by changing the profile of the track design and placement of bridge piers. Vertical design considerations, including for the San Joaquin River, are described in Section 3.0 and Appendices G.2 and H of this report. Elevating a crossing over the Fresno River would avoid resources. The HST track crosses the Fresno River and nearby SR 145, which is grade-separated from the existing BNSF tracks by an undercrossing. The HST track crosses SR 145 just south of the Fresno River. The original design included an overcrossing for Raymond Road (north of the river) over the HST and existing BNSF tracks and deepening an existing undercrossing of SR 145 (south of the river) under the HST tracks and the existing BNSF tracks. The modified design increases the height of the HST tracks by approximately 7 feet and, thus, eliminates the need for the overcrossing for Raymond Road and modifying the undercrossing for SR 145.

5.2.3 Summary

Implementing these horizontal and vertical revisions to the Hybrid Alternative design would result in avoiding 2.35 to 3.17 acres of permanent direct effects on jurisdictional waters.

6.0 Alternatives (33 CFR 320.4(b)(4), 40 CFR 230.10)

6.1 No Fill Alternative

To assure a robust evaluation of alternatives pursuant to the 404(b)(1) process, a no fill alternative is evaluated to determine whether the project can be practicably implemented (i.e., built) without the discharge of fill into waters of the United States. If there is a practicable no -fill alternative, it would then serve as the Least Environmentally Damaging Practicable Alternative (LEDPA).

Throughout the project development process, the Authority and FRA have sought to balance the regulatory need to minimize and avoid the use of fill materials (e.g., by shifting the alignment and/or maximizing the use of elevated structures) taking into account the project's purpose and need, along with design, engineering, cost, and environmental criteria. Despite adherence to a rigorous alternatives screening and evaluation process, the Authority and FRA are unable to identify a practicable no fill alternative. In addition, a no fill alternative would have other significant adverse environmental effects.

6.1.1 There is No Practicable No Fill Alternative

The 404(b)(1) Guidelines state that an alternative is *practicable* "if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of the overall project purposes." 40 CFR § 230.10(a)(2). The purpose of the statewide HST System is to provide a reliable high-speed electric-powered train system that links the major metropolitan areas of the state, and that delivers predictable and consistent travel times. The purpose of the project is to implement the Merced to Fresno Section of the California HST System to provide the public with electric-powered high-speed rail service as an alternative to vehicular and other types of travel that generate higher emissions of pollutants, while providing predictable and consistent travel times between major urban centers and connectivity to airports, mass transit systems, and the highway network in the south San Joaquin Valley. The project would implement the critical segment of the HST System that connects the northern and southern portions of the system. Specifically, the Merced to Fresno HST Project section would connect a Merced station and a Fresno station. The planned HST line west of the Merced to Fresno Section is through the Pacheco Pass, and will connect the San Francisco to San Jose HST Project to the Central Valley and the rest of the HST System. South of the Downtown Fresno Station, the HST line is planned to continue to Los Angeles through Bakersfield and Palmdale.

The HST System must meet California's need for reliable, high-speed, lower emissions transit in a manner that is consistent with provisions of Proposition 1A, the Safe, Reliable, High-Speed Passenger Train Bond Act, adopted by California voters in November 2008 (Streets & Highways Code § 2704, et seq.). That initiative states: "[i]n order to reduce impacts on communities and the environment, the alignment for the HST system shall follow existing transportation or utility corridors to the extent feasible and shall be financially viable, as determined by the authority." Streets & Highways Code § 2407.09(g). In addition, the project must be designed to "[p]reserv[e] wildlife corridors and mitigating impacts to wildlife movement, where feasible as determined by the authority, in order to limit the extent to which the system may present an additional barrier to wildlife's natural movement." *Id.* § 2704.09(j).

- **Construction of a No Fill Alternative Would Be Cost Prohibitive** – There is no alignment between Merced and Fresno that follows existing transportation or utility corridors to the maximum extent feasible that does not cross waters of the United States. To design a no fill alternative, portions of the Merced to Fresno HST alternative that cross jurisdictional waters would need to be built on elevated structure regardless of historical fills, the size of the jurisdictional water to be crossed, or the quality of those waters. Subject to cost variations related to on the location and design demands for a particular segment of track, a one-mile trackway built on an elevated structure

costs approximately $48 million as compared to costs for construction of an at-grade section, which typically costs $2.2 million. While typically construction costs for elevated track segments are about 22 times more expensive than its at-grade counterpart, some aerial structures could cost considerably more than 22 times the cost of an at-grade structure. In addition to the generally incomparable costs of construction for elevated v. at-grade HST System improvements, the engineering design criteria require track alignments that are mostly straight (tangent alignment) and, when required, use a large curve radius of up to 5 miles to safely achieve high speeds of up to 220 mph. This engineering requirement results in a rigid system (i.e., the design of the track alignments cannot easily and frequently accommodate vertical or horizontal deviations to avoid specific resources), while meeting the design criteria. A change in the track alignment to avoid one location can result in a shift in track alignment over a distance of 2 to 4 miles and thus, has the potential to affect other resources and facilities Any attempt to avoid all jurisdictional waters would, therefore, require elevation of most if not all of the track which would add significantly (billions of dollars) to the cost of the Proposed Project/Preferred Alternative. Thus, a no fill alternative is not practicable from a cost standpoint in light of the purpose of the Proposed Project/Preferred Alternative and the legal requirements imposed on the HST System by Streets & Highways Code § 2704.09(g).

Taking into account that tax revenues and public monies are the source of funding for the HST System, including the proposed project, and consistent with the legal requirement that the HST project must be "financially viable," the Authority and FRA have emphasized the need to maximize the use of at-grade construction except in locations where impacts to aquatic features are unavoidable or system design dictates. (*e.g.,* in order to meet public safety requirements).

- **Logistics** – Design of a no fill alternative to avoid all jurisdictional waters would add additional logistical complexity to project construction. For example, while an alternative design for any particular limited track segment of an HST System may not be prohibitive in terms of technological limitations, the logistics of creating a more circuitous alignment that diagonally traverses farmlands or county roads for over 40 miles to avoid the use of fill material for project construction would, at a minimum, result in cumbersome overcrossings, ineffective circulation, and inefficient use of adjacent lands. Due to the necessity of a longer, more circuitous route, a no fill alternative on elevated structure, would likely require the need to acquire additional property to avoid aquatic resources. In addition, such a route would add significant travel time to the trips that the Proposed Project is designed to accommodate, and would therefore be inconsistent with the project's purpose.

  If the alternative were designed as a primarily elevated alternative, it would offer no efficiency advantages over other less environmentally damaging alternatives and, therefore, would not be practicable from a cost efficiency perspective.

- **Technical Considerations** – Construction of a no fill alternative between Merced and Fresno is possible given existing technology, but is cost prohibitive.

6.1.2 A No Fill Alternative Would Have Greater Non-Aquatic Environmental Impacts

The 404(b)(1) Guidelines require the USACOE to determine whether each project alternative, including a no fill alternative, would cause other significant adverse environmental impacts as compared to the Proposed Project and other potential project alternatives. 40 CFR § 230.10(a). A no fill alternative would result in more significant adverse impacts than the Proposed Project to several types of environmental resources, including the following significant adverse environmental impacts:

- **Aesthetic Impacts** – With some variances related to height and location, the use of a primarily elevated structure that diagonally traverses the approximately 65-mile route to avoid aquatic features would trigger additional visual and aesthetic impacts, both during project construction and system operation. Significant impacts and impacts with substantial intensity that cannot be mitigated would

result from the vertical elements of the HST that would block views of natural resources and change the landscape character.

- **Traffic Impacts** – As described above under Logistics, a no fill alternative could introduce additional traffic impacts due to road closures designed to avoid aquatic resources. The rerouting of traffic could also cause out-of-direction travel for in individuals adding time and distance to local roadway trips.

- **Noise Impacts** – In general, noise and vibration impacts would occur during project construction and system operation, whether the alternative is built at-grade or on elevated structure. However, train noise can be heard from a greater distance on an elevated structure than when operating at ground level. In addition, to the extent that the route must be longer and more circuitous to accommodate avoidance of all jurisdictional waters, both adverse construction and operational noise impacts will affect more receptors than the Proposed Project. While noise mitigation measures can be used to reduce impacts to local residents, businesses, and sensitive receptors (e.g., hospitals, etc.), the impact to be mitigated will be far greater and will affect far more receptors, and depending on the ability to deploy and the efficacy of mitigation, may remain significant following mitigation.

- **Air Quality Impacts (Including GHG Emissions)** – In general, a no fill alternative that results in a longer, more circuitous alignment to avoid aquatic impacts would result in greater construction-related air quality impacts. Since the HST is to be electrically powered, there would be no additional air quality impacts associated with system operation.

- **Energy Generation or Consumption Impacts** - A no fill alternative that results in a longer, more circuitous alignment to avoid aquatic impacts would result in a slight if negligible increase in energy consumption needed to power the train.

- **Cultural Resources Impacts** – Due to the necessity of a longer, more circuitous route, a no fill alternative on a primarily elevated structure requires definition of a larger area of potential project effect (APE) for both architectural and archaeological resources. A larger APE will likely result in the identification of additional cultural and historical resources considered "unique" under CEQA and/or eligible for national register status under the National Historic Preservation Act. Consequently, both construction and operational adverse impacts to cultural and historical resources can be anticipated to increase with the no fill alternative

- **Section 4(f) Resources Impacts** - Due to the necessity of a longer, more circuitous route, a no fill alternative on a primarily elevated structure would likely result in the identification of additional parks, refuges and historical sites subject to protection under Section 4(f) under the Department of Transportation Act of 1966 that would be subject to both construction and operational adverse impacts. For the HST Project, the FRA may not approve the use of a Section 4(f) property unless it determines that there is no feasible or prudent alternative to avoid use of the property, creating a regulatory conflict between the no fill alternative and Section 4(f). Should the no fill alternative pose a potential impact to parks, refuges or historical resources located adjacent to its longer more circuitous alignment, it could result in the alternative being infeasible if it cannot be built to avoid those resources as a matter of sound engineering judgment under FRA's *Procedures for Considering Environmental Impacts* (64 FR 25445, May 26, 1999) and under 49 U.S.C. § 303.

- **Property Acquisition** – Due to the necessity of a longer, more circuitous route, a no fill alternative on elevated structure, would likely require the need to acquire additional property to avoid aquatic resources. Depending on location and the distance the alignment would need to be re-routed, this could increase environmental impacts to local resources and receptors and right-of-way acquisition costs for the project substantially.

6.1.3 Purpose and Need

Based on cost and logistics concerns, as well as issues regarding greater environmental impacts, the Authority and FRA were unable to identify a practicable no-fill alternative that does not have greater significant adverse environmental impacts than the Proposed Project and the other project alternatives. Equally important to the Authority and FRA is the fact that a no fill alternative would be inconsistent with the project's purpose and need, including the legal mandates to construct an HST project that follows existing transportation or utility corridors to the extent feasible and that is financially viable. Streets & Highways Code § 2704.09(g).

As described earlier in this Summary, the purpose of the HST project is to provide the public with electric-powered high-speed rail service that provides predictable and consistent travel times between major urban centers and connectivity to airports, mass transit systems, and the highway network in the South San Joaquin Valley, and to connect the northern and southern portions of the system. To achieve this goal, the Authority has a statutory mandate to plan, build, and operate the HST system coordinated with California existing transportation network, particularly intercity rail and bus lines, commuter rail lines, urban rail lines, highways and airports.

For travel between Merced and Fresno, the existing north-south transportation network, including State Route 99 and the Union Pacific Railroad (UPRR) and Burlington Northern and Santa Fe (BNSF) rail lines, crosses a number of streams, irrigation canals, drainages, and the San Joaquin River. While many of these water courses and jurisdictional waters technologically could be spanned, construction of the HST project for several of the crossings will require the use of some fill materials for project construction. To propose a no fill alternative that avoids all jurisdictional waters, given operating constraints of the HSTs, requires a project that fails to meet purpose and need, and applicable legal mandates in that:

- It would not follow the existing transportation network to the extent feasible;
- It would not provide a direct, short route with predictable and fast transit time consistent with high-speed services; and
- It would not efficiently serve existing urban centers, airports, mass transit systems or the highway network.

6.2 UPRR/SR 99 Alternative

6.2.1 UPRR Project Description

The alignment for the UPRR/SR 99 Alternative traverses urban downtown areas in the cities of Merced, Madera, and Fresno. It is generally adjacent to SR 99 and UPRR. This HST alignment is designed to follow the existing UPRR corridor adjacent to the UPRR mainline right-of-way. In several locations, the HST segment is elevated to cross over the UPRR operational right-of-way. In these instances, the alternative maintains required horizontal and vertical clearance over UPRR operational right-of-way to avoid or minimize impacts on other UPRR right-of-way, spurs, and facilities. The alternative is designed to avoid the existing UPRR operations right-of-way and active rail spurs to the greatest extent possible. Similarly, the HST follows the SR 99 corridor and, therefore, crosses over SR 99 in some locations and under SR 99 in Merced. In some instances, HST at-grade guideway may cross the roadway approaches of SR 99 overcrossings and interchange elements. For additional detail regarding the UPRR/SR 99 Alternative see Section 2.4.2 of the EIR/EIS.

6.2.2 Practicability of UPRR Alternative

The 404(b)(1) Guidelines state that an alternative is practicable "if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of the overall project purposes" (40 CFR 230.10(a)(2)).

6.2.2.1 Cost

The UPRR Alternative is a cost-prohibitive alternative. With the Ave 21, the UPRR Alternative would cost an estimated $5.9 billion on the low end, and with the Ave 24 Wye would cost an estimated $6.7 billion on the high end (a table showing the capital cost of all HST alternatives is provided in Section 8). This is up to $2.9 billion more than the Hybrid Alternative. As stated in the California High-Speed Rail Program Draft 2012 Business Plan, the Authority has secured $3.5 billion as part of the American Recovery and Reinvestment Act of 2009 (Recovery Act or ARRA) and the potential for $9.5 billion from the sale of bonds authorized under Proposition 1A. It is extremely important to note that these funding sources apply to the whole of the high-speed rail program; for maximum of 90 track miles from estimated total 800 plus miles of the California High-Speed Rail network, the UPRR Alternative's potential total cost of up to $6.7 billion would consume well over half of the total currently available funding for the entire program.

6.2.2.2 Logistics

One major logistical consideration for the proposed project is constructability and maintainability (Table 6.3-1). Some of the major factors involved in both are:

- Total length of track
- Total length of elevated structures
- Complex crossing angles
- Number and type of crossings over/under existing highways and roadways and rail lines
- Number of river crossings

Table 6.3-1
Logistics of the HST Alternatives

Alternative:	UPRR/SR 99 Alternative					BNSF Alternative							
						Mariposa Way				Mission Ave			
Design Option:	East Chow-chilla		West Chow-chilla	Hybrid Alternative		Le Grand Design Option		East of Le Grand Design Option		Le Grand Design Option		East of Le Grand Design Option	
Wye:	Ave 24	Ave 21	Ave 24	Ave 24	Ave 21	Ave 24	Ave 21	Ave 24	Ave 21	Ave 24	Ave 21	Ave 24	Ave 21
Total length[a] (linear miles)	90	86	74	75	76	94	92	95	93	94	92	95	93
At-grade profile[a] (linear miles)	49	49	43	60	59	71	71	71	71	71	71	71	71
Elevated profile[a] (linear miles) (including retained	41	37	32	15	17	23	21	24	22	23	21	24	22

Alternative:	UPRR/SR 99 Alternative			Hybrid Alternative		BNSF Alternative							
						Mariposa Way				Mission Ave			
Design Option:	East Chow-chilla		West Chow-chilla			Le Grand Design Option		East of Le Grand Design Option		Le Grand Design Option		East of Le Grand Design Option	
Wye:	Ave 24	Ave 21	Ave 24	Ave 24	Ave 21	Ave 24	Ave 21	Ave 24	Ave 21	Ave 24	Ave 21	Ave 24	Ave 21
fill)													
Number of Straddle Bents [b]	60	78	75	55	40	52	43	52	43	52	43	52	43
Number of Railroad Crossings	9	9	7	6	4	6	6	10	10	6	6	10	10
Number of Water Crossings	98	105	113	113	113	92	97	88	93	104	109	101	106
Approximate Number of Roadway Closures [c]	23	26	32	49	37	74	59	80	65	71	56	77	62
Number of Roadway Overcrossings	29	26	28	48	45	53	45	53	45	53	45	53	45
Number of High Risk Utility Conflicts	47	45	37	19	30	17	14	18	15	19	16	19	16
Number of Low Risk Utility Conflicts	145	125	139	89	107	77	80	78	81	84	87	80	83

[a] 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.

[b] 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 to be determined during design.

[c] Includes public and private road closures.

The UPRR Alternative would present several constructability challenges. While the UPRR Alternative would have one of the shorter overall total lengths of track, it would have the most elevated structure (32 miles with West Chowchilla and 37-41 miles with East Chowchilla). As reflected in the cost section above, the more elevated structure an alternative has the greater its construction cost. The increased costs are due to material costs as well as increased labor costs and construction conditions. Structures involve more complicated construction techniques than at-grade construction. This also means that elevated structures take longer to construction than at-grade facilities. But construction cost is only one piece of the overall costs, elevated structures present more maintenance difficulties as well. Maintenance activities become more complicated because of the need to maintain not only the tracks themselves but the structures and substructures which support the tracks.

The UPRR Alternative also would have the most crossings that would have small (skewed) crossing angles over Union Pacific Railroad and State Route 99. Crossings that would occur nearly parallel with the feature they are crossing (small skew angle of crossing) present the most design and construction difficulties. These types of crossings typically require several straddle bents over the railroad or highway to support a long crossing length, due to the small crossing angle. Straddle bents require 2 columns and a bent cap to support the elevated facility. Caltrans' design and safety standards for its highway facilities emphasis the importance of eliminating potential obstructions to motorists' ability to recover when their vehicles veer outside of highway main lanes; Caltrans calls this "clear recovery area." Placing columns both within the median and at the outside shoulders would present concerns with the ability to maintain clear recovery areas. In addition to operational concerns, construction over traffic or rail in particular is especially challenging since safety and operational measures have to be taken into account for traffic and rail operation to continue during construction. The UPRR Alternative design options have several small skew angle crossings:

- Over the existing UPRR rail lines north of Chowchilla
- Over the SR-99/SR-152 interchange south of Chowchilla
- Over SR-99, south of Chowchilla

As discussed in the paragraph above crossings over/under existing highways and roadways pose special logistical concerns both during construction and maintenance. The UPRR Alternative has the greatest number of crossings over SR-99. The majority of UPRR highway crossings are at difficult and small crossing angles. Hybrid alternative pose most convenient crossing angle of SR 99 than the other two alternatives.

Not including highway/roadway crossings common to all alternatives, the UPRR Alternative would require the following crossings with SR-99:

1. Over and through SR233/SR99 interchange (Chowchilla)
2. Over and through SR152/SR99 interchange (S. of Chowchilla)
3. Alignment and Ave 24 WYE Over and through /SR99/Ave 21 1/2 interchange (S. of Chowchilla)
4. Alignment and Ave 21 WYE Over and through /SR99/Ave 20 1/2 interchange (S. of Chowchilla)
5. Alignment and Ave 21 WYE Over and through /SR99/Ave 17 interchange (N. of Madera)
6. Alignment and Ave 21 WYE Over and through /SR99/Ave 13 interchange (S. of Madera)
7. Alignment and Ave 21 WYE Over and through /SR99/Ave 12 interchange (S. of Madera)
8. Alignment and Ave 21 WYE Over and through /SR99/Ave 11 crossing (S. of Madera)
9. Alignment and Ave 21 WYE Over and through /SR99/Ave 9 interchange (S. of Madera)
10. Alignment and Ave 21 WYE Over and through /SR99/Ave 8 crossing (S. of Madera)
11. Alignment and Ave 21 WYE Over and through /SR99/Ave 9 interchange (S. of Madera)

When crossing over highways and other major roadways, the high speed rail alignments must account for not only the existing conditions of those facilities, but also any upcoming projects within the project area as well as the ultimate build-out condition of those facilities. This means that configuring a safe crossing over the state highway, would not only have to clear existing highway features (i.e. lanes, bridges, columns), but also would also be expected to clear the footprint of future expansion plans and ultimate conditions, to satisfy "operational capability" considerations.

The safety and design standards for the HST facilities as well as for the highway and roadway facilities must be taken into consideration. As discussed above, these considerations include the placement of columns and other HST features such that they do not pose safety hazards for motorists, the careful planning of construction methods and timing of construction over live traffic (for worker and motorist safety), and the need to keep people and goods moving along the highways and roadways. Even when the HST would go under existing road crossings, the road facilities would most likely have to be totally demolished and reconstructed in order to provide the necessary clearance for the HST. While clearance requirements for vehicular crossings under structures are 16.5 ft, and those for freight rail are 23.5 to 24

ft, the clearance requirement for the HST is 27 ft. This means where the high speed rail parallels existing UPRR tracks to minimize other impacts, placing the HST within UPRR right of way will require demolition and reconstruction of most overcrossings over UPRR to raise the clearance to 27 ft. Likewise, modifications of the overcrossings at SR-99 to raise the clearance would also result in complete demolition and reconstruction of affected overcrossings/interchanges.

The UPRR/SR 99 Alternative depending on option, has between 170 and 192 utility conflicts. This is the greatest number of conflicts of all the alternatives. Depending on design option, this includes between 37 and 47 high risk utility conflicts. Electrical transmission and power lines, natural gas distribution lines, petroleum and fuel pipelines, and substations are considered high risk utilities. Low risk utilities include cable lines, telephone lines, fiber optic lines, irrigation canals, water lines, sewer lines, stormwater retention ponds, and stormwater pipelines. Utility relocations can not only pose logistic difficulties with temporary service outages, but cause additional natural and community resource impacts. Service outages for rerouting of major gas and petroleum pipelines would require coordination with local communities and local public and emergency services. Relocation could require additional impacts to biological resources, farmlands, residential and commercial properties, and parks.

Another substantial concern with the constructability of the UPRR Alternative is the crossing of the UPRR Alternative through Madera and over the existing UPRR facilities. The crossing would occur next to Gateway Drive, which is the main north-south thoroughfare in Madera. This proposed crossing is a major concern for the City of Madera and a primary reason that the city has not supported this alternative. Gateway Drive is located 250 ft west of the at-grade UPRR tracks. Due to the extensive development in the area and the already existing rail crossing conditions in Madera, the UPRR Alternative would have to be elevated in this location. As shown in Figure 6.3-1, the elevation has to be unusually high to clear existing railroad grade separations which go over the UPRR tracks at 24-ft clearance. Given the engineering constraints caused by the existing conditions at this location, the high speed rail facilities would need to be elevated up to 60 to 70 ft in elevation (top of rail) to clear existing grade separations.

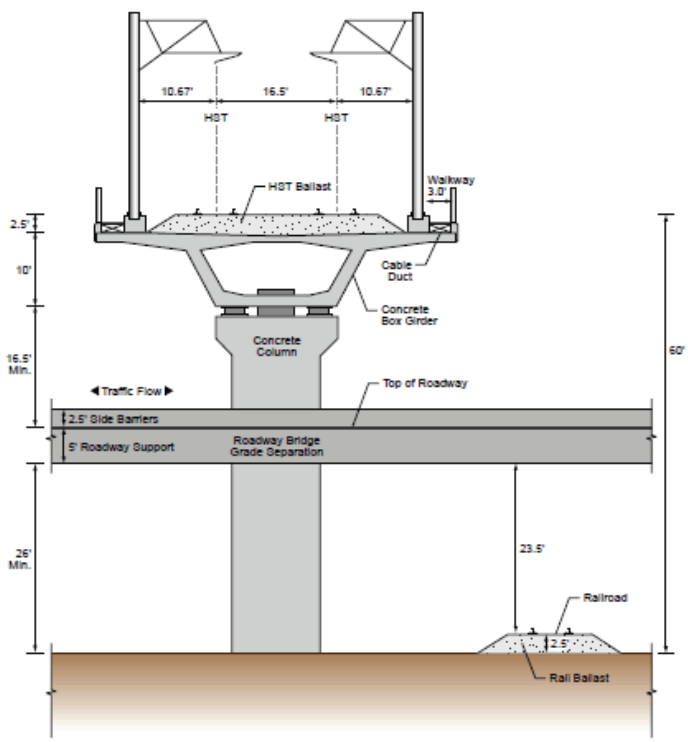


Figure 6.3-1
Example of Elevated Track

Leaving the UPRR Alternative at-grade at this location is not an option due to the significant community impacts that would cause. An at-grade high speed rail facility, adjacent to existing Union Pacific Rail tracks, would require an east-west overcrossing over the two facilities. The overcrossing would have to clear the high speed tracks on the west side of the existing UPRR by 27 feet. This will result in the overcrossing to overshoot the main North-South Gateway Drive intersection, a main down town street, severely impacting traffic and local businesses in the area. Likewise elevating both the existing UPRR lines and the high speed rail lines is not practicable due to the environmental impacts, operational impact to Union Pacific, as well as the inordinate costs that would be involved, making the already most expensive alternative, even more cost-prohibitive.

6.2.3 Aquatic Resources

The UPRR/SR 99 Alternative has three design option combinations: East Chowchilla Ave 21, East Chowchilla Ave 24, and West Chowchilla Ave 24. The WSA for the UPRR/SR 99 Alternative conservatively assumes that all aquatic resources present within the 100-foot wide at-grade construction footprint would be directly and permanently lost. For elevated segments, a 60-foot wide footprint is assumed, and temporary impacts are assumed to occur in the 20-foot wide area to either side of the project footprint.[1] It is further assumed that all aquatic resources within 250 feet of the project footprint would be subject to permanent indirect impacts. Potential indirect impacts on jurisdictional waters that could result from implementing the project include reduction in water quality caused by runoff, erosion, and siltation; changes in hydrologic regime caused by damage to the hardpan soil layer, sedimentation, stream or wetland fragmentation, soil compaction, disruption of the upland micro watershed area, barriers to water flow (e.g., the rail bed); and changes in wetland plant communities from introduction or spread of invasive plant species. Based on these assumptions, the UPRR/SR 99 Alternative would result in total (i.e., direct and indirect) permanent impacts to approximately 112 acres of jurisdictional waters with the East Chowchilla Ave 21 design option combination, approximately 111 acres with the Ave 24 design option combination, and approximately 125 acres with the West Chowchilla Ave 24 design option combination. Thus, implementing the West Chowchilla Ave 24 design option combination would result in the greatest amount of direct and indirect permanent impacts to jurisdictional waters and implementing the East Chowchilla Ave 24 design option combination would result in the least direct and indirect permanent impacts on jurisdictional waters. In terms of direct but temporary impacts, all three design options are within one acres of one another with the West Chowchilla Ave 24 design option having the least direct temporary impacts.

Table 6.3-2 summarizes the expected impacts to jurisdictional waters for the various design options for the UPRR/SR 99 Alternative.

Table 6.3-2
Impacts on Jurisdictional Waters Under the UPRR/SR 99 Alternative

North-South Alignment Isolated and with Wye Design Option	East Chowchilla Design Option (Ave 21)	East Chowchilla Design Option (Ave 24)	West Chowchilla Design Option (Ave 24)
Vernal Pools			
Direct Permanent Effects (acres)			

[1] Because all construction activity will be contained within the 100-foot wide footprint for at-grade segments, no temporary impacts are anticipated outside the 100-foot wide footprint for at-grade segments.

North-South Alignment Isolated and with Wye Design Option	East Chowchilla Design Option (Ave 21)	East Chowchilla Design Option (Ave 24)	West Chowchilla Design Option (Ave 24)
North-South Alignment	0.93	0.87	1.02
Ave 24 Wye	NA	0.00	0.03
Ave 21 Wye	0.51	NA	NA
Total Direct Permanent Effects to Vernal Pools (acres)	**1.44**	**0.87**	**1.05**
Indirect Permanent Effects (acres)			
North-South Alignment	2.38	1.39	1.18
Ave 24 Wye	NA	0.23	0.00
Ave 21 Wye	0.25	NA	NA
Total Indirect Permanent Effects to Vernal Pools (acres)	**2.64**	**1.62**	**1.18**
Seasonal Wetlands			
Direct Permanent Effects (acres)			
North-South Alignment	1.08	1.08	1.08
With Ave 24	NA	0.00	0.00
With Ave 21	0.00	NA	NA
Total Direct Permanent Effects to Seasonal Wetlands (acres)	**1.08**	**1.08**	**1.08**
Indirect Permanent Effects (acres)			
North-South Alignment	0.34	0.29	0.29
With Ave 24	NA	0.00	0.00
With Ave 21	0.00	NA	NA
Total Indirect Permanent Effects to Seasonal Wetlands (acres)	**0.34**	**0.29**	**0.29**
Freshwater Marsh			
Direct Permanent Effects (acres)			
North-South Alignment	0.00	0.00	0.00
With Ave 24	NA	0.00	0.00
With Ave 21	0.00	NA	NA
Total Direct Permanent Effects to Freshwater Marsh (acres)	**0.00**	**0.00**	**0.00**
Direct Temporary Effects (acres)			

North-South Alignment Isolated and with Wye Design Option	East Chowchilla Design Option (Ave 21)	East Chowchilla Design Option (Ave 24)	West Chowchilla Design Option (Ave 24)
North-South Alignment	0.00	0.00	0.00
With Ave 24	NA	0.00	0.00
With Ave 21	0.00	NA	NA
Total Direct Temporary Effects to Freshwater Marsh(acres)	**0.00**	**0.00**	**0.00**
Indirect Permanent Effects (acres)			
North-South Alignment	0.00	0.00	0.00
With Ave 24	NA	0.00	0.00
With Ave 21	0.00	NA	NA
Total Indirect Permanent to Freshwater Marsh (acres)	**0.00**	**0.00**	**0.00**
Palustrine Forested Wetlands			
Direct Permanent Effects (acres)			
North-South Alignment	3.94	3.94	3.89
With Ave 24	NA	0.17	0.00
With Ave 21	0.00	NA	NA
Total Direct Permanent Effects (acres)	**3.94**	**4.11**	**3.89**
Direct Temporary Effects (acres)			
North-South Alignment	2.04	2.04	2.01
With Ave 24	NA	0.01	0.00
With Ave 21	0.02	NA	NA
Total Direct Temporary Effects (acres)	**2.06**	**2.05**	**2.01**
Indirect Permanent Effects (acres)			
North-South Alignment	3.45	3.45	3.75
With Ave 24	NA	1.20	0.00
With Ave 21	0.29	NA	NA
Total Indirect Permanent Effects (acres)	**3.75**	**4.65**	**3.75**
Natural Watercourses			
Direct Permanent Effects (acres)			
North-South Alignment	2.79	2.78	5.12

North-South Alignment Isolated and with Wye Design Option	East Chowchilla Design Option (Ave 21)	East Chowchilla Design Option (Ave 24)	West Chowchilla Design Option (Ave 24)
With Ave 24	NA	3.29	2.65
With Ave 21	0.97	NA	NA
Total Direct Permanent Effects (acres)	**3.76**	**6.08**	**7.76**
Direct Temporary Effect (acres)			
North-South Alignment	6.12	6.12	5.82
With Ave 24	NA	0.24	0.18
With Ave 21	0.08	NA	NA
Total Direct Temporary Effects (acres)	**6.20**	**6.36**	**6.00**
Indirect Permanent Effects (acres)			
North-South Alignment	14.32	14.16	21.17
With Ave 24	NA	13.87	8.28
With Ave 21	7.00	NA	NA
Total Indirect Permanent Effects (acres)	**21.32**	**28.02**	**29.45**
Constructed Watercourses			
Direct Permanent Effects (acres)			
North-South Alignment	4.99	5.05	8.80
With Ave 24	NA	6.97	5.75
With Ave 21	13.35	NA	NA
Total Direct Permanent Effects (acres)	**18.35**	**12.02**	**14.54**
Direct Temporary Effects (acres)			
North-South Alignment	3.49	3.46	2.96
With Ave 24	NA	0.23	0.09
With Ave 21	0.38	NA	NA
Total Direct Temporary Effects (acres)	**3.87**	**3.69**	**3.05**
Indirect Permanent Effects (acres)			
North-South Alignment	9.82	9.97	17.99
With Ave 24	NA	7.24	4.51
With Ave 21	10.24	NA	NA

North-South Alignment Isolated and with Wye Design Option	East Chowchilla Design Option (Ave 21)	East Chowchilla Design Option (Ave 24)	West Chowchilla Design Option (Ave 24)
Total Indirect Permanent Effects (acres)	**20.06**	**17.21**	**22.50**
Constructed Basins			
Direct Permanent Effects (acres)			
North-South Alignment	4.23	4.23	6.17
With Ave 24	NA	2.47	1.64
With Ave 21	0.56	NA	NA
Total Direct Permanent Effects (acres)	**4.80**	**6.70**	**7.81**
Direct Temporary Effects (acres)			
North-South Alignment	0.93	0.93	0.95
With Ave 24	NA	0.71	0.25
With Ave 21	0.19	NA	NA
Total Direct Temporary Effects (acres)	**1.12**	**1.64**	**1.19**
Indirect Permanent Effects (acres)			
North-South Alignment	19.22	19.26	25.51
With Ave 24	NA	3.72	1.95
With Ave 21	6.30	NA	NA
Total Indirect Permanent Effects (acres)	**25.53**	**22.99**	**27.46**
Open Water			
Direct Permanent Effects (acres)			
North-South Alignment	1.50	1.50	1.03
With Ave 24	NA	0.14	0.28
With Ave 21	0.16	NA	NA
Total Direct Permanent Effects (acres)	**1.65**	**1.64**	**1.30**
Indirect Permanent Effects (acres)			
North-South Alignment	3.68	3.68	3.46
With Ave 24	NA	0.07	0.02
With Ave 21	0.21	NA	NA
Total Indirect Permanent Effects (acres)	**3.89**	**3.75**	**3.48**

North-South Alignment Isolated and with Wye Design Option	East Chowchilla Design Option (Ave 21)	East Chowchilla Design Option (Ave 24)	West Chowchilla Design Option (Ave 24)
Summary of Total Effects on all Waters			
Total Direct Permanent Effects (acres)	**35.02**	**32.50**	**37.43**
Total Direct Temporary Effects (acres)	**13.25**	**13.74**	**12.25**
Total Indirect Permanent Effects (acres)	**77.53**	**78.53**	**88.11**
TOTAL DIRECT AND INDIRECT PERMAENT EFFECTS (acres)	**112.55**	**111.03**	**125.54**

6.2.3.1 Construction Period Impacts

Construction period impacts would include those impacts that are considered temporary impacts that would occur only during the period of construction. In the case of wetland resources, this would refer to impacts that are classified as direct temporary impacts. For the UPRR/SR 99 alternative, these impacts range from a total of 12.25 to 13.74 acres depending on design alternative. The features that are temporarily impacted are expected to be restored after completion of construction.

Construction Period Mitigation Measures

Construction period mitigation measures are those that are designed to minimize the extent of temporary impacts to wetland features and those designed to restore temporarily impacted features to their original functions and values after the completion of construction. The mitigation measures listed here are summaries of mitigation measures included in the Draft EIR/EIS; for a complete description of these mitigation measures, see Chapter 3, Section 3.7.6 of the EIR/EIS:

- **Bio-MM#1: Designate Project Biologist(s), Contractor's Biologist(s), and Project Biological Monitor(s).** During contract procurement and for construction management and Contractor selection and prior to ground-disturbing activities, the Authority or its designee will designate a Project Biologist(s), a Contractor's Biologist(s), and a Project Biological Monitor(s) responsible for conducting biological monitoring, overseeing regulatory compliance requirements, and monitoring restoration activities associated with ground-disturbing activities in accordance with the adopted mitigation measures and applicable laws.

- **Bio-MM#2: Regulatory Agency Access.** If requested, before, during, or upon completion of ground-disturbing activities, the Contractor will allow access by USFWS, USACE, RWQCB, and CDFG staff to the construction site. Due to safety concerns, all visitors will check in with the Resident Engineer prior to accessing the construction site. The final product will be a memorandum prepared by the Project Biologist within 1 day documenting agency access and issues raised during the field meeting and submitted to the Mitigation Manager. Any non-compliance issues will be reported to the Authority or its designee.

- **Bio-MM#3: Prepare and Implement a Worker Environmental Awareness Program**. Prior to ground-disturbing activities, the Mitigation Manager or designee will prepare and implement a WEAP for construction crews. WEAP training materials will include the following: discussion of the federal ESA, CESA, BGEPA, and the MBTA; consequences and penalties for violation or 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; hazardous

substance spill prevention and containment measures; the contact person in the event of the discovery of a dead or injured wildlife species; and review of mitigation measures. In the WEAP, the Mitigation Manager will detail construction timing in relation to habitat and species' life stage requirements and discuss project maps, showing areas of planned minimization and avoidance measures.

- **Bio-MM#4: Prepare and Implement a Weed Control Plan.** Prior to ground-disturbing activities, the contractor will prepare and implement a Weed Control Plan to minimize or avoid the spread of weeds during ground-disturbing activities. This will be accomplished by removing all invasive plants on a monthly basis so that invasive species are not allowed to become established. The Weed Control Plan will address the following:

  - Identify weed control treatments including permitted herbicides, and manual and mechanical methods for application. Restrict herbicide application from use in environmentally sensitive areas (ESAs).
  - Determine timing of the weed control treatment for each plant species.
  - Identify fire prevention measures.

  The contractor will implement the Weed Control Plan during the construction period and require that maintenance crews follow the guidelines in the Weed Control Plan during the project period. The Authority or its designee will appoint the responsible party during the operations period. A monthly memorandum will be prepared by the Project Biologist to document the progress of the Plan and its implementation.

- **Bio-MM#5: Prepare and Implement a Biological Resources Management Plan.** During final design, the Project Biologist will prepare the Biological Resources Management Plan (BRMP), and assemble the biological resources mitigation measures. In the BRMP, the Project Biologist will include terms and conditions from applicable permits and agreements and make provisions for monitoring assignments, scheduling, and responsibility. The BRMP will also include habitat replacement and revegetation, protection during ground-disturbing activities, performance (growth) standards, maintenance criteria, and monitoring requirements for temporary and permanent native plant community impacts. The BRMP will form the parameters for the biology mitigation measures from the EIR/EIS, including terms and conditions as applicable from the USFWS, USACE, RWQCB, and CDFG permits.

- **Bio-MM#6: Prepare and Implement a Restoration and Revegetation Plan.** During final design, the Contractor's Biologist will prepare a restoration and revegetation plan (RRP) for upland communities and verified by the Project Biologist. This is a complement for site restoration in addition to the temporary effects for riparian plant communities (Bio-MM#15) and for jurisdictional waters (Bio-MM#43). In the RRP, address impacts on habitat subject to temporary ground disturbances that will require decompaction or regrading, if appropriate.

- **Bio-MM#7: Delineate Environmentally Sensitive Areas and Environmentally Restricted Areas (on plans and in-field).** Prior to ground-disturbing activities, to the extent practicable, the Project Biologist will verify that environmental sensitive areas (ESAs) and environmentally restricted areas (ERAs) are delineated as appropriate. ESAs are areas within the construction zones containing suitable habitat for special-status species and habitats of concern that may allow construction activities, but have restrictions based on the presence of special-status species or habitats of concern at the time of construction. ERAs are areas outside the construction footprint that must be protected in-place during all construction activities.

- **Bio-MM#8: Equipment Staging Areas.** Prior to ground-disturbing activities, the Contractor will locate staging areas for construction equipment outside sensitive biological resources including

habitat for special-status species, habitats of concern(i.e. wetlands, waters of the U.S., riparian communities, etc.), and wildlife movement corridors, to the maximum extent possible. The Project Biologist will submit memoranda to the Mitigation Manager documenting compliance.

- **Bio-MM#10: Vehicle Traffic.** During ground-disturbing activities, the Contractor will restrict project-related vehicle traffic, within the construction area, to established roads, construction areas, and other designated areas. Establish vehicle traffic locations disturbed by previous activities to prevent further adverse effects. Observe a 20 mph speed limit for construction areas with potential special-status species habitat. Clearly flag and mark access routes and prohibit off-road traffic. The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance on a weekly basis.

- **Bio-MM#14: Post-Construction Compliance** Reports**.** After each construction period is completed, the Project Biologist will submit post-construction compliance reports consistent with the appropriate agency (e.g., UFSWS, NMFS and CDFG) protocols, including compliance with resource agency permits (i.e., Section 7 of FESA, Section 2081 of CESA and Section 401 and 404 of FCWA and Section 1600 of Fish and Game Code). The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance. The frequency of the memorandum compilation and submission will be consistent with regulatory compliance permits.

- **Bio-MM#15: Restore Temporary Riparian Impacts.** During post-construction, the Contractor's Biologist will revegetate all disturbed riparian areas using appropriate plants and seed mixes. The Project Biologist will monitor restoration activities consistent with provisions in the Habitat Mitigation and Monitoring Plan (HMMP) as described in Bio-MM#56. The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance and other reporting requirements, including progress toward meeting performance and success criteria, in the 1600 Streambed Alteration Agreement.

- **Bio-MM#43: Restore Temporary Impacts on Jurisdictional Waters.** During or post-construction, the Contractor will restore disturbed jurisdictional waters using stockpiled and segregated soils. The Contractor's Biologist will conduct revegetation using appropriate plants and seed mixes, and conduct maintenance monitoring consistent with the provisions in the HMMP (Bio-MM#56). The Project Biologist will document compliance with memorandum submitted to the Mitigation Manager.

- **Bio-MM#44: Monitor Construction Activities within Jurisdictional Waters.** During ground-disturbing activities, the Project Biological Monitor will conduct monitoring within and adjacent to jurisdictional waters, including monitoring of the installation of protective devices (silt fencing, sandbags, fencing, etc.), installation and/or removal of creek crossing fill, construction of access roads, vegetation removal, and other associated construction activities. The Project Biological Monitor will conduct biological monitoring to document adherence to habitat avoidance and minimization measures addressed in the project mitigation measures and as listed in the USFWS, CDFG, RWQCB, and USACE permits conditions.

Other measures that potentially apply to aquatic resources include the following:

- AQ-MM#1: Reduce Fugitive Dust by Watering.
- AQ-MM#3: Reduce Fugitive Dust from Material Hauling.

<u>Significance of Construction Period Impacts</u>

Construction of the UPRR/SR 99 Alternative has the potential to result in direct and indirect temporary impacts to jurisdictional waters during the construction period. However, these impacts are, by definition, temporary and will be restored after the completion of construction. Therefore, the impact is considered to have moderate intensity under NEPA and is considered significant under CEQA.

6.2.3.2 Project Period Impacts

Project period impacts to jurisdictional wetlands are those that occur after the completion of construction and are associated with the operation of the project. These impacts are considered permanent direct impacts for those jurisdictional features within the project footprint and permanent indirect impacts for those features within 250 feet of the edge of the project footprint.

Project Period Mitigation Measures

The following mitigation measures apply to mitigation for impacts of jurisdictional wetland features from the project period:

- **Bio-MM#56: Conduct Delineation of Jurisdictional Waters and State Streambeds.** The Authority or its designee, prior to final design, shall prepare a jurisdictional delineation, documenting jurisdictional waters and state streambeds consistent with USACE, RWQCB, and CDFG guidance. As part of the delineation, determine the functions and values of the jurisdictional waters using accepted methods such as the California Rapid Assessment Method will be determined so that the functions and values have been replaced and that no net loss of jurisdictional waters and state streambed values occurs. Develop habitat replacement guidelines to identify and quantify habitats that are to be removed and identify the locations for restoring or relocating habitats. The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance.

- **Bio-MM#57: Prepare and Implement a Habitat Mitigation and Monitoring Plan.** As part of the USFWS, USACE, RWQCB, and CDFG permit applications and prior to ground-disturbing activities, the Authority or its designee will prepare an HMMP to mitigate for temporary and permanent impacts on jurisdictional waters and state streambeds. In the HMMP, detail performance standards, including percent cover of natives, survivability, tree height requirements, wildlife utilization, the acreage basis, restoration ratios, and the combination of onsite and/or offsite mitigation; give preference to conduct the mitigation within the same watershed where the impact occurs. Work with the USACE, RWQCB, and CDFG to develop appropriate avoidance, minimization, mitigation, and monitoring measures to be incorporated into the HMMP. In the HMMP, outline the intent to mitigate for the lost functions and values of impacts on jurisdictional waters and state streambeds consistent with resource agency requirements and conditions presented in Sections 404 and 401 of the CWA and Section 1600 of the CFGC.

- **Bio-MM#58: Compensate for Permanent Impacts on Jurisdictional Waters.** The Authority or its designee will mitigate permanent wetland impacts through compensation determined in consultation with the USACE, RWQCB, USFWS, and CDFG, in order to be consistent with the HMMP (Bio-MM#56). Regulatory compliance for jurisdictional waters includes relevant terms and conditions from the USACE 404 Permit, RWQCB 401 Permit, and CDFG 1600 Streambed Alteration Agreement. The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance.

Compensation will include one or more of the following:

- Purchase of credits from an agency-approved mitigation bank.
- Fee-title-acquisition of natural resource agency-related property.
- Purchase or establishment of a conservation easement with an endowment for long-term management of the property-specific conservation values.
- In-lieu fee contribution determined through negotiation and consultation with the various natural resource regulatory agencies.

Base compensation for permanent impacts on the following ratios (acres of mitigation to acres of impact), subject to agency confirmation:

- Vernal pools and other seasonal wetlands: 2:1 Preservation and 1:1 Creation.
- Coastal and Valley Freshwater Marsh: 1:1.
- Other Wetlands: Between 1.1:1 and 1.5:1 (1:1 onsite and 0.1 to 0.5:1 offsite), based on function and values temporarily lost.

The ratios will be determined in consultation with the appropriate jurisdictional agencies.

Significance of Project Period Impacts

Jurisdictional waters are considered sensitive natural communities due to their relative scarcity and importance in sustaining biological resources and are also regulated by USACE. Any impacts that result in reduction of jurisdictional waters would be considered to be of moderate to substantial intensity under NEPA and be considered significant under CEQA. Because implementation of the UPRR/SR 99 Alternative has the potential to result in direct and indirect impacts to jurisdictional waters as described above, the impact is considered to have substantial intensity under NEPA and is considered significant under CEQA.

6.2.3.3 Cumulative Construction Period Impacts

Wetlands may be affected by the project and other foreseeable projects. Potential wetland losses would be small relative to the quantity of existing wetland habitat in the study area but would contribute to the net loss of wetland habitat within the California Central Valley. Therefore, cumulative impacts would likely be of substantial intensity under NEPA and would be cumulatively considerable under CEQA. Avoidance, minimization, and mitigation measures will be implemented consistent with USACE, CDFG, and State Board permits and authorizations to minimize impacts on wetlands.

Cumulative Construction Period Mitigation Measures

There are no specific mitigation measures proposed to address cumulative impacts to jurisdictional features during the construction period.

Significance of Cumulative Construction Period Impacts

After implementing avoidance and minimization measures, and mitigation measures for unavoidable impacts summarized previously, the cumulative construction and operational impacts on biological resources will remain of moderate intensity under NEPA and cumulatively considerable under CEQA.

6.2.3.4 Cumulative Project Period Impacts

Wetlands may be affected by the project and other foreseeable projects. Potential wetland losses would be small relative to the quantity of existing wetland habitat in the study area but would contribute to the net loss of wetland habitat within the California Central Valley. Therefore, cumulative impacts would likely be of substantial intensity under NEPA and cumulatively considerable under CEQA. Avoidance, minimization, and mitigation measures would minimize impacts on wetlands.

Cumulative Project Period Mitigation Measures

There are no feasible mitigation measures beyond those specified above to address cumulative impacts to jurisdictional features during the project period. However, the mitigation measures summarized above will mitigate the project's contribution to the cumulative impact.

Cumulative Project Period Significance

After implementing avoidance and minimization measures, and mitigation measures for unavoidable impacts provided in Section 3.7.6, the cumulative construction and operational impacts on biological resources will remain of moderate intensity under NEPA and cumulatively considerable under CEQA.

6.2.4 Non-Aquatic Biological Resources

Non-aquatic biological resources that could potentially be affected the by the UPRR/SR 99 Alternative include special-status plant species, special-status wildlife species, and sensitive habitat types including riparian habitats, and wildlife movement corridors.

6.2.4.1 Special Status Plant Species

Affected Environment Summary

The footprint and area of indirect impact for the UPRR/SR 99 Alternative contains suitable habitat for 36 special-status plant species. No special-status plant species have been found to date within the area available for direct, focused survey. The estimate of impacts to special-status plant species described below is based on impacts to suitable habitat available for special-status plant species known to occur in the vicinity of the footprint of the UPRR/SR 99 Alternative. Table 6.3-3 provides potential impacts in acres to aquatic special-status plant species within the footprint of the UPRR/SR 99 Alternative.

Table 6.3-3
Impacts to Special Status Aquatic Plant Species under the UPRR/SR 99 Alternative

	UPRR/SR 99 Alternative		
	East Chowchilla Design Option (Ave 21)	East Chowchilla Design Option (Ave 24)	West Chowchilla Design Option Ave 24)
Colusa grass			
Direct Permanent Effect (acres)			
North-South Alignment	0.14	0.14	0.14
Ave 24 Wye	NA	0.00	0.00
Ave 21 Wye	0.00	NA	NA
Total Direct Permanent Effect (acres)	**0.14**	**0.14**	**0.14**
Indirect Permanent Effects (acres)			
North-South Alignment	0.07	0.07	0.07
Ave 24 Wye	NA	0.00	0.00
Ave 21 Wye	0.00	NA	NA
Total Indirect Permanent Effect (acres)	**0.07**	**0.07**	**0.07**
San Joaquin Valley Orcutt grass			
Direct Permanent Effect (acres)			

	UPRR/SR 99 Alternative		
	East Chowchilla Design Option (Ave 21)	East Chowchilla Design Option (Ave 24)	West Chowchilla Design Option Ave 24)
North-South Alignment	1.92	1.85	1.53
Ave 24 Wye	NA	0.00	0.00
Ave 21 Wye	0.53	NA	NA
Total Direct Permanent Effect (acres)	**2.45**	**1.85**	**1.53**
Indirect Permanent Effects (acres)			
North-South Alignment	2.03	1.32	1.50
Ave 24 Wye	NA	0.23	0.00
Ave 21 Wye	0.29	NA	NA
Total Indirect Permanent Effect (acres)	**2.32**	**1.54**	**1.50**
Hairy Orcutt grass			
Direct Permanent Effect (acres)			
North-South Alignment	1.95	1.95	1.95
Ave 24 Wye	NA	0.00	0.00
Ave 21 Wye	0.00	NA	NA
Total Direct Permanent Effect (acres)	**1.95**	**1.95**	**1.95**
Indirect Permanent Effects (acres)			
North-South Alignment	0.62	0.62	0.62
Ave 24 Wye	NA	0.00	0.00
Ave 21 Wye	0.00	NA	NA
Total Indirect Permanent Effect (acres)	**0.62**	**0.62**	**0.62**
Greene's tuctoria			
Direct Permanent Effect (acres)			
North-South Alignment	1.19	1.19	0.86
Ave 24 Wye	NA	0.00	0.00
Ave 21 Wye	0.00	NA	NA
Total Direct Permanent Effect (acres)	**1.19**	**1.19**	**0.86**
Indirect Permanent Effects (acres)			
North-South Alignment	0.65	0.65	0.62

	UPRR/SR 99 Alternative		
	East Chowchilla Design Option (Ave 21)	East Chowchilla Design Option (Ave 24)	West Chowchilla Design Option Ave 24)
Ave 24 Wye	NA	0.00	0.00
Ave 21 Wye	0.00	NA	NA
Total Indirect Permanent Effect (acres)	**0.65**	**0.65**	**0.62**
Succulent owl's-clover			
Direct Permanent Effect (acres)			
North-South Alignment	1.88	1.82	1.50
Ave 24 Wye	NA	0.00	0.00
Ave 21 Wye	0.53	NA	NA
Total Direct Permanent Effect (acres)	**2.42**	**1.82**	**1.50**
Indirect Permanent Effects (acres)			
North-South Alignment	2.00	1.28	1.47
Ave 24 Wye	NA	0.23	0.00
Ave 21 Wye	0.29	NA	NA
Total Indirect Permanent Effect (acres)	**2.29**	**1.51**	**1.47**

Construction Period Impacts

Direct impacts on special-status plant species may occur as a result of construction crews removing vegetation within and adjacent to the construction footprint, and from construction vehicles and personnel in the area disturbing the vegetation (i.e., trampling and crushing). Vegetation removed to accommodate construction operations (access, laydown area, etc.) would be restored after construction activities are completed.

Indirect impacts on special-status plant species would potentially include: erosion, siltation, and runoff into natural and constructed watercourses; soil and water contamination from construction equipment leaks; construction-related dust affecting plants by reducing their photosynthetic capability (especially during flowering periods); and an increased risk of fire (e.g., construction equipment use and smoking by construction workers) in adjacent open spaces.

Construction Period Mitigation Measures

The following mitigation measures are proposed to reduce or avoid impacts to special-status plant species during the construction period.

- **Bio-MM#17: Conduct Pre-Construction Surveys for Special-Status Plant Species.** The Project Biologist will conduct pre-construction surveys for special-status plant species in suitable habitat areas, subject to ground-disturbing activities. The surveys will be conducted in the appropriate season prior to ground-disturbing activities for salvage and relocation activities. The

Project Biologist will use the results of the Special-Status Plants Survey Report (prepared as part of the Biological Resources Technical Report), including mapping of locations of special-status plant species, to determine focused locations for the pre-construction surveys, as appropriate. The Project Biologist will work with the Contractor's Biologist to mark and avoid locations of all special-status plant species observed where feasible or incorporate the species into the relocation/compensation program defined in Bio-MM#49: Compensate for Impacts on Special-Status Plant Species.

Prior to ground-disturbing activities, the Contractor will protect any populations of special-status plant species identified during the surveys within 100 feet of the construction footprint as ERAs. As appropriate, the Contractor's Biologist will update the special-status or habitats of concern mapping within the construction limits, based upon resource agency permits.

The Contractor's Biologist will determine the locations of special-status plant species on construction drawings and identified as ESAs within the construction footprint. Plant populations within 100 feet of the construction limits will be fenced as ERAs by the Contractor's Biologist. Terms and conditions from Section 7 and Section 2081 agreements will be incorporated as appropriate. The Project Biologist will provide verification and report through memorandum to the Mitigation Manager.

- **Bio-MM#18: Prepare and Implement Plan for Salvage, Relocation and/or Propagation of Special-Status Plant Species.** The Contractor's Biologist will prepare a plan prior to ground-disturbing activities to address monitoring, salvage, relocation, and propagation of special-status plant species. The plan will be submitted to the Project Biologist for concurrence. The relocation or propagation of plants and seed will be performed at a suitable mitigation site, as appropriate per species. Documentation will include provisions that address the techniques, location, and procedures required for successful establishment of the plant populations. Permit conditions issued by the appropriate resource agencies (e.g., USFWS, CDFG) will guide the development of the plan. The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance.

Other measures that potentially apply to special-status plants include:

- AQ-MM#1: Reduce Fugitive Dust by Watering.
- AQ-MM#3: Reduce Fugitive Dust from Material Hauling.
- Bio-MM#4: Prepare and Implement a Weed Control Plan.
- Bio-MM#5: Prepare and Implement a Biological Resources Management Plan.
- Bio-MM#6: Prepare and Implement a Restoration and Revegetation Plan.
- Bio-MM#7: Delineate Environmentally Sensitive Areas and Environmentally Restricted Areas (on plans and in-field).
- Bio-MM#8: Equipment Staging Areas.
- Bio-MM#10: Vehicle Traffic.
- Bio-MM#14: Post-Construction Compliance Reports.
- WR-MM#1: Construction Stormwater Pollution Prevention Plan.

Significance of Construction Period Impacts

Because construction of the UPRR/SR 99 Alternative has the potential to result in the temporary loss of or damage to all 36 special-status plant species and their habitats for reasons identified above, the impact is considered to have moderate intensity under NEPA and is considered significant under CEQA.

Project Period Impacts

Direct impacts on special-status plant species would result from the permanent removal of vegetation from within the HST system footprint. In addition, special-status plants would be affected by increased pedestrian access/activity in the area, which would trample or crush them; and exposure to accidental spills including contaminants/pollutants. During ongoing operation and maintenance activities (e.g.,

routine inspection and maintenance of the HST right-of-way) vehicle or foot traffic would also trample or crush the native vegetation.

Indirect impacts on special-status plant species are anticipated to include: increased erosion, sedimentation, siltation from runoff, and hydrology that could affect adjacent aquatic habitats; wind erosion effects (including from unvegetated rights-of-way and passing HSTs); an increased risk of fire in adjacent open spaces due to increased human activity; and the introduction of noxious plant species (nonnative, detrimental species) from increased human activity. Indirect impacts would be less during the project period of the HST as project design features would be in place to direct water flow.

Project Period Mitigation Measures

The following mitigation measures are designed to avoid or minimize impacts to special-status plants during the project period:

- **Bio-MM#50: Compensate for Impacts on Special-Status Plant Species.** Prior to Final Design and during the permitting process, the Authority will comply with CESA and the federal ESA by implementing the following measures:
  - Purchase credits from an existing mitigation bank or conduct a special-status plant re-establishment program within the same watershed or in proximity to the impact area at a 1:1 ratio.
  - Mitigate the impacts on special-status plants in accordance with the USFWS Biological Opinion and/or CDFG 2081(b).

The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance. Other measures that potentially apply to special-status plant species include the following:

- Bio-MM#4: Prepare and Implement a Weed Control Plan.
- Bio-MM#14: Post-Construction Compliance Reports.
- Bio-MM#51: Implement Conservation Guidelines During the Project Period for Valley Elderberry Longhorn Beetle.
- Bio-MM#56: Conduct Delineation of Jurisdictional Waters and State Streambeds.
- Bio-MM#57: Prepare and Implement a Habitat Mitigation and Monitoring Plan.
- Bio- MM#58: Compensate for Permanent Impacts on Jurisdictional Waters.

Significance of Project Period Impacts

Implementation of the UPRR/SR 99 Alternative would result in direct and indirect impacts to all 36 special-status plant species as described above. However, most impacts would occur to the following species based on a comparison of acres affected per species: Hoover's calycadenia, Keck's checkerbloom, beaked clarkia, recurved larkspur, and heartscale. It should be noted that Hoover's calycadenia could be substantially more affected than any other special-status plant since permanent removal of suitable habitat is anticipated for this species.

Because implementation of the UPRR/SR 99 Alternative has the potential to result in the loss of or damage to all 36 special-status plant species and their habitats for reasons identified above, the impact is considered to have moderate intensity under NEPA and is considered significant under CEQA.

Cumulative Construction Period Impacts

Implementation of the UPRR/SR 99 Alternative has the potential to result in the loss of or damage to all 36 special-status plant species and their habitats. No special-status plant species have been found to date in areas that have been available for survey. Therefore, the exact extent of this impact is unknown.

Cumulative Construction Period Mitigation Measures

There are no mitigation measures proposed specifically for the cumulative impacts to special-status plant species during the construction period.

Significance Cumulative Construction Period

After implementing avoidance and minimization measures, and mitigation measures for unavoidable impacts provided, the cumulative construction and operational impacts on biological resources will remain moderate under NEPA and cumulatively considerable under CEQA.

Cumulative Project Period Impacts

Implementation of the UPRR/SR 99 Alternative has the potential to result in the loss of or damage to all 36 special-status plant species and their habitats. No special-status plant species have been found to date in areas that have been available for survey. Therefore, the exact extent of this impact is unknown.

Cumulative Project Period Mitigation Measures

There are no specific mitigation measures proposed for cumulative impacts to special-status plant species during the project period.

Cumulative Project Period Significance

Because implementation of the UPRR/SR 99 Alternative has the potential to result in the loss of or damage to all 36 special-status plant species and their habitats for reasons identified above, the impact is considered to have moderate intensity under NEPA and is considered significant under CEQA.

6.2.4.2 Special Status Wildlife Species

Affected Environment

The UPRR/SR 99 Alternative contains suitable habitat for a variety of special-status wildlife species as summarized below. Focused surveys for most of these species within the potential alignment footprint and the area of potential indirect impact have not been conducted. Therefore, the impact analysis is based on analysis of the impacts that are projected to occur to suitable habitats for the species in question.

Invertebrates

The footprint and area of indirect impact for the UPRR/SR 99 Alternative contains a relatively small amount of vernal pools and other seasonal wetlands, including California annual grassland with soils suitable for vernal pools and other seasonal wetlands. Vernal pools and other seasonal wetlands provide habitat for Conservancy fairy shrimp, vernal pool fairy shrimp, and vernal tadpole fairy shrimp. Special-status invertebrates are regulated by the USFWS; the loss of suitable habitat could impair the survival of self-sustaining populations.

The footprint and area of indirect impact for the UPRR/SR 99 Alternative also contains populations of Mexican elderberry shrubs, specifically along the San Joaquin River area. Mexican elderberry shrubs with stem diameters of 2 to 8 inches are the larval host plant for the valley elderberry longhorn beetle. All habitats with elderberry shrubs are assumed to be occupied by the valley elderberry longhorn beetle. Populations of the valley elderberry longhorn beetle are regulated by USFWS; the loss of elderberry shrubs could impair the survival of self-sustaining populations.

Fish

The footprint and area of indirect impact for the UPRR/SR 99 Alternative contains aquatic habitats (primarily along the San Joaquin River) known to support Kern brook lamprey, Central Valley steelhead, Central Valley spring-run Chinook salmon, hardhead, and San Joaquin roach. Essential fish habitat and the associated special-status fish are being restored with the San Joaquin River from the Friant Dam to the Merced River confluence. Potential project impacts (i.e., indirect from runoff/water-quality related) could hinder re-establishment of special-status fish along the San Joaquin River; as such, essential fish habitat is regulated by NMFS, CDFG, and USFWS.

Amphibians

The footprint and area of indirect impact for the UPRR/SR 99 Alternative contains suitable breeding and upland habitat for California tiger salamanders and western spadefoot toads. All suitable vernal pool and other seasonal wetland habitat with associated upland areas are assumed to be occupied by California tiger salamanders and western spadefoot toads. Populations of these special-status amphibians are regulated by both CDFG and USFWS; the loss of suitable breeding and upland habitat could impair the survival of self-sustaining populations.

Reptiles

The footprint and area of indirect impact for the UPRR/SR 99 Alternative contains suitable habitat for populations of western pond turtles. All suitable aquatic habitats are assumed to be occupied by western pond turtles. Populations of these special-status reptiles are regulated by CDFG; the loss of suitable habitat could impair the survival of self-sustaining populations.

Birds (includes all native birds covered under MBTA)

The footprint and area of indirect impact for the UPRR/SR 99 Alternative contains a wide range of habitats known to support a diversity of birds. All suitable habitat is assumed to be occupied by special-status bird species. Populations of special-status birds are regulated by both CDFG and USFWS; the loss of suitable habitat could impair the survival of self-sustaining populations.

Mammals

The footprint and area of indirect impact for the UPRR/SR 99 Alternative contains California annual grassland and agricultural lands known to support American badger (California annual grassland only), San Joaquin kit fox, and special-status bats (also known to occur within trees and rocky outcrops). All suitable habitats are assumed to be occupied by special-status mammals. Populations of mammals are regulated by both the CDFG and USFWS; the loss of suitable habitat could impair the survival of self-sustaining populations.

Construction Period Impacts

Invertebrates

The footprint and area of indirect impact for the UPRR/SR 99 Alternative contains a relatively small amount of vernal pools and other seasonal wetlands, including California annual grassland with soils suitable for vernal pools and other seasonal wetlands. Vernal pools and other seasonal wetlands provide habitat for Conservancy fairy shrimp, vernal pool fairy shrimp, and vernal tadpole fairy shrimp. Special-status invertebrates are regulated by the USFWS; the loss of suitable habitat could impair the survival of self-sustaining populations. The potential loss of suitable vernal habitat could result in the elimination of vernal pool invertebrate populations.

The footprint and area of indirect impact for the UPRR/SR 99 Alternative also contains populations of Mexican elderberry shrubs, specifically along the San Joaquin River area. Mexican elderberry shrubs with stem diameters of 2 to 8 inches are the larval host plant for the valley elderberry longhorn beetle. All habitats with elderberry shrubs are assumed to be occupied by the valley elderberry longhorn beetle. Populations of the valley elderberry longhorn beetle are regulated by USFWS; the loss of elderberry shrubs could impair the survival of self-sustaining populations.

Fish

The footprint and area of indirect impact for the UPRR/SR 99 Alternative contains aquatic habitats (primarily along the San Joaquin River) known to support Kern brook lamprey, Central Valley steelhead, Central Valley spring-run Chinook salmon, hardhead, and San Joaquin roach. Essential fish habitat and the associated special-status fish are being restored with the San Joaquin River from the Friant Dam to the Merced River confluence. Potential project impacts (i.e., indirect from runoff/water-quality related) could hinder re-establishment of special-status fish along the San Joaquin River; as such, essential fish habitat is regulated by NMFS, CDFG, and USFWS.

Amphibians

The footprint and area of indirect impact for the UPRR/SR 99 Alternative contains suitable breeding and upland habitat for California tiger salamanders and western spadefoot toads. All suitable vernal pool and other seasonal wetland habitat with associated upland areas are assumed to be occupied by California tiger salamanders and western spadefoot toads. Populations of these special-status amphibians are regulated by both CDFG and USFWS; the loss of suitable breeding and upland habitat could impair the survival of self-sustaining populations. .

Reptiles

The footprint and area of indirect impact for the UPRR/SR 99 Alternative contains suitable habitat for populations of western pond turtles. All suitable aquatic habitats are assumed to be occupied by western pond turtles. Populations of these special-status reptiles are regulated by CDFG; the loss of suitable habitat could impair the survival of self-sustaining populations.

Birds (includes all native birds covered under MBTA)

The footprint and area of indirect impact for the UPRR/SR 99 Alternative contains a wide range of habitats known to support a diversity of birds. All suitable habitat is assumed to be occupied by special-status bird species. Populations of special-status birds are regulated by both CDFG and USFWS; the loss of suitable habitat could impair the survival of self-sustaining populations.

Mammals

The footprint and area of indirect impact for the UPRR/SR 99 Alternative contains California annual grassland and agricultural lands known to support American badger (California annual grassland only), San Joaquin kit fox, and special-status bats (also known to occur within trees and rocky outcrops). All suitable habitats are assumed to be occupied by special-status mammals. Populations of mammals are regulated by both the CDFG and USFWS; the loss of suitable habitat could impair the survival of self-sustaining populations.

Construction Period Mitigation Measures

Invertebrates

Vernal Pool Branchiopods. Prior to final design and during the permitting process, the Contractor will comply with CESA and federal ESA. The Project Biologist will document compliance with the mitigation

measures specific to vernal pool branchiopods, including the results of sampling, seasonal work restrictions and protective measures. These activities will be documented daily during the specific season for sampling, work restrictions, and protective measures when construction takes place:

- **Bio-MM#19: Conduct Pre-Construction Sampling and Assessment for Vernal Pool Fauna.** Prior to ground-disturbing activities, the Project Biologist will conduct pre-construction, non-protocol surveys in seasonally inundated habitats (seasonal wetland, open waters) within the construction footprint. The Project Biologist will conduct general aquatic surveys at a suitable interval after the first significant storm event of the rainy season (October 15 to June 1), as feasible prior to ground-disturbing activities. The sampling is an assessment of the hydrological, biological and ecological conditions of each seasonal wetland and inundated non-wetland. This assessment will determine the quality and suitability of seasonal wetlands for special-status species (e.g., vernal pool branchiopods, western spadefoot toads, and California tiger salamanders).

  The sampling is an assessment that will guide the implementation of performance standards to be consistent with Bio-MM#21: Implement and Monitor Vernal Pool Protection for vernal pool special-status species (e.g., vernal pool branchiopods, western spadefoot toads, and California tiger salamanders). The Project Biologist will submit a report within 1 month of completing the field work and submitted to the Mitigation Manager and Authority or its designee. The report will provide the documentation and the results of the sampling, including the results of the data collected and compared with the performance standards.

- **Bio-MM#20: Seasonal Vernal Pool Work Restriction.** For seasonal avoidance of special-status vernal pool branchiopods and vernal pool-dependent species (e.g., California tiger salamander), in the areas assumed to be permanently indirectly impacted the Contractor will not work within 250 feet of aquatic habitats suitable for these species (e.g., vernal pools and other seasonal wetlands) from October 15 to June 1 (corresponding to the rainy season), or as determined through informal or formal consultation with the USFWS or USACE. Ground-disturbing activities may begin once the habitat is no longer inundated for the season. If any work remains to be completed after October 15, exclusion fencing and erosion control measures will be placed at the vernal pools and other seasonal wetlands by the Contractor's Biologist. The fencing will act as a buffer between ground-disturbing activities and the vernal pools and other seasonal wetlands as determined through consultations with USFWS/USACE. The Project Biologist will document compliance through memorandum to the Mitigation Manager during the establishment of the fencing activities.

- **Bio-MM#21: Implement and Monitor Vernal Pool Protection.** For temporary impacts on vernal pools and other seasonal wetlands that cannot be avoided, the Contractor's Biologist will apply geotextile fabric and a layer of gravel over the affected vernal pool(s) prior to ground-disturbing activities to protect the contours. The Contractor will implement this measure within temporary impact areas adjacent to or within the construction footprint.

If temporary impacts occur over a full wet-dry season cycle and the vernal pool(s) cannot be avoided, the vernal pool(s) will be protected by erecting exclusion fencing by the Contractor's Biologist.

If temporary impacts occur within the dry season (approximately June 1 to October 15) and the vernal pool(s) cannot be fenced, geotextile fabric and rinsed gravel should be placed within and cover the vernal pool(s) to minimize damage to the soils. The Contractor's Biologist in coordination with the Project Biologist will collect a representative sampling of soils from the vernal pool(s) will be taken prior to initiating ground-disturbing activities within vernal pools. The representative soil sample(s) will contain viable plant seeds and vernal pool branchiopod cysts to be preserved from the vernal pool(s). These samples may be incorporated into other vernal pools, as applicable, with USFWS and/or CDFG consultation. If temporary impacts take more than two full wet-dry season cycles, the above-described soil storage and/or offsite mitigation will be implemented.

Other measures that potentially apply to vernal pools and other seasonal wetlands include the following:

- AQ-MM#1: Reduce Fugitive Dust by Watering.
- AQ-MM#3: Reduce Fugitive Dust from Material Hauling.
- Bio-MM#3: Prepare and Implement a Worker Environmental Awareness Program.
- Bio-MM#4: Prepare and Implement a Weed Control Plan.
- Bio-MM#5: Prepare and Implement a Biological Resources Management Plan.
- Bio-MM#7: Delineate Environmentally Sensitive Areas and Environmentally Restricted Areas (on plans and in-field).
- Bio-MM#6: Prepare and Implement a Restoration and Revegetation Plan
- Bio-MM#8: Equipment Staging Areas.
- Bio-MM#10: Vehicle Traffic.
- Bio-MM#12: Work Stoppage
- Bio-MM#14: Post-Construction Compliance Reports.
- Bio-MM#43: Restore Temporary Impact on Jurisdictional Waters
- Bio-MM#44: Monitor Construction Activities within Jurisdictional Waters
- WR-MM#1: Construction Stormwater Pollution Prevention Plan.
- WR-MM#2: Central Valley Regional Water Quality Board, Order No. 5-00-175, Waste Discharge Requirements General Order for Dewatering and Other Low Threat Discharges to Surface Waters.

Valley Elderberry Longhorn Beetle. The following mitigation measures are designed to avoid or minimize impacts to special-status wildlife during construction:

- **Bio-MM#22: Implement Conservation Guidelines During the Construction Period for Valley Elderberry Longhorn Beetle.** Prior to and during ground-disturbing activities, the Contractor will implement the avoidance and minimization measures detailed in the *Conservation Guidelines for the Valley Elderberry Longhorn Beatle* (USFWS 1999a). These measures include establishing and maintaining appropriate buffer areas around elderberry plants, surveying for beetle boreholes in affected shrubs, restricting the use of chemicals that might harm beetles, and mowing. After ground-disturbing activities are completed, restore any damage to buffer areas containing elderberry shrubs according to specifications within the *Conservation Guidelines for the Valley Elderberry Longhorn Beatle* (USFWS 1999a).

  In areas where encroachment on the 100-foot buffer has been approved by USFWS, the Contractor will provide a minimum setback of at least 20 feet from the dripline of each Mexican elderberry plant. In buffer areas, ground-disturbing activities should be minimized, and any damaged area should be restored following construction by the Contractor.

  The Contractor will erect signage every 50 feet along the edge of the avoidance 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 Federal ESA of 1973, as amended. Violators are subject to prosecution, fines, and imprisonment." The signs should be clearly readable from a distance of 20 feet, and must be maintained by the Contractor for the duration of ground-disturbing activities.

  To prevent encroachment, these buffer areas must continue to be protected per USFWS protocol (after ground-disturbing activities) from adverse effects of the project (USFWS 1999) during the construction phase. The Contractor will include protective measures such as fencing, signage, weeding, and trash removal to enforce the protection of the valley elderberry longhorn beetle and its associated habitat. The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance on a weekly basis or at other appropriate intervals.

Other measures that potentially apply to valley elderberry longhorn beetle include the following:

- AQ-MM#1: Reduce Fugitive Dust by Watering.
- AQ-MM#3: Reduce Fugitive Dust from Material Hauling.
- Bio-MM#3: Prepare and Implement a Worker Environmental Awareness Program.
- Bio-MM#4: Prepare and Implement a Weed Control Plan.
- Bio-MM#5: Prepare and Implement a Biological Resources Management Plan.
- Bio-MM#6: Prepare and Implement a Restoration and Revegetation Plan.
- Bio-MM#7: Delineate Environmentally Sensitive Areas and Environmentally Restricted Areas (on plans and in-field).
- Bio-MM#8: Equipment Staging Areas.
- Bio-MM#10: Vehicle Traffic.
- Bio-MM#11: Entrapment Prevention.
- Bio-MM#12: Work Stoppage.
- Bio-MM#13: 'Take' Notification and Reporting.
- Bio-MM#14: Post-Construction Compliance Reports.
- WR-MM#1: Construction Stormwater Pollution Prevention Plan.

Amphibians

California Tiger Salamander. The following mitigation measures are designed to avoid or minimize impacts to special-status wildlife during construction:

- **Bio-MM#23: Translocation of California Tiger Salamanders.** Prior to ground-disturbing activities, the Project Biologist or designee will conduct a pre-construction survey and relocate any California tiger salamanders from within the construction footprint in accordance with the *Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander* (USFWS 2003). The relocation will occur for any individuals within the construction footprint per coordination with the USFWS. The Project Biologist will conduct pit trapping. The Contractor's Biologist will work in coordination with the Project Biologist when installing amphibian exclusion fencing specified in Bio-MM#24. The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance on a weekly basis or at other appropriate intervals.

- **Bio-MM#24: Erect Amphibian Exclusion Fencing**. The Contractor's Biologist will install exclusion barriers (i.e. silt fences) to influence the movement of California tiger salamander, including other amphibian species, within impacted areas. They can be used to both exclude California tiger salamander, including other amphibian species, from ground-disturbing areas as well as to guide breeding adults toward pre-identified mitigation ponds. Exclusion fencing will be maintained by the Contractor throughout the California tiger salamander's entire active period (November to April) or until all ground-disturbing activities are completed, whichever occurs first. Exclusion fencing must be trenched into the soil at least 4 inches in depth with the soil compacted against both sides of the fence for its entire length to prevent amphibians from passing under the fence. Barriers must be inspected by the Contractor's Biologist at least twice weekly on non-consecutive days and after any significant rain event (defined as a 0.75 inch downpour or 1.5 inches of rain in any 24-hour period). Barriers will be installed by the Contractor with turn-arounds at any access openings needed in the fencing, in order to redirect amphibians away from openings. The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance.

Other measures that potentially apply to California tiger salamander include the following:

- AQ-MM#1: Reduce Fugitive Dust by Watering.
- AQ-MM#3: Reduce Fugitive Dust from Material Hauling.
- Bio-MM#3: Prepare and Implement a Worker Environmental Awareness Program.

- Bio-MM#4: Prepare and Implement a Weed Control Plan.
- Bio-MM#5: Prepare and Implement a Biological Resources Management Plan.
- Bio-MM#6: Prepare and Implement a Restoration and Revegetation Plan
- Bio-MM#7: Delineate Environmentally Sensitive Areas and Environmentally Restricted Areas (on plans and in-field).
- Bio-MM#8: Equipment Staging Areas.
- Bio-MM#9: Mono-Filament Netting.
- Bio-MM#10: Vehicle Traffic.
- Bio-MM#11: Entrapment Prevention.
- Bio-MM#12: Work Stoppage.
- Bio-MM#13: 'Take' Notification and Reporting.
- Bio-MM#14: Post-Construction Compliance Reports.
- Bio-MM#19: Conduct Preconstruction Sampling and Assessment for Vernal Pool Fauna.
- Bio-MM#20: Seasonal Vernal Pool Work Restriction.
- Bio-MM#21: Implement and Monitor Vernal Pool Protection.
- WR-MM#1: Construction Stormwater Pollution Prevention Plan.
- WR-MM#2: Central Valley Regional Water Quality Board, Order No. 5-00-175, Waste Discharge Requirements General Order for Dewatering and Other Low Threat Discharges to Surface Waters.

Western Spadefoot Toad. The Project Biologist or designee (qualified herpetologist) will conduct protocol emergence and larval surveys for western spadefoot toad during autumn and early spring (October-April). Western spadefoot toads emerge from burrows following an aestivation period during heavy rains in autumn and winter and spawn in seasonal wetlands in late winter or early spring. Spawning cues are believed to include the onset of warmer winter rains of subtropical origin and the increase of ambient temperatures. Western spadefoot toad emergence surveys will be conducted within 24 hours of the first significant precipitation event(s) following a warm dry period when western spadefoot toad are expected to emerge. Two day and night pedestrian/visual surveys will be conducted. The focus of the day surveys will be to evaluate the presence of western spadefoot toad upland and breeding habitat (lowlands with permanent, semi-permanent wetlands). Night surveys will be conducted concurrently with day surveys to determine the presence of western spadefoot toad by listening for calls and/or direct observation of individuals foraging. In addition, potential breeding pools, including vernal pools, will be surveyed for western spadefoot toad larvae concurrently with special-status vernal pool branchiopod- and California tiger salamander-focused surveys. Western spadefoot toad larval surveys will include three visits while vernal pools are inundated, with surveys spaced 10 days apart for each month from March through May. Aquatic surveys for western spadefoot toad larvae will require concurrence from the USFWS. The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance after surveys are complete.

Other measures that potentially apply to western spadefoot toad include the following:

- AQ-MM#1: Reduce Fugitive Dust by Watering.
- AQ-MM#3: Reduce Fugitive Dust from Material Hauling.
- Bio-MM#3: Prepare and Implement a Worker Environmental Awareness Program.
- Bio-MM#4: Prepare and Implement a Weed Control Plan.
- Bio-MM#5: Prepare and Implement a Biological Resources Management Plan.
- Bio-MM#6: Prepare and Implement a Restoration and Revegetation Plan
- Bio-MM#7: Delineate Environmentally Sensitive Areas and Environmentally Restricted Areas (on plans and in-field).
- Bio-MM#8: Equipment Staging Areas
- Bio-MM#9: Mono-Filament Netting.
- Bio-MM#10: Vehicle Traffic
- Bio-MM#11: Entrapment Prevention
- Bio-MM#12: Work Stoppage.
- Bio-MM#19: Conduct Pre-Construction Sampling and Assessment for Vernal Pool Fauna

- Bio-MM#20: Seasonal Vernal Pool Work Restriction.
- Bio-MM#21: Implement and Monitor Vernal Pool Protection.
- Bio-MM#24: Erect Amphibian Exclusion Fencing.
- WR-MM#1: Construction Stormwater Pollution Prevention Plan.
- WR-MM#2: Central Valley Regional Water Quality Board, Order No. 5-00-175, Waste Discharge Requirements General Order for Dewatering and Other Low Threat Discharges to Surface Waters.

Reptiles

Western Pond Turtle. The following mitigation measures are designed to avoid or minimize impacts to special-status wildlife during construction:

- **Bio-MM#25: Conduct Western Pond Turtle Pre-Construction Surveys and Relocation.** Prior to ground-disturbing activities, conduct pre-construction surveys for western pond turtles to determine the presence or absence of western pond turtles within the construction footprint. If western pond turtles are found within the construction footprint, conduct daily clearance surveys prior to the initiation of any construction activities. If a western pond turtle nest will be affected by ground-disturbing activities, relocate the eggs according to relocation protocol coordinated with CDFG for all life stages of western pond turtles. Relocate hatchling and adult turtles outside of the construction footprint in suitable habitat. The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance.

- **Bio-MM#26: Conduct Western Pond Turtle Monitoring.** During ground-disturbing activities, the Project Biologist will observe all construction activities immediately adjacent to, or within, habitat that supports populations of western pond turtles. If environmentally sensitive areas (ESAs) are deemed necessary, the Project Biologist will conduct a clearance survey for western pond turtles prior to the time the fence is installed. If necessary, conduct daily clearance surveys prior to construction. The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance.

- **Bio-MM#27: Implement Western Pond Turtle Avoidance and Relocation.** Prior to ground-disturbing activities, if a western pond turtle nesting area is present and will be affected by ground-disturbing activities as determined by the Project Biologist, the Contractor will avoid western pond turtles nesting areas, where feasible. If not feasible, the Project Biologist will coordinate with CDFG to identify where to relocate western pond turtles. The Project Biologist will coordinate specific trapping and relocation protocols with CDFG for adults, hatchlings, and eggs prior to ground-disturbing activities. The Contractor will not move eggs or hatchlings without prior coordination with the Project Biologist and concurrence from CDFG. The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance on a weekly basis or as determined appropriate pending construction progress.

Other measures that potentially apply to western pond turtles include the following:

- Bio-MM#3: Prepare and Implement a Worker Environmental Awareness Program.
- Bio-MM#5: Prepare and Implement a Biological Resources Management Plan.
- Bio-MM#6: Prepare and Implement a Restoration and Revegetation Plan
- Bio-MM#7: Delineate Environmentally Sensitive Areas and Environmentally Restricted Areas (on plans and in-field).
- Bio-MM#8: Equipment Staging Areas.
- Bio-MM#10: Vehicle Traffic.
- Bio-MM#12: Work Stoppage.
- Bio-MM#13: 'Take' Notification and Reporting.
- Bio-MM#14: Post-Construction Compliance Reports.
- Bio-MM#15: Restore Temporary Riparian Impacts
- Bio-MM#43: Restore Temporary Impacts on Jurisdictional Waters

- Bio-MM#44: Monitor Construction Activities on Jurisdictional Waters
- WR-MM#1: Construction Stormwater Pollution Prevention Plan.
- WR-MM#2: Central Valley Regional Water Quality Board, Order No. 5-00-175, Waste Discharge Requirements General Order for Dewatering and Other Low Threat Discharges to Surface Waters.

Fish. Mitigation measures that potentially apply to fish include the following:

- Bio-MM#3: Prepare and Implement a Worker Environmental Awareness Program.
- Bio-MM#5: Prepare and Implement a Biological Resources Management Plan.
- Bio-MM#7: Delineate Environmentally Sensitive Areas and Environmentally Restricted Areas (on plans and in-field).
- Bio-MM#8: Equipment Staging Areas.
- Bio-MM#10: Vehicle Traffic.
- Bio-MM#14: Post-Construction Compliance Reports.
- WR-MM#1: Construction Stormwater Pollution Prevention Plan
- WR-MM#2: Central Valley Regional Water Quality Board, Order No. 5-00-175, Waste Discharge Requirements General Order for Dewatering and Other Low Threat Discharges to Surface Waters.

Birds

Birds included in the following mitigation measures are those protected under the MBTA and/or listed as a Species of Special Concern (SSC) by CDFG:

- **Bio-MM#28: Conduct Pre-Construction Surveys and Monitoring for Raptors.** Prior to ground-disturbing activities, the Project Biologist or designee will conduct pre-construction surveys for nesting raptors if construction and habitat removal activities are scheduled to occur during the breeding season (February 1 to August 15). The Project Biologist or designee will conduct surveys in areas within 300 feet of the construction footprint. Modify the required survey dates based on local conditions. If breeding raptors with active nests are found, establish a 300-foot buffer around the nest and phase construction activities within the buffer(s) until the young have fledged from the nest or the nest is abandoned. Approve construction activities within the buffer area, pending site conditions that will not jeopardize the nest.

  The Project biologist will conduct pre-construction surveys for bald and golden eagle nests within ¼ mile of the construction footprint. If nesting bald or golden eagles are identified, the Contractor's Biologist in coordination with the Project Biologist will establish a 1,000-foot buffer area. The Project Biologist or designee will adjust the 1,000-foot buffer as needed to reflect existing conditions including ambient noise, topography, and disturbance with the approval of the USFWS or CDFG, as appropriate. The Project Biologist or designee will conduct regular monitoring of the nest to determine success/failure and to confirm that project activities are not conducted within the buffer(s) until the nesting cycle is complete or the nest fails. The Project Biologist or designee will document the results of the surveys and the ongoing monitoring, and provide a copy of the monitoring reports for impact areas to the respective agencies. The Project Biologist or designee will approve ground-disturbing activities within the buffer area, pending site conditions that will not jeopardize the nest. The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance.

- **Bio-MM#29: Conduct Pre-Construction Surveys and Delineate Active Nest Exclusion Areas For Other Breeding Birds.** In the event active bird nests are encountered during the pre-construction survey, the Project Biologist or designee will determine the nest avoidance buffer zones as appropriate. The Project Biologist or designee will coordinate with the Contractor's Biologist to establish the suitable buffers consistent with the intent of the MBTA and as determined by the Project Biologist. The Project Biologist or designee will delineate nest avoidance buffers established for ground nesting birds in a manner that does not create predatory bird perch points in close proximity (150 feet) to the active nest site. The Project Biological Monitor will monitor weekly active bird nests or more frequently pending status of nest and status of fledgling development. The Contractor's Biologist will maintain the nest avoidance buffer zone until nestlings have fledged or the nest is

abandoned. The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance.

Bio-MM#30: Raptor Protection on Power Lines. During final design, the Contractor will verify that the catenary system and masts are designed to be raptor-safe, in accordance with the *Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006* (Avian Power Line Interaction Committee 2006). The Project Biologist will check the final design drawings and submit a memorandum to the Mitigation Manager documenting compliance.

Other measures that potentially apply to raptors and breeding birds include the following:

- AQ-MM#1: Reduce Fugitive Dust by Watering.
- AQ-MM#3: Reduce Fugitive Dust from Material Hauling.
- Bio-MM#3: Prepare and Implement a Worker Environmental Awareness Program.
- Bio-MM#5: Prepare and Implement a Biological Resources Management Plan.
- Bio-MM#7: Delineate Environmentally Sensitive Areas and Environmentally Restricted Areas (on plans and in-field).
- Bio-MM#8: Equipment Staging Areas.
- Bio-MM#10: Vehicle Traffic.
- Bio-MM#12: Work Stoppage.
- Bio-MM#13: 'Take' Notification and Reporting.
- Bio-MM#14: Post-Construction Compliance Reports.

Swainson's Hawks. Following are potential construction mitigation measures for Swainson's Hawks:

- **Bio-MM#31: Conduct Pre-Construction Surveys for Swainson's Hawks.** The Project Biologist or designee will conduct pre-construction surveys for Swainson's hawks during the nesting season (March 1 through September 15) within the construction footprint and within a 0.5-mile buffer. The Project Biologist or designee will conduct the pre-construction nest surveys at least 30 days prior to ground-disturbing activities and phase with project construction. The pre-construction surveys will determine the status (i.e. active, inactive) of the nest. The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance with the measure.

- **Bio-MM#32: Swainson's Hawk Nest Avoidance.** If active Swainson's hawk nests (defined as a nest used one or more times in the last 5 years) are found within 0.5 mile of the construction footprint during the nesting season (March 1 to September 15), the Contractor's Biologist will implement buffers restricting construction activities, following CDFG's *Staff Report Regarding Mitigation for Impacts to Swainson's Hawks* (*Buteo swainsoni) in the Central Valley of California* (CDFG 1994). Adjustments to the buffer(s) will require prior approval by CDFG as coordinated by the Project Biologist. The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance on a weekly basis.

- **Bio-MM#33: Monitor Removal of Nest Trees for Swainson's Hawks.** Prior to ground-disturbing activities, the Project Biologist or designee will monitor nest trees for Swainson's hawks in the construction footprint that are not removed. If a nest tree for a Swainson's hawk must be removed, the Contractor will obtain a Management Authorization (including conditions to offset the loss of the nest tree) from the CDFG, as described in CDFG's *Staff Reporting Regarding Mitigation for Impacts to Swainson's Hawks (Buteo swainsoni) in the Central Valley of California* (CDFG 1994). The Management Authorization will specify the tree removal period, generally between October 1 and February 1. If ground-disturbing activities or other project-related activities may cause nest abandonment by a Swainson's hawk or forced fledging within the specified buffer area, monitoring of the nest site (funded by the Authority) by the Project Biologist will be required to determine if the nest is abandoned. The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance on a weekly basis during the appropriate season.

Other measures that potentially apply to Swainson's hawk include the following:

- AQ-MM#1: Reduce Fugitive Dust by Watering.
- AQ-MM#3: Reduce Fugitive Dust from Material Hauling.
- Bio-MM#3: Prepare and Implement a Worker Environmental Awareness Program.
- Bio-MM#5: Prepare and Implement a Biological Resources Management Plan.
- Bio-MM#7: Delineate Environmentally Sensitive Areas and Environmentally Restricted Areas (on plans and in-field).
- Bio-MM#8: Equipment Staging Areas.
- Bio-MM#10: Vehicle Traffic.
- Bio-MM#12: Work Stoppage.
- Bio-MM#13: 'Take' Notification and Reporting.
- Bio-MM#14: Post-Construction Compliance Reports.

Burrowing Owls. Following are potential construction mitigation measures for Burrowing Owls:

- **Bio-MM#34: Conduct Protocol Surveys for Burrowing Owls.** Prior to ground-disturbing activities, the Project Biologist or designee will conduct protocol-level surveys in accordance with CDFG's *Staff Report on Burrowing Owl Mitigation* (CDFG 1995). The Project Biologist or designee will conduct the protocol-level surveys during the winter (December 1 through January 31) and breeding season (April 15 through July 15). The Project Biologist or designee will conduct these surveys within suitable habitat of the construction footprint and within a 500-foot buffer. The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance.

- **Bio-MM#35: Burrowing Owl Avoidance and Minimization.** Implement burrowing owl avoidance and minimization measures following CDFG's *Staff Report on Burrowing Owl Mitigation* (CDFG 1995).

  The Contractor will not disturb occupied burrowing owl burrows during the nesting season (February 1 through August 31) unless it is verified that either the birds have not begun egg-laying and incubation, or that juveniles from the occupied burrows are foraging independently and are capable of independent survival as determined by the Project Biologist or designee. Eviction outside the nesting season may be permitted pending evaluation of eviction plans and receipt of formal written approval from the CDFG authorizing the eviction.

  Unless otherwise authorized by CDFG, the Contractor's Biologist will establish a 250-foot buffer (as an environmentally sensitive area) between the construction work area and nesting burrowing owls during the nesting season. The Contractor will maintain this protected area until August 31 or a time set at CDFG's discretion and based upon monitoring evidence, until the young owls are foraging independently.

  Unless otherwise authorized by CDFG, the Contractor's Biologist will establish a 160-foot buffer (as an environmentally sensitive area) between the construction work area and occupied burrows during the non-breeding season (September 1 through January 31). The Contractor will maintain this protected area until January 31 or at CDFG's discretion and based upon monitoring evidence, until the young owls are foraging independently.

  If burrowing owls must be moved away from the construction footprint, the Contractor's Biologist will undertake the passive relocation measures in accordance with CDFG's (1995) guidelines. The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance on a weekly basis.

Other measures that potentially apply to burrowing owls include the following:

- AQ-MM#1: Reduce Fugitive Dust by Watering.

- AQ-MM#3: Reduce Fugitive Dust from Material Hauling.
- Bio-MM#3: Prepare and Implement a Worker Environmental Awareness Program.
- Bio-MM#5: Prepare and Implement a Biological Resources Management Plan.
- Bio-MM#7: Delineate Environmentally Sensitive Areas and Environmentally Restricted Areas (on plans and in-field).
- Bio-MM#8: Equipment Staging Areas.
- Bio-MM#10: Vehicle Traffic.
- Bio-MM#11: Entrapment Prevention.
- Bio-MM#12: Work Stoppage.
- Bio-MM#13: 'Take' Notification and Reporting.
- Bio-MM#14: Post-Construction Compliance Reports.

Mammals

Special-Status Bats. Following are potential construction mitigation measures for special-status bats:

- **Bio-MM#36: Conduct Pre-Construction Surveys for Special-Status Bat Species.** Prior to any ground-disturbing activities, the Project Biological Monitor or designee will conduct a visual and acoustic pre-construction survey for roosting bats. Include a minimum of one day and one evening in the visual pre-construction survey. The Project Biologist, in coordination with the Mitigation Manager, will contact CDFG if any hibernation roosts or active nurseries are identified within or immediately adjacent to the construction footprint, as appropriate. The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance.

- **Bio-MM#37: Bat Avoidance and Relocation.** During ground-disturbing activities the Contractor will avoid active hibernation nests. If avoidance of the hibernation roost is not feasible, the Contractor's Biologist will prepare a relocation plan and coordinate the construction of an alternative bat roost with CDFG. The Contractor will implement the Bat Roost Relocation Plan prior to the commencement of construction activities.

  Remove roosts with approval from CDFG before hibernation begins (October 31), or after young are flying (July 31), using exclusion and deterrence techniques described in Bio-MM#38 below. The timeline to remove vacated roosts is between August 1 and October 31. All effort to avoid disturbance to maternity roosts will be made during construction activities. The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance.

- **Bio-MM#38: Bat Exclusion and Deterrence.** During ground-disturbing activities, if non-breeding or non-hibernating individuals or groups of bats are found within the construction footprint, the bats will be safely excluded by either opening the roosting area to change lighting and airflow conditions, or by installing one-way doors, or other appropriate methods specified by CDFG. The Contractor will leave the roost undisturbed by project-related activities for a minimum of one week after implementing exclusion and/or eviction activities. The Contractor will not implement exclusion measures to evict bats from established maternity roosts or occupied hibernation roosts. The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance.

Other measures that potentially apply to bats include the following:

- Bio-MM#3: Prepare and Implement a Worker Environmental Awareness Program.
- Bio-MM#5: Prepare and Implement a Biological Resources Management Plan.
- Bio-MM#7: Delineate Environmentally Sensitive Areas and Environmentally Restricted Areas (on plans and in-field).
- Bio-MM#8: Equipment Staging Areas.
- Bio-MM#10: Vehicle Traffic.
- Bio-MM#11: Entrapment Prevention.

- Bio-MM#12: Work Stoppage.
- Bio-MM#13: 'Take' Notification and Reporting.
- Bio-MM#14: Post-Construction Compliance Reports.

American Badger. Following are potential construction mitigation measures for American Badger:

- **Bio-MM#39: Conduct Pre-Construction Surveys for American Badger.** Prior to ground-disturbing activities, the Project Biologist or designee will conduct pre-construction surveys for American badger den sites within suitable habitats in the construction footprint. The Project Biologist will conduct these surveys no more than 30 days before the start of ground-disturbing activities and phase with project build out. The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance.

- **Bio-MM#40: American Badger Avoidance.** The Contractor's Biologist will establish a 50-foot buffer around occupied American badger dens. The Contractor will establish a 200-foot buffer around badger maternity dens through the pup-rearing season (February 15 through July 1). Adjustments to the buffer(s) will require prior approval by CDFG as coordinated by the Project Biologist. The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance.

Other measures that potentially apply to the American badger include the following:

- Bio-MM#3: Prepare and Implement a Worker Environmental Awareness Program.
- Bio-MM#5: Prepare and Implement a Biological Resources Management Plan.
- Bio-MM#7: Delineate Environmentally Sensitive Areas and Environmentally Restricted Areas (on plans and in-field).
- Bio-MM#8: Equipment Staging Areas.
- Bio-MM#10: Vehicle Traffic.
- Bio-MM#11: Entrapment Prevention.
- Bio-MM#12: Work Stoppage.

San Joaquin Kit Fox. Following are potential construction mitigation measures for San Joaquin Kit Fox:

- **Bio-MM#41: Conduct Pre-Construction Surveys for San Joaquin Kit Fox.** The USFWS' *Standardized Recommendations for Protection of the San Joaquin Kit Fox Prior to or During Ground Disturbance* (USFWS 1999c) will be implemented as follows for construction related impacts.

  Prior to the start of ground-disturbing activities, the Project Biologist or designee will conduct pre-construction surveys in accordance with the USFWS' *San Joaquin Kit Fox Survey Protocol for the Northern Range* (USFWS 1999b). The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance.

- **Bio-MM#42: Minimize Impacts on San Joaquin Kit Fox.** The Contractor's Biologist will Implement USFWS' *Standard Measures for Protection of the San Joaquin Kit Fox Prior to or During Ground Disturbance* (USFWS 1999c) to minimize ground disturbance-related impacts to this species. The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance.

Other measures that potentially apply to the San Joaquin kit fox include the following:

- Bio-MM#3: Prepare and Implement a Worker Environmental Awareness Program.
- Bio-MM#5: Prepare and Implement a Biological Resources Management Plan.
- Bio-MM#7: Delineate Environmentally Sensitive Areas and Environmentally Restricted Areas (on plans and in-field).
- Bio-MM#8: Equipment Staging Areas.
- Bio-MM#10: Vehicle Traffic.
- Bio-MM#11: Entrapment Prevention.

- Bio-MM#12: Work Stoppage.
- Bio-MM#13: 'Take' Notification and Reporting.
- Bio-MM#14: Post-Construction Compliance Reports.

Significance of Construction Period Impacts

Because construction of the UPRR/SR 99 Alternative would temporarily affect these special-status mammals both directly and indirectly as described above, the impact is considered to have moderate intensity under NEPA and is considered significant under CEQA.

Project Period Impacts

Invertebrates

The footprint and area of indirect impact for the UPRR/SR 99 Alternative contains a relatively small amount of vernal pools and other seasonal wetlands, including California annual grassland with soils suitable for vernal pools and other seasonal wetlands. Vernal pools and other seasonal wetlands provide habitat for Conservancy fairy shrimp, vernal pool fairy shrimp, and vernal tadpole fairy shrimp. Special-status invertebrates are regulated by the USFWS; the loss of suitable habitat could impair the survival of self-sustaining populations. The potential loss of suitable vernal habitat would result in the elimination of vernal pool invertebrate populations.

The footprint and area of indirect impact for the UPRR/SR 99 Alternative also contains populations of Mexican elderberry shrubs, specifically along the San Joaquin River area. All habitats with elderberry shrubs are assumed to be occupied by the valley elderberry longhorn beetle. Populations of the valley elderberry longhorn beetle are regulated by USFWS; the loss of elderberry shrubs could impair the survival of self-sustaining populations.

Fish

The footprint and area of indirect impact for the UPRR/SR 99 Alternative contains aquatic habitats (primarily along the San Joaquin River) known to support Kern brook lamprey, Central Valley steelhead, Central Valley spring-run Chinook salmon, hardhead, and San Joaquin roach. Essential fish habitat and the associated special-status fish are being restored with the San Joaquin River from the Friant Dam to the Merced River confluence. Potential project impacts during the project period are not expected to adversely affect re-establishment of special-status fish along the San Joaquin River. The potential impacts are being considered during the project design (i.e., final bridge design and piling locations). Impacts to essential fish habitat are anticipated to be avoided after construction is complete. Two approaches to bridge crossing design are presented in Section 3.7.6 of the Draft EIR/EIS. The HST crossing would be designed for anticipated increases in river flows resulting from the implementation of the SJRRP. The design minimizes any appreciable changes in scour, sediment transport and deposition, or other hydrofluvial processes that could adversely alter salmonid habitat.

Amphibians

The footprint and area of indirect impact for the UPRR/SR 99 Alternative contains suitable breeding and upland habitat for California tiger salamanders and western spadefoot toads. All suitable vernal pool and other seasonal wetland habitat with associated upland areas are assumed to be occupied by California tiger salamanders and western spadefoot toads. Populations of these special-status amphibians are regulated by both CDFG and USFWS; the loss of suitable breeding and upland habitat could impair the survival of self-sustaining populations.

Reptiles

The footprint and area of indirect impact for the UPRR/SR 99 Alternative contains suitable habitat for populations of western pond turtles. All suitable aquatic habitats are assumed to be occupied by western pond turtles. Populations of these special-status reptiles are regulated by CDFG; the loss of suitable habitat could impair the survival of self-sustaining populations.

Birds (includes all native birds covered under MBTA)

The footprint and area of indirect impact for the UPRR/SR 99 Alternative contains a wide range of habitats known to support 37 special-status bird species. All suitable habitat is assumed to be occupied by special-status bird species. Populations of special-status birds are regulated by both CDFG and USFWS; the loss of suitable habitat could impair the survival of self-sustaining populations.

Mammals

The footprint and area of indirect impact for the UPRR/SR 99 Alternative contains California annual grassland and agricultural lands known to support American badger (California annual grassland only), San Joaquin kit fox, and special-status bats (also known to occur within trees and rocky outcrops). All suitable habitats are assumed to be occupied by special-status mammals. Populations of mammals are regulated by both the CDFG and USFWS; the loss of suitable habitat could impair the survival of self-sustaining populations.

Project Period Mitigation Measures

The following mitigation measures are designed to avoid or minimize impacts to special-status wildlife species during the project period.

Invertebrates

Vernal Pool Branchiopods. The Authority or its designee will mitigate direct and indirect impacts, including temporary and permanent, on vernal pool branchiopod habitat through compensation determined in consultation with the USFWS and CDFG. Vernal pool branchiopods are addressed for the project-period mitigation measures under jurisdictional waters (refer to Bio-MM#56, 57, 58) to re-establish vernal pool branchiopod habitat values. Compensatory mitigation for vernal pool branchiopods will incorporate appropriate terms and conditions from CESA and Federal ESA requirements.

Valley Elderberry Longhorn Beetle. Following are potential project period mitigation measures for Valley Elderberry Longhorm Beetle:

- **Bio-MM#51: Implement Conservation Guidelines During the Project Period for Valley Elderberry Longhorn Beetle.** The Authority or its designee will conduct compensatory mitigation for the valley elderberry longhorn beetle, including transplantation and replacement of elderberry shrubs, and maintenance for replacement shrubs, following the USFWS' *Conservation Guidelines for the Valley Elderberry Longhorn Beetle* (USFWS 1999a). The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance.

Other measures that potentially apply to valley elderberry longhorn beetle include the following:

- Bio-MM#4: Prepare and Implement a Weed Control Plan.
- Bio-MM#14: Post-Construction Compliance Reports.

Amphibians: California Tiger Salamander

Following are potential project period mitigation measures for California Tiger Salamander:

- **Bio-MM#52: Compensate for Impacts on California Tiger Salamander.** The Authority or its designee will determine compensatory mitigation for the temporary and permanent loss of suitable upland and aquatic breeding habitat through agency consultation with the USFWS and CDFG. Compensatory mitigation could include one of the following:
  - Purchase of credits from an agency-approved mitigation bank.
  - Fee-title-acquisition of natural resource regulatory agency-approved property.
  - Purchase or establishment of a conservation easement with an endowment for long-term management of the property-specific conservation values.
  - In-lieu fee contribution determined through negotiation and consultation with the various natural resource regulatory agencies.
  - Implementation of USFWS Biological Opinion and/or CDFG 2081(b).
  - The Project Biologist will submit a memorandum documenting compliance to the Mitigation Manager.
  - Other mitigation measures that potentially apply to California tiger salamander include:
  - Bio-MM#4: Prepare and Implement a Weed Control Plan.
  - Bio-MM#56: Conduct Delineation of Jurisdictional Waters and State Streambeds.
  - Bio-MM#57: Prepare and Implement a Habitat Mitigation and Monitoring Plan.
  - Bio-MM#58: Compensate for Permanent Impacts on Jurisdictional Waters.

Reptiles: Western Pond Turtle

The Authority or its designee will mitigate the impacts on western pond turtle in accordance with the USFWS Biological Opinion and/or CDFG 2081(b). The Project Biologist will submit a memorandum documenting compliance to the Mitigation Manager.

The following measures potentially apply to western pond turtle:

- Bio-MM#4: Prepare and Implement a Weed Control Plan.
- Bio-MM#49: Compensate for Permanent Riparian Impacts.
- Bio-MM#56: Conduct Delineation of Jurisdictional Waters and State Streambeds.
- Bio-MM#57: Prepare and Implement a Habitat Mitigation and Monitoring Plan.
- Bio-MM#58: Compensate for Permanent Impacts on Jurisdictional Waters.

Fish

Mitigation measures that potentially apply to fish include the following:

- Bio-MM#4: Prepare and Implement a Weed Control Plan.
- Bio-MM#49: Compensate for Permanent Riparian Impacts.
- Bio-MM#56: Conduct Delineation of Jurisdictional Waters and State Streambeds.
- Bio-MM#57: Prepare and Implement a Habitat Mitigation and Monitoring Plan.
- Bio-MM#58: Compensate for Permanent Impacts on Jurisdictional Waters.

Birds

Birds included in the following mitigation measure are those protected under the MBTA and/or listed as SSC by CDFG:

- Bio-MM#4: Prepare and Implement a Weed Control Plan.
- Bio-MM#49: Compensate for Permanent Riparian Impacts.
- Bio-MM#56: Conduct Delineation of Jurisdictional Waters and State Streambeds.
- Bio-MM#57: Prepare and Implement a Habitat Mitigation and Monitoring Plan.
- Bio-MM#58: Compensate for Permanent Impacts on Jurisdictional Waters.
- Bio-MM#61: Compensate for Impacts to Protected Trees.

Raptors

Swainson's Hawks. Following are potential project period mitigation measures for Swainson's Hawks:

- **Bio-MM#53: Compensate for Loss of Swainson's Hawk Foraging Habitat.** To compensate for the loss of Swainson's hawk foraging habitat, the Authority or its designee will provide compensatory mitigation that follows the ratios recommended by CDFG's (1994) Staff Report Regarding Mitigation for Impacts to Swainson's hawks in the Central Valley. The Project Biologist will submit a memorandum documenting compliance to the Mitigation Manager. The ratios are based on the distance from the construction footprint to the closest active nest site (which for this species is defined as a nest used one or more times in the last 5 years), as follows:
  - Compensate where impacts on foraging habitat occur within 1 mile of an active nest tree, at a 1:1 ratio on agricultural lands or other suitable foraging habitat; or at a 0.5:1 ratio where habitat can be managed for prey production.
  - Compensate where impacts on foraging habitat occur within 5 miles, but more than 1 mile from an active nest tree, at a 0.75:1 ratio.
  - Compensate where impacts on foraging habitat occur within 10 miles, but more than 5 miles from an active nest tree, at a 0.5:1 ratio.
  - Mitigate the impacts on special-status plants in accordance with the USFWS Biological Opinion and/or CDFG 2081(b).

Other measures that potentially apply to Swainson's hawk include the following:

- Bio-MM#4: Prepare and Implement a Weed Control Plan.
- Bio-MM#49: Compensate for Permanent Riparian Impacts.
- Bio-MM#56: Conduct Delineation of Jurisdictional Waters and State Streambeds.
- Bio-MM#57: Prepare and Implement a Habitat Mitigation and Monitoring Plan.
- Bio-MM#58: Compensate for Permanent Impacts on Jurisdictional Waters.
- Bio-MM#61: Compensate for Impacts to Protected Trees.

Burrowing Owls. Following is a potential project period mitigation measure for Burrowing Owls:

- **Bio-MM#54: Compensate for Loss of Burrowing Owl Foraging and Breeding Habitat.** The Authority or its designee will provide base compensatory mitigation for the temporary and permanent loss of foraging and breeding habitat on the number of western burrowing owl pairs or individuals affected. Compensation will be at a 6.5:1 ratio (acres of habitat: number of pairs or individuals). Mitigate each occupied burrow destroyed by enlarging or enhancing existing unsuitable burrows at a 2:1 ratio based on CDFG's (1995) *Staff Report on Burrowing Owl Mitigation*. The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance.

Mammals

Special-Status Bats. The following measures potentially apply to special-status bats:

- Bio-MM#4: Prepare and Implement a Weed Control Plan.
- Bio-MM#14: Post-Construction Compliance Reports.
- Bio-MM#49: Compensate for Permanent Riparian Impacts.
- Bio-MM#56: Conduct Delineation of Jurisdictional Waters and State Streambeds.
- Bio-MM#57: Prepare and Implement a Habitat Mitigation and Monitoring Plan.
- Bio-MM#58: Compensate for Permanent Impacts on Jurisdictional Waters.
- Bio-MM#59: Wildlife Corridor Artificial Dens.

American Badger. The following measures potentially apply to American badgers:

- Bio-MM#4: Prepare and Implement a Weed Control Plan.
- Bio-MM#14: Post-Construction Compliance Reports.
- Bio-MM#56: Conduct Delineation of Jurisdictional Waters and State Streambeds.
- Bio-MM#57: Prepare and Implement a Habitat Mitigation and Monitoring Plan.
- Bio-MM#58: Compensate for Permanent Impacts on Jurisdictional Waters.
- Bio-MM#59: Wildlife Corridor Artificial Dens.

San Joaquin Kit Fox. The following measure potentially apply to San Joanquin Kit Fox:

- **Bio-MM#55: Compensate for Destruction of Natal Dens.** The Authority or its designee will mitigate the destruction of kit fox natal dens by the purchase of suitable, approved habitat (USFWS and CDFG). Replace habitat at a minimum of 1:1 acre of habitat in order to provide additional protection and habitat in a location consistent with the recovery of the species. Mitigate the impacts on San Joaquin kit fox in accordance with the USFWS Biological Opinion and/or CDFG 2081(b) agreement. The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance.

Other measures that potentially apply to San Joaquin Kit Fox include the following:

- Bio-MM#4: Prepare and Implement a Weed Control Plan.
- Bio-MM#56: Conduct Delineation of Jurisdictional Waters and State Streambeds.
- Bio-MM#57: Prepare and Implement a Habitat Mitigation and Monitoring Plan.
- Bio-MM#58: Compensate for Permanent Impacts on Jurisdictional Waters.
- Bio-MM#59: Wildlife Corridor Artificial Dens.
- Bio-MM#60: Monitoring and Reporting of Wildlife Corridor Undercrossings.

Significance of Project Period Impacts

The potential permanent impact to suitable habitat for special-status wildlife species would be considered to have moderate intensity under NEPA and is considered significant under CEQA.

Cumulative Construction and Project Period Impacts

Construction and operations cumulative impacts on most biological resources would have moderate intensity under NEPA and not be cumulatively considerable under CEQA because most impacts would not result in the loss of species populations. Impacts on the San Joaquin kit fox would be considered to have moderate intensity under NEPA and be cumulatively considerable under CEQA because disruption to linkages and movement corridors may result in isolated populations that are at greater risk of extirpation.

Cumulative Construction and Project Period Mitigation Measures

There are no feasible mitigation measures beyond those specified above to address cumulative impacts to special status wildlife species. However, the mitigation measures summarized above will mitigate the project's contribution to the cumulative impact.

Cumulative Construction Period and Project Period Significance

After implementing avoidance and minimization measures, and mitigation measures for unavoidable impacts, the cumulative construction and operational impacts on biological resources, including special-status wildlife species will remain of moderate intensity under NEPA and cumulatively considerable under CEQA.

6.2.5 Other Biological Resources (Wildlife Corridors)

6.2.5.1 Affected Environment

The Merced to Fresno Section is located in an area that traverses some designated wildlife corridors and essential connectivity areas. The UPRR/SR 99 Alternative crosses the designated corridors summarized below.

6.2.5.2 North-South Alignment

The UPRR/SR 99 Alternative crosses the Eastman Lake – Bear Creek ECA near Mariposa Creek and Dutchman Creek north of the Harris-DeJager HMF site. The North-South alignment integrates the East Chowchilla design option. The Eastman Lake – Bear Creek ECA, formerly referred to as the Madera-Merced Linkage (Linkage 18 in Penrod et al. [2001]) and as the Sandy Mush Road corridor by ESRP (1999) and USFWS (1998), has been documented as a wildlife linkage. Linking the natural areas in the Sandy Mush Road area with the San Joaquin kit fox population east of SR 99 has been recommended as a recovery action by the USFWS (USFWS 1998). In addition, the UPRR/SR 99 Alternative crosses other modeled wildlife corridors to the south potentially used by wildlife to move between habitat areas.

6.2.5.3 West Chowchilla Design Option

The portion of the West Chowchilla design option with the Ave 24 Wye habitat study area near SR 99 does not intersect the Eastman Lake – Bear Creek ECA or other modeled wildlife corridors potentially used by wildlife to move between habitat areas.

6.2.5.4 Fresno HST Station Alternatives

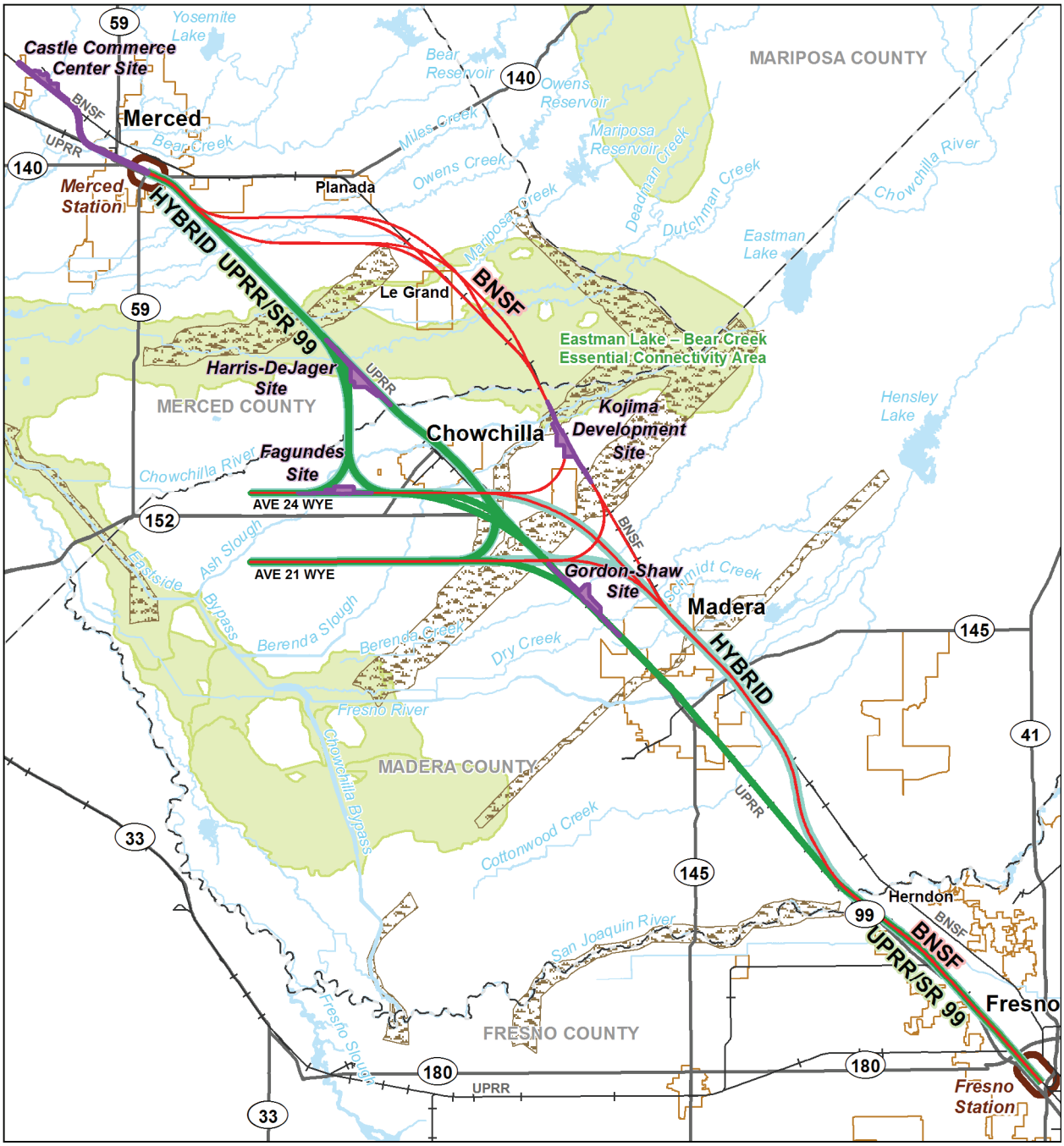
Within the habitat study area, the Fresno HST Station alternatives would not cross or intersect the Eastman Lake – Bear Creek ECA or other wildlife corridors potentially used by wildlife to move between habitat areas.

6.2.5.5 Ave 24 Wye

The Ave 24 Wye near SR 99 intersects a portion of the Eastman Lake-Bear Creek ECA to the north. However, the Ave 24 Wye habitat study area near SR 99 does not intersect with any other modeled wildlife corridors.

6.2.5.6 Ave 21 Wye

The Ave 21 Wye does not intersect the Eastman Lake – Bear Creek ECA or other modeled wildlife corridors.



Source: Spencer et al. (2010), Huber (2007).

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- UPRR/SR 99 Alternative
- BNSF Alternative
- Hybrid Alternative
- Station Study Area
- Potential Heavy Maintenance Facility
- City Limit
- County Boundary
- Railroad
- Essential Connectivity Area
- Modeled Wildlife Corridors

Figure 6.3-2
Wildlife Corridors

6.2.5.7 Construction Period Impacts

Direct Impacts During Construction

Temporary impacts from placement of barriers during construction activities would affect the ability of San Joaquin kit fox and other free-ranging animals to move freely within the Eastman Lake – Bear Creek ECA and other modeled wildlife corridors.

Indirect Impacts During Construction

Construction of the project would result in concentrated heavy vehicle and equipment use. Construction-related activities occurring at or in the vicinity of wildlife movement corridors, such as the Eastman Lake – Bear Creek ECA, may result in indirect disruption of wildlife movement through lighting, noise, motion, and startle effects. Construction activities would also potentially affect wildlife in adjacent habitats by interfering with movement patterns or by causing wildlife to temporarily avoid areas adjacent to the construction areas.

Construction Period Mitigation Measures

The following measures apply to impacts that could potentially occur to wildlife movement corridors during the project construction period; as part of the project design, bridges, canals, culverts, and some pipelines will accommodate wildlife movement; these are referred to as project design features:

- **Bio-MM#45: Wildlife Corridor Undercrossing (Planning/Refinement).** In response to the California Department of Fish and Game (Department) letter (October 13, 2011 RE: SCH No. 2009091125 Draft EIR/EIS comment letter) regarding wildlife movement the Authority and its regional consultant met with the Department on January 11, 2012 to discuss the Wildlife Permeability Approach (WPA). The Authority presented the original overall approach for mitigating potential landscape permeability and wildlife movement impacts for the Merced to Fresno Section. The Department identified other opportunities that may exist for wildlife movement and provided some direction to the Authority. As a result, the WPA is reflected in the Merced to Fresno HST Landscape Permeability Plan Technical Memorandum (LPPTM) and is provided in Appendix 3.7-C to this EIR/EIS. The LPPTM addresses the following as a result of comments received by the Department:

- Consider wildlife movement within and outside of the ECA.

- Incorporate contiguous habitat including but not limited to farming activities such as pasture land, grain crops, and alfalfa farming, short stature forage, natural open space; including riparian corridors as dispersal routes for species.

- Evaluate the efficacy of existing hydraulic crossing structures for wildlife utilization by considering opening size, adjacent contiguous habitat, and complementary underpasses on adjacent facilities (SR 99, UPRR, BNSF).

- Incorporate consideration for the underpasses as part of the improvements to SR 99 (Plainsburg/Alameda SR 99 Project).

- Provide supplemental designated wildlife underpasses as specified/needed in the LPTM. Prior to final design, the recommendations in the LPPTM as concurred with the Department, will be incorporated into the construction documents by the Contractor.

- **Bio-MM#46: Wildlife Corridor Undercrossing (Implementation).** During ground-disturbing activities, the Contractor will install wildlife corridor undercrossing(s) at the designated locations shown on the construction drawings. To the extent feasible, water crossing structures (those serving either constructed or natural watercourses) should be designed to also accommodate wildlife

passage. Openness ratios of 0.40 or greater should be factored into the crossing designs. The Project Biologist will check implementation of the undercrossing to determine consistency with the construction drawings and to confirm that installation is consistent and incorporates applicable conditions from resource agency permits (e.g., 2081, Section 7). The Project Biologist will prepare a memorandum documenting compliance and submit to the Mitigation Manager.

- **Bio-MM#47: Install Wildlife Fencing.** Prior to operation of the HST, the Contractor's Biologist will install free-ranging mammal-proof fencing along portions of the proposed project that are adjacent to wildlife movement corridors consistent with final design. The Project Biologist will verify that the installation is consistent with the designated terms and conditions in the applicable permits. The Project Biologist will prepare and submit a memorandum to the Mitigation Manager documenting compliance.

- **Bio-MM#48: Construction in Wildlife Movement Corridors.** Before ground-disturbing activities, the Contractor's Biologist will submit a construction avoidance and minimization plan for the Eastman Lake-Bear Creek ECA to the Project Biologist for concurrence. During ground-disturbing activities, the Contractor will keep the Eastman Lake-Bear Creek ECA riparian corridors (including Deadman and Dutchman Creeks) free of all equipment, storage materials, construction materials, and any significant potential impediments. The Contractor will minimize ground-disturbing activities within the Eastman Lake-Bear Creek ECA riparian corridors (Deadman and Dutchman Creeks) during nighttime hours to the extent practicable. In addition, keep nighttime illumination (e.g., for security) from spilling into the ECA or shield nighttime lighting to avoid illumination spilling into the ECA. Inspections will verify compliance and the Project Biologist will report through an appropriate memorandum to the Mitigation Manager.

Other measures that potentially apply to wildlife movement corridors include the following:

- Bio-MM#3: Prepare and Implement a Worker Environmental Awareness Program.
- Bio-MM#4: Prepare and Implement a Weed Control Plan.
- Bio-MM#5: Prepare and Implement a Biological Resources Management Plan.
- Bio-MM#6: Prepare and Implement a Restoration and Revegetation Plan.
- Bio-MM#7: Delineate Environmentally Sensitive Areas and Environmentally Restricted Areas (on plans and in-field).
- Bio-MM#8: Equipment Staging Areas.
- Bio-MM#10: Vehicle Traffic.
- Bio-MM#11: Entrapment Prevention.
- Bio-MM#15: Restore Temporary Riparian Impacts.
- Bio-MM#43: Restore Temporary Impacts on Jurisdictional Waters.
- N&V-MM#1: Construction Noise Mitigation Measures.

Significance of Construction Period Impacts

Because construction of the UPRR/SR 99 Alternative has the potential to interfere with the movement of wildlife species within the Eastman Lake – Bear Creek ECA and other modeled wildlife corridors for reasons identified above, the impact is considered to have moderate intensity under NEPA and is considered significant under CEQA.

6.2.5.8 Project Period Impacts

Within the Eastman Lake – Bear Creek ECA, the UPRR/SR 99 Alternative intersects approximately 3.6 to 4.1 miles of the noted ECA, and would cross two to four watercourses depending on the design option. Specifically, the East Chowchilla and West Chowchilla design options with Ave 24 Wye would cross four watercourses, whereas the East Chowchilla design option with Ave 21 Wye would cross two watercourses. Most of the watercourses crossed by the UPRR/SR 99 Alternative within the ECA are natural watercourses, including Deadman and Dutchman creeks. However, within other modeled wildlife

corridors that are present near the Berenda Slough and the Fresno River channels, the UPRR/SR 99 Alternative intersects approximately 5.25 to 7.75 miles of the other modeled wildlife corridors, and would cross zero to five watercourses depending on the design option. All of the watercourses crossed by the UPRR/SR 99 Alternative within the other modeled wildlife corridors are constructed watercourses, such as canals.

Project Period Mitigation Measures

The following mitigation measures are designed to avoid or minimize impacts to designated wildlife corridors during the project period:

- **Bio-MM#60: Wildlife Corridor Artificial Dens.** To prevent predation by larger predators (e.g., coyotes, bobcats, red foxes, and dogs) at wildlife undercrossings, the Contractor's Biologist will install artificial dens at each dedicated wildlife crossing structure to provide escape cover for wildlife (e.g., San Joaquin kit foxes). The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance.

- **Bio-MM#61: Monitoring and Reporting of Wildlife Corridor Undercrossings.** Prior to final design, the Authority or its designee will prepare the Wildlife Corridor Monitoring Program which will document wildlife usage of the undercrossing(s). The Authority or its designee will monitor and report the wildlife usage of the designated undercrossings during operation of the project consistent with the methods identified in the Wildlife Corridor Monitoring Program.

Other measures that potentially apply to wildlife movement corridors include the following:

- Bio-MM#4: Prepare and Implement a Weed Control Plan.
- N&V-MM#3: Installation of Noise Barriers.

Significance of Project Period Impacts

Because construction of the UPRR/SR 99 Alternative has the potential to interfere with the movement of wildlife species within the Eastman Lake – Bear Creek ECA and other modeled wildlife corridors for reasons identified above, the impact is considered to have moderate intensity under NEPA and is considered significant under CEQA.

6.2.5.9 Cumulative Construction and Project Period Impacts

Cumulative Construction and Project Period Mitigation Measures

There are no feasible mitigation measures beyond those specified above to address cumulative impacts to wildlife corridors. However, the mitigation measures summarized above will mitigate the project's contribution to the cumulative impact.

Significance of Cumulative Construction and Project Period Impacts

Impacts on movement of the San Joaquin kit fox would be of moderate intensity under NEPA and cumulatively considerable under CEQA because disruption to linkages and movement corridors may result in isolated populations that are at greater risk of extirpation.

6.2.5.10 Critical Habitat

Critical habitat does not occur within the habitat study area.

6.2.6 Other Significant Environmental Consequences

This section discusses the other significant environmental consequences that help to differentiate the UPRR/SR 99 Alternative from the other alternatives.

6.2.6.1 Noise

Affected Environment

The noise environment along the proposed UPRR/SR 99 Alternative is influenced by SR 99, UPRR, and BNSF railroad traffic, local community noise, and local roadway traffic. 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 close to Santa Fe Avenue, local roadway traffic dominates the noise environment. Nearing Merced from the north, traffic on SR 99 and freight trains on the UPRR railroad dominate the noise exposure, with roadway traffic contributing more noise near the city center where SR 99, SR 59, and SR 140 converge. Merced Regional Airport is located approximately 2 miles southwest of Merced's city center and contributes aircraft noise to the environment.

South of Merced, noise from SR 99 and UPRR dominates the noise environment in unincorporated areas between Merced and Chowchilla. Because noise-sensitive areas in Chowchilla are farther from SR 99 than the UPRR, freight trains and local community noise dominate the noise environment for both Chowchilla design options. In addition, there is a general aviation airport in Chowchilla located 1 mile southeast of the city center.

South of Chowchilla, noise from SR 99 and UPRR dominates the existing noise environment at scattered residences. Upon entering Madera, the HST alignment moves farther from SR 99, and the noise environment near Madera's city center is dominated by UPRR traffic and local community noise. Madera Municipal Airport is located approximately 3 miles northwest of the city center. This general aviation airport contributes aircraft noise to the environment.

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. 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 SR 99 and local community noise. South of the rail yard, the noise environment is dominated by UPRR traffic and local community noise.

Fresno is the most densely populated city along the proposed corridor, with several highways, busy local roads, UPRR, and aircraft noise contributing to the noise environment. SR 99, SR 180, and SR 41 are all near the proposed HST station site in Fresno. Fresno has two airports, Fresno-Yosemite International and Fresno Chandler Downtown. Fresno-Yosemite International Airport is located approximately 3 miles northeast of Fresno's city center and operates scheduled commercial flights. Fresno Chandler is located approximately 2.5 miles southwest of the city center and is a public airport used for general aviation. Sierra Sky Park Airport, a privately owned airport used for general aviation, is located approximately 8 miles northwest of Fresno's city center. Aircraft noise from these three airports adds to the existing noise environment in the Fresno area.

Wye Design Options

The Ave 24 Wye and the Ave 21 Wye are in a rural, unincorporated portion of Madera County. The existing noise environment is dominated by natural sounds, distant traffic, and agricultural activities.

Significance Criteria (NEPA and CEQA)

Pursuant to NEPA regulations (40 CFR 1500-1508), project effects are evaluated based on the criteria of context and intensity. Context means the affected environment in which a proposed project occurs. Intensity refers to the severity of the effect, which is examined in terms of the type, quality, and sensitivity of the resource involved, location and extent of the effect, duration of the effect (short- or long-term), and other consideration of context. Beneficial effects are identified and described. When there is no measurable effect, impact is found not to occur. Intensity of adverse effects is summarized as the degree or magnitude of a potential adverse effect where the adverse effect is thus determined to have negligible, moderate, or substantial intensity. It is possible that a significant adverse effect may still exist when on balance the impact is of negligible intensity or even beneficial. For this assessment, FTA terminology of "no impact" was used rather than the NEPA term "negligible."

If the project results in an insignificant increase in the number of people highly annoyed by the project noise, there would be no impact (FRA's "No Impact" category, as shown in Figure 3.4-3 of the Draft EIR/EIS). If the project results in a change in the cumulative noise level that would be noticeable to most people, but may not be sufficient to generate strong, adverse reactions, the impact is defined as having moderate intensity (FRA's "Moderate Impact" category, as shown in Figure 3.4-3 of the Draft EIR/EIS). If the project results in a change in the cumulative noise level that would cause a significant percentage of people to be highly annoyed by the project's noise, the impact is defined as faving substantial intensity (FRA's "Severe Impact" category, as shown in Figure 3.4-3 of the Draft EIR/EIS). Because of the significant percentage of people who would be highly annoyed, the noise impacts under NEPA would have substantial intensity and would be considered significant.

For vibration, all impacts, as defined by the FRA criteria in Section 3.4.3.3, would have substantial intensity. Because there is only one level of impact in the FRA criteria, all project vibration levels over the impact criteria would be considered significant.

The FRA noise and vibration criteria for evaluating effects under NEPA may be used as the CEQA significance criteria. In addition to these criteria, CEQA guidelines also define an impact pertaining to noise and vibration as considered significant if it would result in any of the following environmental effects:

- Exposure of persons to or generation of noise levels in excess of standards for a severe impact established by the FRA for high-speed ground transportation and by the FTA for transit projects. These standards cover both permanent and temporary/periodic increases in ambient noise levels in the project vicinity above levels existing without the project.
- Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels.

Construction Period Impacts

By using the FTA criteria provided in Table 3.4-1 of the EIR/EIS and the noise projections in Table 3.4-13 of the EIR/EIS, and assuming that construction noise reduces by 6 dB for each doubling of distance from the center of the site, it is possible to estimate the screening distances for potential construction noise impact. These estimates suggest that the potential for construction noise impact would be minimal for commercial and industrial land use, with impact screening distances of 79 feet and 45 feet, respectively. For residential land use, the potential for temporary construction noise impact would be limited to locations within approximately 141 feet of the alignment. However, the potential for noise impact from nighttime construction could extend to residences as far as 446 feet, but the Authority will work to minimize this potential impact. For residences within 141 feet of the alignment, or within 446 feet during nighttime construction, construction impacts would be impacts with moderate intensity under NEPA.

Construction Period Mitigation Measures

During construction, noise levels will be monitored to verify compliance with the FTA construction noise limits. The contractor will have the flexibility to meet the FTA construction noise limits in the most efficient and cost-effective manner. The contractor would have the flexibility of either prohibiting certain noise-generating activities during nighttime hours or providing additional noise control measures to meet the noise limits. To meet required noise limits, the following noise control mitigation measures will be implemented as necessary, for nighttime and daytime:

- Install a temporary construction site sound barrier near a noise source.
- Avoid nighttime construction in residential neighborhoods.
- Locate stationary construction equipment as far as possible from noise-sensitive sites.
- Re-route construction-related truck traffic along roadways that will cause the least disturbance to residents.
- During nighttime work, use smart back-up alarms, which automatically adjust the alarm level based on the background noise level, or switch off back-up alarms and replace with spotters.
- Use low-noise emission equipment.
- Implement noise-deadening measures for truck loading and operations.
- Monitor and maintain equipment to meet noise limits.
- Line or cover storage bins, conveyors, and chutes with sound-deadening material.
- Use acoustic enclosures, shields, or shrouds for equipment and facilities.
- Use high-grade engine exhaust silencers and engine-casing sound insulation.
- Prohibit aboveground jackhammering and impact pile driving during nighttime hours.
- Minimize the use of generators to power equipment.
- Limit use of public address systems.
- Grade surface irregularities on construction sites.
- Use moveable sound barriers at the source of the construction activity.
- Limit or avoid certain noisy activities during nighttime hours.

Construction Period Significance

Construction noise and vibration impacts could have substantial intensity for all alternatives. These impacts would be significant because the magnitude of the noise increase that would result in a severe impact under FRA criteria is considered highly annoying by the general population. Construction noise impacts under CEQA are less than significant after mitigation.

Project Period Impacts

Table 6.3-4 summarizes potential direct noise impacts related to operation of HSTs under the UPRR/SR 99 Alternative without mitigation during the design year (2035) for both the ballast and tie and slab track construction alternatives. HST noise impacts are assessed for noise-sensitive land uses based on a comparison of existing noise levels with future noise levels from the project. North of the wye there are fewer noise-sensitive areas and fewer trains than south of the wye. Consequently, there would be fewer noise impacts in areas of Merced and Chowchilla than in the southern sections of Madera and Fresno.

Ballast and Tie Track Construction Alternative

Figures 3.4-9 through 3.4-12 of the EIR/EIS show the locations of noise impacts with ballast and tie track under the UPRR/SR 99 Alternative without mitigation during the design year (2035).

For ballast and tie track, Table 3.4-15 of the EIR/EIS indicates that for the Ave 24 Wye design options east of Chowchilla, severe noise impacts are projected at 852 residences, 4 hotels, 1 church, 1 park, and 1 outdoor movie theater. For the Ave 24 Wye design option west of Chowchilla, severe noise impacts are projected at 875 residences, 4 hotels, 2 churches, 1 park, and 1 outdoor movie theater. Under the Ave 21

Wye design option, severe noise impacts are projected at 776 residences, 6 hotels, 1 church, 1 park, and 1 outdoor movie theater. The number of impacts with moderate intensity would vary among each of the design options.

In the Merced vicinity, no severe noise impacts are projected to occur. Because of the relatively high existing noise levels in this urban area and the significantly fewer HST operations north of the wyes, project noise would not result in increases in noise sufficient to cause severe impacts.

In the Chowchilla vicinity with the East Chowchilla design option, severe noise impacts are projected to occur at 65 residences with the Ave 24 Wye design option and at 18 residences and 2 hotels with the Ave 21 Wye design option. With the West Chowchilla design option, 155 residences and 1 church would experience severe noise impacts.

In the Madera vicinity, severe noise impacts are projected at 537 residences, 1 hotel, and 1 outdoor movie theater. Moderate noise impact is projected at Sierra Vista Elementary School and Washington Elementary School. In the Fresno vicinity, severe noise impacts are projected to occur at 173 residences, 3 hotels, 1 church, and Roeding Park.

With the Ave 24 Wye design option, severe noise impacts are projected at 77 residences in the area along the Ave 24 Wye with the East Chowchilla design option and at 10 residences with the West Chowchilla design option, but with the Ave 21 Wye, severe noise impacts are projected at 48 residences in the area along the Ave 21 Wye.

Table 6.3-4 below summarizes potential direct noise impacts related to operation of HSTs under the UPRR/SR 99 Alternative without mitigation during the design year (2035) for both the ballast and tie and slab track construction alternatives.

Table 6.3-4
Potential Noise Impacts under the UPRR/SR 99 Alternative without Mitigation for Design Year 2035

UPRR/SR 99 Alternative	Total Number of Impacts for Ballast & Tie Track		Total Number of Impacts for Slab Track	
	Moderate	Severe	Moderate	Severe
Impacts by Project Combination				
UPRR/SR 99 with West Chowchilla design option and Ave 24 Wye	1,247 residences, 7 hotels, 5 churches, 2 schools, 1 hospital	875 residences, 4 hotels, 2 churches, 1 park, 1 outdoor movie theater	1,458 residences, 7 hotels, 6 churches, 3 parks, 3 schools, 2 libraries, 1 cemetery	1,354 residences, 7 hotels, 4 churches, 1 school, 1 park, 1 outdoor movie theater, 1 hospital
UPRR/SR 99 with East Chowchilla design option and Ave 24 Wye	1,304 residences, 9 hotels, 6 churches, 2 schools, 1 hospital	852 residences, 4 hotels, 1 church, 1 park, 1 outdoor movie theater	1,590 residences, 8 hotels, 6 churches, 3 parks, 2 schools, 2 libraries, 1 cemetery	1,350 residences, 9 hotels, 4 churches, 1 school, 1 park, 1 outdoor movie theater, 1 hospital
UPRR/SR 99 with East Chowchilla design option and Ave 21 Wye	1,328 residences, 8 hotels, 6 churches, 2 schools, 1 hospital	776 residences, 6 hotels, 1 church, 1 park, 1 outdoor movie theater	1,647 residences, 8 hotels, 7 churches, 3 parks, 2 schools, 2 libraries, 1 cemetery	1,211 residences, 9 hotels, 3 churches, 1 school, 1 park, 1 outdoor movie theater, 1 hospital

UPRR/SR 99 Alternative	Total Number of Impacts for Ballast & Tie Track		Total Number of Impacts for Slab Track	
	Moderate	Severe	Moderate	Severe
Range of Impacts under the UPRR/SR 99 Alternative	**1,247 to 1,328 residences, 7 to 9 hotels, 5 to 6 churches, 2 schools, 1 hospital**	**776 to 875 residences, 4 to 6 hotels, 1 to 2 churches, 1 park, 1 outdoor movie theater**	**1,458 to 1,647 residences, 7 to 8 hotels, 6 to 7 churches, 2 to 3 schools, 3 parks, 2 libraries, 1 cemetery**	**1,211 to 1,354 residences, 7 to 9 hotels, 3 to 4 churches, 1 school, 1 park, 1 outdoor movie theater, 1 hospital**
Source: Authority and FRA (2010).				

Project noise levels for comparison depend on factors such as number of trains per day, speed, and track configuration. The conceptual operations schedule shows that up to 272 trains per day would pass through Madera and Fresno, in contrast with about 100 per day in Merced in 2035. Fewer trains at lower speeds would result in lower noise levels, and combined with fewer noise-sensitive land uses, would result in fewer noise impacts north of the wye. The large number of homes along the alignment in Madera and Fresno, along with higher train speeds and greater number of trains, would result in many more noise impacts in the southern section. In rural areas with low existing noise levels and no building shielding, impacts occur at greater distances from the alignment. More impacts result from slab track than ballast and tie track because of an assumed 3-dB increase in noise level from the HST on slab track. All alternatives would result in severe and moderate noise impacts from the project. In locations where train speeds and operations are high, severe noise impacts would be substantial under NEPA and moderate noise impacts would be moderate under NEPA. This evaluation is based on the information currently available. Project elements, such as the specific vehicle type, track structure and other elements, may change during engineering and design, resulting in changes to the noise assumptions and the results of the impact assessment. As project elements affecting noise either change or are refined, additional analyses will be conducted to reflect these changes.

Slab Track Construction Alternative

For slab track, Table 6.3-4 indicates that for the Ave 24 Wye design options east of Chowchilla, severe noise impacts are projected at 1,350 residences, 9 hotels, 4 churches, 1 school, 1 park, 1 outdoor movie theater, and 1 hospital. For the Ave 24 Wye design option west of Chowchilla, severe noise impacts are projected at 1,354 residences, 7 hotels, 4 churches, 1 school, 1 park, 1 outdoor movie theater, and 1 hospital. Under the Ave 21 Wye design option, severe noise impacts are projected at 1,211 residences, 9 hotels, 3 churches, 1 school, 1 park, 1 outdoor movie theater, and 1 hospital. The number of moderate impacts would vary among each of the design options.

In the Merced vicinity, no severe noise impacts are projected to occur. In the Chowchilla vicinity with the East Chowchilla design option, severe noise impacts are projected to occur at 136 residences, 2 hotels, and 1 church with the Ave 24 Wye design option and at 58 residences and 2 hotels with the Ave 21 Wye design option. With the West Chowchilla design option, 243 residences and 1 church would experience severe noise impacts. With the West Chowchilla design option, moderate noise impact would occur at Fairmead Elementary School.

In the Madera vicinity, severe noise impacts are projected at 734 residences, 3 hotels, Sierra Vista Elementary School, 1 hospital, 2 churches, and 1 outdoor movie theater. Moderate noise impact is projected at Washington Elementary School.

In the Fresno vicinity, severe noise impacts are projected to occur at 367 residences, 4 hotels, 1 church, and Roeding Park. Moderate noise impact is projected at Addams Elementary School.

With the Ave 24 Wye design option, severe noise impacts are projected at 113 residences in the area along the Ave 24 Wye with the East Chowchilla design option and at 10 residences with the West Chowchilla design option. With the Ave 21 Wye, severe noise impacts are projected at 52 residences in the area along the Ave 21 Wye.

Project Period Mitigation Measures

N&V-MM#3: Implement Proposed California High-Speed Train Project Noise and Vibration Mitigation Guidelines. Figures 3.4-18 through 3.4-21 of the EIR/EIS show the locations where the noise mitigation guidelines will be applied for ballast and tie track. Figures 3.4-22 through 3.4-25 of the EIR/EIS show the locations where the noise mitigation guidelines will be applied for slab track. Various options exist to address the potentially severe noise effects from HSTs. With input from local jurisdictions and balancing technological factors, such as structural and seismic safety, cost, number of affected receptors, and effectiveness, mitigation measures will be selected and implemented. For example, where moderate increases in noise affect receptors, noise-reducing measures could be implemented, even though not required. Conversely, in rural areas devoid of receptors where severe noise effects are anticipated, it might be appropriate and acceptable not to apply any noise-reducing treatments. The mitigation measure or suite of mitigation measures for severe noise impacts will be designed to reduce the noise level from HST operations from "severe" to "moderate" according to the provisions of the FRA noise and vibration manual (FRA 2005). The noise guidelines include the following mitigation measures:

- Install sound barriers. Depending on the height and location relative to the tracks, sound barriers can achieve between 5 and 15 dB of noise reduction. The primary requirements for an effective sound barrier are that the barrier must (1) be high enough and long enough to break the line-of-sight between the sound source and the receiver, (2) be of an impervious material with a minimum surface density of 4 pounds per square foot, and (3) not have any gaps or holes between the panels or at the bottom. Because many materials meet these requirements, aesthetics, durability, cost, and maintenance considerations usually determine the selection of materials for sound barriers. Depending on the situation, sound barriers can become visually intrusive. Typically, the sound barriers style is selected with input from the local jurisdiction to reduce the visual effect of barriers on adjacent lands uses. For example, sound barriers could be solid or transparent, of various colors, materials, and surface treatments.

- The maximum sound barrier height would be 14 feet for at-grade sections; however, all sound barriers would be designed to be as low as possible while still achieving a substantial noise reduction. Berm and berm/wall combinations are the preferred types of sound barriers where space and other environmental constraints permit. On aerial structures, the maximum sound barrier height would also be 14 feet, but barrier material would be limited by engineering weight restrictions for barriers on the structure. Sound barriers on the aerial structure should still be designed to be as low as possible while still achieving a substantial noise reduction. Sound barriers on aerial structures and at-grade could consist of solid, semitransparent, and transparent materials.

- Work with the communities to determine how the use and height of sound barriers would be determined using jointly developed performance criteria. Other solutions may result in higher numbers of residual impacts than reported herein. Options may be to reduce the height of sound barriers and combine barriers with sound insulation or to accept higher than the FRA's current noise thresholds.

- Install building sound insulation. Sound insulation of residences and institutional buildings to improve the outdoor-to-indoor noise reduction is a mitigation measure that can be provided when the use of sound barriers is not feasible in providing a reasonable level (5 to 7 dB) of noise reduction. Although

this approach has no effect on noise in exterior areas, it may be the best choice for sites where sound barriers are not feasible or desirable and for buildings where indoor sensitivity is of most concern. Substantial improvements in building sound insulation (on the order of 5 to 10 dB) can often be achieved by adding an extra layer of glazing to windows, by sealing holes in exterior surfaces that act as sound leaks, and by providing forced ventilation and air conditioning so that windows do not need to be opened. Establish performance criteria to balance existing noise events and ambient roadway noise conditions as factors for determining mitigation measures.

- Acquire easements on properties severely affected by noise. Another option for mitigating noise impacts is for the Authority to acquire easements on residences likely to be affected by HST operations in which the homeowners would accept the future noise conditions. This approach is usually taken only in isolated cases where other mitigation options are infeasible, impractical, or too costly.

N&V-MM#4: Vehicle Noise Specification. In the procurement of an HST vehicle technology, the Authority will require bidders to demonstrate that their offered technology constitutes "quietest available" technology that will emit a minimum of 3 dB less noise at 220 mph than the FRA model that was used for noise analysis in the EIR/EIS (i.e., the train technology that formed the basis for the EIR/EIS analysis). Depending on the available technology, this could significantly reduce the number of impacts throughout the corridor.

N&V-MM#5: Special Trackwork at Crossovers and Turnouts. Because the impacts of HST wheels over rail gaps at turnouts increases HST noise by approximately 6 dB over typical operations, turnouts can be a major source of noise impact. If the turnouts cannot be moved from sensitive areas, the project can use special types of trackwork that eliminate the gap.

N&V-MM#6: Additional Noise Analysis During Final Design. If final design or final vehicle specifications results in changes to the assumptions underlying the noise analysis, reassess noise impacts and recommendations for mitigation and provide supplemental environmental documentation, as required by CEQA and NEPA.

Project Period Significance

Table 6.3-5 shows the number and length of sound barriers for the Merced to Fresno Section alternatives that meet the noise mitigation guidelines for both ballast and tie and slab track construction alternatives for the UPRR/SR99 Alternative. Figure 3.4-27 through 3.4-30 in the EIR/EIS show the locations of proposed sound barriers along the HST alternatives for both ballast and tie and slab track construction alternatives. With slab track construction, noise levels prior to mitigation would be 3 dB higher than with ballast and tie track, so there would be more residual severe impacts behind sound barriers.

Table 6.3-5
Proposed UPRR/SR 99 Alternative Sound Barriers

HST Alternative	Number of Cost-Effective Barriers	Total Length of All Barriers (ft)	Number of Severe Impacts Eliminated[a]	Number of Severe Impacts Remaining
Ballast and Tie Track	6	35,900	751	0
Slab Track	14	72,700	1,257	18

[a] With the sound barrier, the noise effect is reduced from a severe to a moderate level.

The impacts with substantial intensity identified above are considered significant according to CEQ Regulation 1508.27.

With sound barriers as mitigation, the number of significant noise impacts could be reduced as the barriers would shield HST noise. With full implementation of the guidelines, most significant noise impacts would be eliminated. Severe noise effects would remain for some receptors because they are located outside of the area where the barrier is fully effective or the sound barrier does not fully mitigate the effect (i.e., noise is reduced by 5 dB but not below the severe threshold). Furthermore, severe noise effects would remain for receptors mitigated only with indoor sound insulation or when covered by noise easements.

Cumulative Construction Impacts

Construction would result in noise and vibration effects that would be managed and limited in duration. There are a few areas where SR 99 and other roadway improvements may result in cumulative construction noise and vibration impacts. It is likely that multiple projects would be under construction at the same time in the cities of Merced and Fresno, but construction on these projects would typically occur during daytime hours or with the addition of noise control measures to stay within required noise limits, and would be temporary. Because construction would typically occur during daytime hours and remain within required noise limits, cumulative noise impacts would have negligible intensity under NEPA.

Cumulative Construction Mitigation Measures

Mitigation measures for noise and vibration provided in Section 3.4.7 of the EIR/EIS and described above under Project Period Mitigation Measures will be implemented.

To minimize the potential cumulative effects of overlapping construction activities within the same area, the Authority would work with local jurisdictions to identify construction schedules of other nearby projects and coordinate construction and project activities. This may reduce cumulative construction noise impacts of multiple projects whose noise impacts may be individually minor but cumulatively considerable.

Significance of Cumulative Construction Impacts

The cumulative impact of the project and other reasonably foreseeable projects on noise during construction would have negligible intensity under NEPA because construction would typically occur during daytime hours and remain within required noise limits.

Cumulative Project Period Impacts

The noise analysis compares conditions under an HST alternative with the existing condition, which is conservative, because noise is expected to be higher with population growth and expanded highways. The alternative is located in an existing transportation corridor which has high noise levels caused by traffic and freight train operations, and the downtown areas of Fresno and Merced have high noise levels from multiple sources. Generally, noise levels would likely increase with the inclusion of the 2035 increases in population and accompanying development. Several planned and potential transportation projects are within the project corridor along the proposed UPRR/SR 99 Alternative alignment. The UPRR estimates that freight traffic may increase. However, these facilities (SR 99 and the railroads) would need to double their capacity to noticeably increase noise levels for the average person (i.e., an increase of 3 dBA).

The Roeding Regional Park and Fresno Chaffee Zoo Facility Master Plans (City of Fresno 2011) environmental review analysis lists the potential for significant cumulative noise impacts in conjunction with the HST alternative. Without mitigation, noise impacts resulting from new and expanded park uses

proposed in the master plan, in conjunction with the noise impacts resulting from the HST alternative in the vicinity of Roeding Park, would be impacts with substantial intensity under NEPA.

The HST System would operate more than 200 trains per day after full build-out of the HST System. In rural areas, where typical noise is approximately 60 dBA, passing trains would result in an average noise increase of 11 dBA. In urban areas, the increases would range from 0 to 7 dBA. Noise mitigation (e.g., sound attenuation walls) may be balanced with other objectives of more importance to the adjoining land uses, such as visual aesthetics and integration with the community context. Therefore, there is the possibility of residual severe noise effects during HST operations along the alignment and at the HST stations, which could be cumulatively considerable with other foreseeable projects in the area.

Without mitigation, cumulatively considerable noise and vibration impacts with substantial intensity would result from the project in conjunction with other planned projects, increased development associated with foreseeable projects, and the cumulative condition of the No Project Alternative. The UPRR/SR 99 Alternative has greatest potential for cumulative noise impacts due to the potential increases in noise from SR 99 and the UPRR railroad.

Cumulative Project Period Mitigation Measures

The primary form of noise mitigation for transportation projects is noise barriers. The project and the reasonably foreseeable highway improvements would not benefit from shared noise barriers because of the differences in profile and project location. There would be potential shared benefits, such as the HST guideway shielding traffic noise in locations where the tracks are on a berm. However, even with mitigation measures in place for individual projects, areas of cumulatively considerable noise impacts with substantial intensity are likely to remain.

Mitigation of land development projects associated with the No Project Alternative are likely to be required by local agencies. For example, if residential developments are built near transportation infrastructure, they will require shielding from noise sources. The counties and municipalities where the cumulative projects will occur have all adopted noise standards that require mitigation for significant noise impacts.

Significance of Project Period Cumulative Impacts

Cumulative impacts during operations may have areas of substantial effects under NEPA without mitigation. The combination of project specific mitigation and local mitigation requirements for the cumulative projects will reduce cumulative impacts to moderate intensity under NEPA and impacts will remain significant under CEQA.

6.2.6.2 Displacements

Affected Environment

The UPRR/SR 99 Alternative study area is primarily adjacent to the transportation corridors of the UPRR and SR 99. Of the approximately 60-mile-long alignment, about 40 miles would be in unincorporated parts of the counties, and about 20 miles would be within the incorporated cities of Merced, Madera, and Fresno. Within the unincorporated areas of the three counties, there are few residences and few community facilities or services.

The UPRR/SR 99 Alternative north-south alignment begins in the City of Merced, the county seat. The City of Merced is the economic and cultural hub for the county, where the dairy and agriculture industry are important components of the economy. Because of the agricultural land uses west and east of the city and the airport to the south, much of the growth in the City of Merced has occurred north of the downtown area, as directed by the city's general plan. As growth has occurred northward, areas of Downtown Merced have become vacant or underused.

The Merced to Fresno Section of the HST System is approximately 60 miles long (between the cities of Merced and Fresno) and crosses urban and rural lands. To comply with Authority guidance to use existing transportation corridors when feasible, the Merced to Fresno Section would be primarily sited adjacent to the existing UPRR and BNSF corridors. In some cases, engineering constraints and avoidance of environmental impacts require deviation from those corridors. In these cases, particularly in urban areas, there is a potential need for property acquisitions (and relocations) to construct the HST guideway, maintenance facilities, detours, overpasses, and associated structures.

A preliminary analysis shows that there would be impacts on mobile homes, senior housing facilities, and single-family and multifamily residences under all HST alternatives. Displacement impacts on parks, churches, day-care centers, city and county agencies, warehouse distribution centers, manufacturing facilities, and retail establishments would also occur under all HST alternatives.

Construction Period Impacts

The construction period of the project also includes purchasing of the right-of-way and testing of HST vehicles, in addition to the heavy construction (e.g., grading, excavating, and laying the HST railbed and guideway). Refer to Chapter 2, Alternatives, for information on the construction period timeframe. Although property acquisitions would occur prior to construction, the impacts would be permanent and are discussed in the Project Impacts sections below. The assumption that displacements would be permanent provides a conservative, worst-case estimate.

Project Period Impacts

In Fairmead, the UPRR/SR 99 Alternative would displace residents who likely could not relocate within the community because of the lack of available replacement housing; however, adequate replacement housing exists in Madera County and the nearby cities of Chowchilla and Madera. The elevated HST guideway adjacent to the community of Fairmead would cause a significant adverse visual impact on the community and could negatively affect property values at some residences. Although the alternative would not disrupt or sever community interactions or divide the community, impacts on community character would occur. The UPRR/SR 99 Alternative would be located in proximity to the Galilee Missionary Baptist Church, but would not require the acquisition of the church and would not result in noise impacts. Impacts on community cohesion in Fairmead would be of moderate intensity under NEPA because of the displacements and visual impacts and less than significant under CEQA because the project would not divide the community or displace a large number of houses and people.

Although the UPRR/SR 99 Alternative would more closely follow an existing transportation corridor than the other two build alternatives, that corridor would travel through the City of Madera and in an area that is heavily commercialized, which would result in a greater number of business displacements. The UPRR/SR 99 Alternative would have the lowest range of residential displacements, but the Hybrid alternative would result in almost the same number of residential displacements as the UPRR/SR 99.

Table 6.3-6 below provides a detailed breakdown of the number of displacements caused by each alternative and its associated routing options. The detailed breakdown is discussed in more detail in Section 8 as well. The table below provides an aggregated range of displacements.

Table 6.3-6
Displacement Impacts for All HST Alternatives

Resource Categories	Displacement Impacts by HST Alternative[a]			Explanation of Measured Impact
	UPRR/ SR 99 Alternative	Hybrid Alternative	BNSF Alternative	
Operation Community Impacts				
Displacements	185 to 222	196 to 226	207 to 238	Total Number of Residential Displacements
Displacements	281 to 286	210 to 218	214 to 228	Total Number of Business/Institution Displacements

With the UPRR/SR 99 Alternative, the majority of the residential and business displacements identified in the table above would occur in the cities of Merced, Madera, and Fresno. The remaining displacements would be in the City of Chowchilla and in rural, unincorporated portions of Merced and Madera counties, including Fairmead. Similar to the residential displacements, a majority of the business displacements would occur in the cities of Merced, Madera, and Fresno.

A preliminary analysis of replacement facilities confirmed that there are a sufficient number of suitable residential and business properties for nearly all displaced occupants in the cities of Atwater, Merced, Le Grand, Chowchilla, Madera, and Fresno, and in the rural areas of Merced and Madera counties. Within Merced County, Madera County, and the City of Fresno, approximately 3,900 residential properties are available of comparable price, size, and type. Within the cities of Merced, Chowchilla, Madera, and Fresno, there are 2,625 residential properties available (1,670 of those are in Fresno). In addition, residential properties are for rent in the cities of Merced, Madera, and Fresno that are comparable in price, size, and type. Because there are a sufficient number of suitable residential properties, no construction of replacement housing would be required.

Preliminary research also indicates that there is a sufficient supply of available sites in the counties to accommodate displaced businesses. Because of siting requirements and land availability constraints, agricultural enterprises, farm businesses, and specialized industries including quarries, granaries, and processor facilities may be unable to relocate or will require more time to relocate.

None of the HST alternatives would result in the displacement of a substantial number of residences that would necessitate the construction of replacement housing. Residential displacements would occur in all three counties and, as previously described, there are a suitable number of relocation opportunities.

For all three HST alternatives, most of the businesses that would likely be affected are within the alignment rights-of-way, including the HST station footprints. These businesses include auto dealerships, restaurants, gas stations, motels, businesses that serve the surrounding agricultural community, and industrial and warehouse facilities. The majority of the businesses that would be affected are located in the downtown areas of Merced, Madera, and Fresno. There are no business districts (e.g., a cluster of stores) within these downtown areas that would be negatively affected by the acquisitions. In the urban areas, where such businesses are located, the guideway would be elevated, minimizing the amount of required right-of-way to construct the project. It is also likely that some businesses would be able to relocate under the guideway after construction is complete, which would minimize impacts. In rural areas, the guideway would pass through agricultural land. The largest industries, based on the number of employees, in the three counties are associated with agriculture, services, and government.

In addition to the potential direct impacts on businesses, the HST alternatives may result in physical deterioration of areas if property values decline because of the project. Physical deterioration is not expected in the downtown areas of Merced and Fresno, because the HST stations would likely be a catalyst for new development and redevelopment in those areas. In areas where there is no HST station, such as downtown Madera, the elevated guideways could have a negative impact on businesses; however, as previously discussed, implementation of mitigation measures may result in beneficial effects for the downtown area. Refer to Appendix 3.13-B, Land Use and Communities, for additional information on the adjacent land uses and how development would not be precluded in these areas.

Project Period Mitigation Measures

The project would comply with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Uniform Relocation Act). The Uniform Relocation Act and its amendments provide mandatory rules and requirements on how federal, state, and local agencies compensate for impacts on property owners or tenants who need to relocate if they are displaced by a federally funded project. In addition, housing of last resort would be available, if required. Housing of last resort may require replacement housing payments that exceed the maximum amounts allowed under the Uniform Relocation Act or other methods of providing comparable decent, safe, and sanitary housing within the displaced person's financial means.

SO-MM#2: Develop a relocation mitigation plan. Before any acquisitions occur, the Authority will develop a relocation mitigation plan, in consultation with affected cities and counties. In addition to establishing a program to minimize the economic disruption related to relocation, the relocation mitigation plan will be written in a style that also enables it to be used as a public information document. The plan will be intended to meet the following objectives:

- Provide affected property and business owners and tenants a high level of individualized assistance in situations when relocation is necessary.
- Make a best effort to minimize the permanent closure of displaced businesses and non-profit agencies as a result of relocations.
- Within the limits established by law and regulation, minimize the economic disruption caused to tenants and residents by relocation.
- In individual situations where warranted, consider the cost of obtaining the entitlement permits necessary to relocate to a suitable location and take those costs into account when establishing the fair market value of the property.
- Provide those business owners who require complex permitting (such as dairies) with regulatory compliance assistance.

The relocation mitigation plan will include the following components:

- A description of the appraisal, acquisition, and relocation process that describes the activities of the appraisal and relocation specialists, for the benefit of the reader.
- A means of assigning appraisal and relocation staff to affected property owners, tenants, or other residents on an individual basis.
- Individualized assistance to affected property owners, tenants, or other residents in applying for funding, including research to summarize loans, grants, and federal aid available, and research of demographically similar areas for relocation.
- Creation of an ombudsman's position to act as a single point of contact for property owners, residents, and tenants with questions about the relocation process. The ombudsman would also act

to address property owners', tenants', and other residents' concerns about the relocation process as it applies to their situations.

Relocation Mitigation Plans are commonly used for large infrastructure projects that remove a large number of residences and businesses, such as this project, and are considered successful in minimizing the impact to individual property owners.

SO-MM#4: Implement measures to reduce impacts associated with the relocation of community facilities. Minimize impacts associated with the acquisition of the homeless shelter in Merced, which is affected by all alternatives, and Joe Stefani Elementary School, Merced Lao Family Community, Merced Senior Center, McCombs Youth Center, which are affected by the Castle Commerce Center HMF, by conducting outreach and coordinating with the facility prior to acquisition. Coordinate with the respective parties prior to land acquisition to reconfigure or relocate facilities, as necessary, to minimize disruption to activities. To reduce disruption to the use of these community facilities, the Authority will make sure that reconfiguring of land uses or buildings or relocating of community facilities is completed before the demolition of any existing structures. Work with the City of Merced and Merced City School District to facilitate the construction of the facilities prior to demolition of the existing structures. During the design process, the Outreach Team will conduct targeted outreach efforts for these facilities to understand and determine their needs for siting criteria. This mitigation measure will be effective in minimizing the impacts of the project by completing new facilities prior to relocation being necessary, and by involving affected facilities in the process of identifying new locations for their facilities.

SO-MM#6: Avoid displacements or consider housing options in Franklin-Beachwood, Le Grand, Fairmead, and rural areas. Displaced residents in these minority communities and rural areas may be unable to relocate within the same community because comparable replacement housing may not be available or limited at the time of acquisition. During property acquisition in these communities and rural areas, the Authority will consider all comparable replacement housing options to allow displaced residents to remain in their communities, including but not limited to the following:

- Construct new housing on vacant lots within the communities.
- For any large parcels, relocate the residential structure or structures on the property if that is feasible and would move them outside the project area.
- Move the residential structures to nearby vacant parcels.

This mitigation measure will be effective by minimizing the distances that residences or businesses have to relocate within these communities and by working to keep them within their current community.

Project Period Significance

At the regional level, the overall impacts of property acquisitions would be impacts of moderate intensity under NEPA and less than significant under CEQA because of the number of housing displacements within the three counties and there are a number of suitable relocation opportunities.

Impacts on agricultural enterprises, farm businesses, and specialized industries including quarries, granaries, and processor facilities would have substantial intensity under NEPA because relocation would be disruptive, and some businesses might not be able to relocate. The project's economic effects are not effects on the physical environment. Therefore, no significance determination is required under CEQA.

6.2.6.3 Farmland

Affected Environment

Section 3.14 of the EIR/EIS describes the regulatory setting and affected environment for agricultural lands and identifies potential project impacts on these lands and associated mitigation measures.

The Central Valley is the state's largest agricultural area. Many of the state's most agriculturally productive counties, including Merced and Madera counties, are in the Central Valley. Almonds are a key regional crop; 80% of the world's almonds come from California, primarily from the San Joaquin Valley. Approximately 1.2 million bee colonies pollinate the almonds during the 2- to 4-week pollination period (Almond Board of California 2007).

In addition to farmlands, California currently has 1,600 to 1,800 dairies; 80% of the dairies are in the Central Valley.

According to the most recent Census of Agriculture profile information for Merced County (USDA 2007), in 2007, a total of 2,607 farms occupied more than 1 million acres, with an average farm size of 399 acres. More than 51% of farmland was devoted to crops and about 44% was pasture (other uses accounted for about 4.5% of total farmland). In 2007, the county's agricultural product market value was more than $2 billion: 38% from crop sales and 62% from livestock sales. The largest crop acreages were devoted to forage, almonds, corn (for silage), vegetable crops, and cotton. In order of sales value, the most important agricultural commodities in Merced County are milk and other dairy products; fruits, tree nuts, and berries; poultry and eggs; vegetables, melons, and potatoes; and cattle.

In 2007, Madera County had 1,708 farms occupying nearly 700,000 acres, with an average farm size of 398 acres. Nearly 43% of farmland was devoted to crops and about 51% was pasture (other uses accounted for about 6% of total farmland). In 2007, the county's agricultural market value was more than $990 million: 63% from crop sales and 37% from livestock sales.

In 2007, Fresno County had 6,081 farms occupying more than 1.6 million acres of land, with an average farm size of 269 acres. More than 67% of farmland was devoted to crops and about 29% was pasture (other uses accounted for about 4% of total farmland). In 2007, the county's agricultural market value was more than $3 billion: 67% from crop sales and 33% from livestock sales.

According to the FMMP data, there are more than 2.3 million acres of Important Farmland in Merced, Madera, and Fresno counties combined (refer to Table 6.3-7 below). In addition, there are nearly 1.8 million acres of Grazing Land in the three counties. The FMMP defines Grazing Land as land that has existing vegetation that is suitable for livestock grazing (DOC 2004). Table 6.3-7 presents the total acreage of each category of Important Farmland and Grazing Land within Merced, Madera, and Fresno counties.

Table 6.3-7
Important Farmland and Grazing Land in Merced, Madera, and Fresno Counties

Type of Agricultural Lands	Merced County (acres[a])	Madera County (acres[a])	Fresno County (acres[a])
Prime Farmland	272,100	97,500	693,200
Farmland of Statewide Importance	153,200	85,100	439,000
Unique Farmland	104,400	164,000	94,200
Farmland of Local Importance	59,900	16,100	149,900

Type of Agricultural Lands	Merced County (acres[a])	Madera County (acres[a])	Fresno County (acres[a])
Total Important Farmland	589,600	362,700	1,376,300
Grazing Land	569,800	399,500	827,000
Total Agricultural Land	**1,159,400**	**762,200**	**2,203,200**

[a]Rounded to the nearest 100 acres.
Source: DOC (2008a).

Although each county in the project study area has policies to protect agricultural lands, according to the DOC farmland conversion reports, conversions of Important Farmland continue to occur. In Merced County, there was a net increase in Important Farmland acreage between 2000 and 2008; however, in 2008, county boundaries were redrawn between Fresno and Merced counties, which might have increased the Important Farmland acreage in Merced County. Madera and Fresno counties reported a reduction in Important Farmland acreage of 3% and 2%, respectively, during this period. Population growth and the associated pressure for rural "ranchettes" and urban development primarily drive the loss of Important Farmland; however, losses also can occur if land goes into habitat conservation or confined animal facilities. Gains in Important Farmland also can occur, for example, when grazing land goes into crop production (e.g., increased area planted to almonds). Nevertheless, one of the leading regions in the state that is losing Important Farmland to urban or other nonfarming uses is the San Joaquin Valley (DOC 2008b). Over time, construction of railroads, state highways, and local roads divided some farms, creating irregularly shaped parcels.

Either the Williamson Act or Farmland Security Zone contracts in Merced, Madera, and Fresno counties protect Farmland and Grazing Land. A higher proportion of protected land exists in Madera County than in Merced County, and no protected farmland exists in the northern portion of the City of Fresno. Protected farmlands also include lands zoned for agricultural use and lands with agricultural conservation easements. Most of the Important Farmland in the area is zoned for agriculture.

The majority of farms are family-owned and range from several hundred to several thousand acres. Often, large farm owners only farm a portion of the land themselves; others farm none. Large farm owners hire agricultural management and specialized service firms (e.g., for pesticide application, bee pollination, or harvesting). Farm infrastructure typically includes irrigation and drainage systems, field access roads, storage structures (e.g., silos and barns) power distribution systems, and residences.

Construction Period Impacts

Some agricultural land outside of the permanent right-of-way would be used for construction activities, such as staging and material laydown areas (see Table 3.14-7 of the EIR/EIS). This land would be leased from the landowner and used for approximately 1 to 3 years during construction. After construction, the land would be restored and returned to the owner.

Construction of the alignment alternatives and related improvements (e.g., road realignments) would affect productive farmland. Each farm maintains a system of onsite utilities needed for operations, such as irrigation systems (e.g., ditches, drains, pipelines, and wells), access roads, and power supplies which could be disrupted by the project during construction. Utility disruptions could jeopardize farm productivity and place some farmland at risk for conversion to nonagricultural use. Two confined animal facilities along the Ave 24 Wye have livestock holding areas within 100 feet of the edge of the alignment, and therefore livestock could experience noise levels in excess of 85 dBA 8-hour L_{eq}. For these two facilities, construction noise impacts could restrict the reasonable use of property within the impact area, and could affect productivity during periods where construction activities are occurring to the edge of the

HST right of way (e.g., to create drainage swales). These impacts also could occur in grazing land where cattle are present.

Construction of the project would generate noise and vibration from construction equipment and vehicles (e.g., clearing, grading, track installation). Noise levels from project construction are estimated to be 89 dBA L_{eq} at 50 feet for an 8-hour workday (refer to Section 3.4, Noise and Vibration). Some construction activities (e.g., clearing and grading) would occur to the edge of the alignment. Noise generated during construction could temporarily disturb livestock (such as dairy cows) near the HST alignment.

Construction Period Mitigation Measures

After construction, leased lands would be restored and returned to the owners. No other mitigation measures are proposed.

Significance of Construction Period Impacts

These impacts would have negligible intensity under NEPA and be less than significant under CEQA because the land would be used temporarily and restored; the land would not be permanently converted to a nonagricultural use. Because utility disruptions would likely be resolved during the right-of-way acquisition process, it is unlikely that it would result in the conversion of farmland to nonagricultural use; therefore, the impact would have negligible intensity under NEPA, and be less than significant under CEQA. The indirect noise and vibration impacts of construction on livestock would have negligible intensity under NEPA and be less than significant under CEQA because there would be sufficient distance between construction noise sources and livestock areas.

Project Period Impacts

Similar to the Hybrid Alternative, the UPRR/SR 99 Alternative would result in permanent conversion of agricultural land to nonagricultural use (including potential conversion from parcel severance), permanent access severance, conflicts with farmland protection contracts (e.g., Williamson Act), and indirect effects on dairies. The UPRR/SR 99 Alternative would not cause adverse wind effects on adjacent agricultural lands nor would they interfere with aerial spraying of the crops.

The project involves construction of the HST guideway and associated structures and facilities (e.g., paralleling stations and HMF access guideway) through areas with Important Farmland, permanently displacing agricultural uses on these lands. In addition, the UPRR/SR99 alternative would sever large agricultural properties, especially where the alternatives are not directly alongside existing transportation facilities. In many cases, severing the parcels would create two farmable parcels, and the only loss of Important Farmland would be caused by the HST facilities. In some cases, severing the parcels would create small remainder parcels. Depending on several factors such as adjacency to neighboring farms, access, and utilities (e.g., irrigation and power systems), these small remainder parcels might be farmable. For example, the parcels might be farmable if neighboring farms acquire them or if the utilities are reconfigured. Where this is not possible, however, it is unlikely that farming would continue. In cases where there is no discernable future use, these unusable remainder parcels are identified in this section as a farmland conversion. Analysts reviewed each affected parcel and considered usable and unusable remainders, and made preliminary recommendations for full or partial property acquisitions. The farmland conversion reported in the Project EIR/EIS reflects a 15% design level. The project also would affect Grazing Land.

Parcels required for the project that are under Williamson Act or FSZ contracts would be subject to property acquisition in accordance with the applicable provisions of these programs.

Local zoning codes and general plan policies also protect most of the Important Farmlands discussed above for agricultural use. Section 3.13 of the EIR/EIS , Station Planning, Land Use, and Development,

addresses the project's consistency with local zoning and general plan policies, including those for protection and preservation of agricultural land.

As discussed in Section 3.14 of the EIR/EIS, Agricultural Lands, HST would not cause adverse wind effects on adjacent farmland and indirect effects (e.g., interference with insect pollination, additional pesticide drift, on application restrictions) are not expected to result in additional farmland conversions.

The height of vertical HST structures, such as poles and elevated guideways, could interfere with aerial spraying of agricultural lands adjacent to the alignment. Because vertical HST structures are similar to existing utility structures in and near agricultural fields, changes in spraying patterns are unlikely to cause conversions of agricultural land.

Table 6.3-8 presents estimates of the permanent conversion of Important Farmland under the UPRR/SR 99 Alternative. The conversions are ranges that reflect the various design options. As shown in the tables that follow, the impacts of the UPRR/SR 99 Alternative are similar to those of the Hybrid Alternative. The precise impacts varies depending on the design alternative or variations of each alternative, but the range of impacts of the UPRR/SR 99 and the Hybrid alternative are very close; the differences are minor in the context of the magnitude of farmland impacts of the project. The UPRR/SR 99 Alternative also would affect Grazing Land, ranging from 66 acres with the West Chowchilla design option to 131 acres with the East Chowchilla design option (Ave 24 Wye).

Table 6.3-8
Farmland Types Potentially Affected by the UPRR/SR 99 Alternative

UPRR/SR 99 Alternative	Important Farmland				
	Prime Farmland (acres)[a]	Farmland of Statewide Importance (acres)[a]	Unique Farmland (acres)[a]	Farmland of Local Importance (acres)[a]	Total (acres)[a]
Impact of Components Combined					
UPRR/SR 99 Alternative North-South Alignment, West Chowchilla design option, with Ave 24 Wye	262	420	330	99	1,111
UPRR/SR 99 Alternative North-South Alignment, East Chowchilla design option, with Ave 24 Wye	286	356	286	100	1,027
UPRR/SR 99 Alternative, East Chowchilla design option, Ave 21 Wye	314	257	447	131	1,149
Total UPRR/SR 99 Alternative	262 to 314	257 to 420	286 to 447	99 to 131	1,027 to 1,149

[a]Acreage rounded to the nearest whole number.
Source: DOC (2008a).

Parcel severance and related impacts would be highest in the curves of the wye. The alignment in these areas potentially would sever approximately 52 large farm parcels along the Ave 24 Wye (East Chowchilla design option), 34 large farm parcels along the Ave 24 Wye (West Chowchilla design option), and 32

large farm parcels along the Ave 21 Wye. The UPRR/SR 99 Alternative would permanently close 20 to 30 roads, mostly along the wyes. Large farm equipment that is not street-legal might not be able to use the detours, overpasses, or underpasses along public roadways.

Table 6.3-9 from the EIR/EIS summarizes potentially affected Williamson Act and FSZ lands under the UPRR/SR 99 Alternative. Parcels in nonrenewal status (i.e., the landowners are not continuing their Williamson Act or FSZ contracts) are not counted.

Table 6.3-9
Protected Farmland Potentially Affected under the UPRR/SR 99 Alternative

Alternative	Williamson Act Land (acres)[a]	Number of Williamson Act Parcels	FSZ Land (acres)[a]	Number of FSZ Parcels
Impact of Components Combined				
UPRR/SR 99 Alternative North-South Alignment, West Chowchilla design option, with Ave 24 Wye	176	59	87	28
UPRR/SR 99 Alternative North-South Alignment, East Chowchilla design option, with Ave 24 Wye	130	46	50	19
UPRR/SR 99 Alternative, East Chowchilla design option, with Ave 21 Wye	270	82	61	27
Total UPRR/SR 99 Alternative	130 to 270	46 to 82	50 to 87	19 to 28

[a]Acreage rounded to the nearest whole number.
Source: DOC (2007, 2008c, and 2009).

The project would result in the conversion of land used for confined animal operations, ranging from less than 1 acre (East Chowchilla design option with Ave 21 Wye) to approximately 20 acres (West Chowchilla design option with Ave 24 Wye). Based on an overlay of the alignments onto existing dairy facilities, land conversion would impact the operations at three confined animal facilities along the Ave 24 Wye, one along the Ave 21 Wye, and two along the West Chowchilla design option. Some property acquisition would occur at all of these confined animal operations, but the loss of facilities is not anticipated to preclude continued operation. The remaining facilities at these sites would be located more than 100 feet away from the tracks, and therefore noise levels would not exceed the 100-dBA SEL threshold. In addition, two other confined animal facilities would be close to the alignment but no acquisition would be required. At these sites, noise levels would not exceed the 100-dBA SEL threshold because facilities would be more than 100 feet away from the tracks.

Project Period Mitigation Measures

Ag-MM#1 Preserve the Total Amount of Prime Farmland, Farmland of Statewide Importance, Farmland of Local Importance, and Unique Farmland (Section 3.14-7 of the EIR/EIS). The Authority will enter into an agreement with the DOC California Farmland Conservancy Program to implement the preservation of farmland. The Authority will fund the California Farmland Conservancy Program's work to identify suitable agricultural land for mitigation of impacts and to fund the purchase of agricultural conservation easements from willing sellers. The performance standards for this measure are to preserve Important Farmland in an amount commensurate with the quantity and quality of the converted farmlands, within the same agricultural regions as the impacts occur, at a replacement ratio of

not less than 1.5:1. The California Farmland Conservancy Program will work with local, regional, or statewide entities whose purpose includes the acquisition and stewardship of agricultural conservation easements.

The Authority and California Farmland Conservancy Program will develop selection criteria under this agreement to guide the pursuit and purchase of conservation easements. These will include, but are not limited to, provisions to ensure that the easements will conform to the requirements of Public Resources Code Section 10252 and to prioritize the acquisition of willing seller easements on lands that are adjacent to other protected agricultural lands or that would support the establishment of greenbelts and urban separators.

This mitigation measure would be effective given the nationwide and local success of farmland preservation programs using agricultural conservation easements and the experience of the DOC California Farmland Conservancy program.

Ag-MM#2 Consolidate Non-Economic Remnants (Section 3.14-7 of the EIR/EIS). The Authority will establish and administer a farmland consolidation program to sell remnant parcels to neighboring landowners for consolidation with adjacent farmland properties. In addition, the program will assist the owners of remnant parcels in selling those remnants to adjacent landowners, upon request. The goal of the program is to provide for continued agricultural use on the maximum feasible amount of remnant parcels that otherwise may be non-economic to farm. The program will focus on severed remainder parcels, including those that were under Williamson Act or Farmland Security Act contract at the time of right-of-way acquisition and have become too small to remain in the local Williamson Act or Farmland Security Act program. The program will assist landowners in obtaining lot line adjustments where appropriate to incorporate remnant parcels into a larger parcel that is consistent with size requirements under the local government general plan. The program will operate for a minimum of 5 years after construction of the section is completed.

The Authority and FRA expect that productive farmland would be farmed in some manner, and not left idle in perpetuity. However, the Authority and FRA recognize that constructing the Merced to Fresno HST Project will have a disruptive effect on farm ownership that would temporarily idle some remainder parcels. The intent of this mitigation measure is to take responsibility for the disruptive effects and proactively work to restore remainder parcels to productive agricultural use (and not rely on market forces to accomplish the same result).

Significance of Project Period Impacts

Mitigation measures identified above would ensure that land is preserved for agriculture and that non-economic remnant parcels are consolidated so that they would remain in agricultural production.

The UPRR/SR99 alternative would have impacts that would have negligible intensity from severing large farm parcels because severance of large parcels would not result in a permanent conversion of farmland to a nonagricultural use. There would be no impact because additional farmland conversion would not occur. Implementation of the UPRR/SR 99 alternative would result in the closure of several dairies and the acquisition of property from several other dairies. Because dairies are not classified as Important Farmland, there would be no loss of Important Farmland. Minor farmland conversion associated with replacement facilities would have no impacts with substantial intensity. HST operations would result in impacts from noise and vibration that would have negligible intensity on farm animals at two dairies and no impacts at other confined animal facilities. The HST-generated wind would not render agricultural land unusable for farming. Therefore, it would not result in an effect. Similarly, the HST vertical structures would not interfere with aerial application of pesticides and would not render agricultural lands unusable for farming. As a result, there would be no adverse impact from HST-generated wind.

Important Farmland losses would range from 1,027 acres to 1,149 acres and would be an impact with substantial intensity under NEPA and a significant impact under CEQA.

Cumulative Construction Period Impacts

Approximately 145 to 261 acres of Important Farmland would be leased for temporary use as laydown areas, staging areas, and concrete prefabrication yards during construction of the HST alternative. Construction of other past, present, and reasonably foreseeable projects could also result in the temporary conversion of farmland for construction-related uses. It is anticipated that this land would be restored and returned to agricultural use after construction is completed.

Cumulative Construction Period Mitigation Measures

No mitigation measures are proposed.

Significance of Cumulative Construction Period Impacts

Approximately 145 to 261 acres of Important Farmland would be leased for temporary use as laydown areas, staging areas, and concrete prefabrication yards during construction of the HST alternative. Construction of other past, present, and reasonably foreseeable projects could also result in the temporary conversion of farmland for construction-related uses. It is anticipated that this land would be restored and returned to agricultural use after construction is completed. Therefore, cumulative construction impacts on farmland would have negligible intensity under NEPA and no impact under CEQA.

Cumulative Project Period Impacts

Approximately 1% of the Important Farmland and Grazing Land in Merced, Madera, and Fresno counties was converted to nonagricultural uses between 2000 and 2006. This trend is expected to continue in the future because more urbanization would continue to occur under the No Project Alternative. By 2035, an additional 23,200 acres of farmland is projected to be converted to urban uses. Although conversion to urban uses in many cases is consistent with local plans and policies that identify areas for planned future growth, loss of Important Farmland is an impact with substantial intensity under NEPA. The HST alternatives would require the acquisition of up to approximately 1,450 acres of farmland, and conversion of farmland to nonagricultural uses is considered a cumulatively considerable impact.

The UPRR/SR99 Alternative would have a less than significant effect regarding Williamson Act conflicts. Most of the reasonably foreseeable projects identified are not under active Williamson Act contracts because they are within city spheres of influence that are planned for urbanization. Outside the sphere of influence of local jurisdictions, Williamson Act protections discourage the early conversion of agricultural lands. Although the Los Banos Bypass project would affect land contracted under the Williamson Act, those effects are not significant because the land required for the project would be removed from Williamson Act contracts, and the contracts would not be cancelled if minimum acreage requirements were met. Conflicts with Williamson Act contracts are not cumulatively considerable, and no additional mitigation is required. The cumulative condition with the project would result in a slightly greater conversion of farmland than the No Project Alternative.

The UPRR/SR99 Alternative could have a significant impact on agricultural lands, therefore contributing to a cumulatively significant impact. Impacts would result from direct conversion of agricultural lands to transportation uses, as well as indirect loss resulting from division of agricultural parcels. Impacts would be greatest in the Central Valley, such as along the Merced to Bakersfield Section, and least in the urbanized corridors, such as the San Francisco to San Jose Section.

Cumulative Project Period Mitigation Measures

The UPRR/SR99 Alternative would implement mitigation measures above to preserve the total amount of Prime Farmland, Farmland of Statewide Importance, Farmland of Local Importance, and Unique Farmland, thereby reducing cumulative impacts. However, even with the implementation of mitigation

measures, farmland impacts will remain impacts of substantial intensity under NEPA and significant under CEQA because of the large amount of farmland conversion.

Cumulative Project Period Significance

Approximately 1% of the Important Farmland and Grazing Land in Merced, Madera, and Fresno counties was converted to nonagricultural uses between 2000 and 2006. This trend is expected to continue in the future because more urbanization would continue to occur under the No Project Alternative. By 2035, an additional 23,200 acres of farmland is projected to be converted to urban uses. Although conversion to urban uses in many cases is consistent with local plans and policies that identify areas for planned future growth, loss of Important Farmland would be an impact with substantial intensity under NEPA and be cumulatively considerable under CEQA. The UPRR/SR99 Alternative would have a less than significant effect regarding Williamson Act conflicts. Most of the reasonably foreseeable projects identified are not under active Williamson Act contracts because they are within city spheres of influence that are planned for urbanization. Outside the sphere of influence of local jurisdictions, Williamson Act protections discourage the early conversion of agricultural lands. Although the Los Banos Bypass project would affect land contracted under the Williamson Act, those effects are not significant because the land required for the project would be removed from Williamson Act contracts, and the contracts would not be cancelled if minimum acreage requirements were met. Conflicts with Williamson Act contracts are not cumulatively considerable, and no additional mitigation is required. The cumulative condition with the project would result in a slightly greater conversion of farmland than the No Project Alternative.

The UPRR/SR99 alternative could have a significant impact on agricultural lands, therefore contributing to a cumulatively significant impact. Impacts would result from direct conversion of agricultural lands to transportation uses, as well as indirect loss resulting from division of agricultural parcels. Impacts would be greatest in the Central Valley, such as along the Merced to Bakersfield Section, and least in the urbanized corridors, such as the San Francisco to San Jose Section.

6.2.6.4 Cultural Resources

Because this project is a federal undertaking, Section 106 of the NHPA, 36 CFR 800.4(a)(1), requires establishing a project APE. The APE is the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist.

The California State Historic Preservation Officer concurred with the initial version Merced to Fresno Section APE on August 16, 2010, prior to the refinement of alternatives. The initial APE was defined as a band centered on the project alternatives, expanding approximately 250 feet on either side of the centerline. The APE included the footprint of actual facilities that would be built (e.g., tracks, stations, switchyards, and maintenance facilities). Following SHPO concurrence with the initial versions of the archaeological and built environment APEs, alternatives were refined and revised. The revised built environment APE was prepared in accordance with the guidance included within Attachment B of the PA. Updated APEs based upon current designs and impacts were prepared and submitted for review and SHPO subsequently concurred with the revised APEs. All cultural resources studies to support this document (HPSR, HASR, and ASR [Authority and FRA 2012a,b,c, respectively]) were undertaken within the updated APEs. See Section 3.17.3.1 of the EIR/EIS for additional information.

<u>Affected Environment (Archaeological)</u>

There are 13 significant and/or potentially significant archaeological resources within the boundaries of the APEs for the three build alternatives. Five of these sites were previously recorded, three are newly identified sites, and five are archaeologically sensitive areas identified as areas of concern through consultation with property owners and with Native American contacts.

Construction Cultural Resources Impacts (Archaeological)

Soil excavation or compaction resulting from the use of heavy machinery, installation of improvements, and installation or relocation of utilities and infrastructure on the construction site itself or in staging areas may affect the integrity of artifact-bearing deposits associated with known and as-yet undiscovered archaeological sites within the APE. Common to all alternatives, unknown or unrecorded archaeological resources, including subsurface buried archaeological deposits, may exist, but are currently unknown. Construction areas related to ground disturbance could contain both recorded and unknown archeological resources. Disturbance and removal of archaeological resources could result in adverse effects on archaeological resources under Section 106 and could cause substantial adverse changes in the significance of an archaeological resource pursuant to Section 15064.5 and is therefore considered an impact with substantial intensity under NEPA and a significant impact under CEQA.

The UPRR/SR 99 Alternative has the potential to affect up to 11 archaeological sites and/or archaeologically sensitive areas (8 on the north-south alignment, 1 on the wye alignment, and 2 on the HMF site). These 11 resources include 5 archaeological sites (P-24-001862, P-24-001676/CA-MER-381/H, P-24-001686/CA-MER-383, P-20-002064/CA-MAD-2064H, P-20-002122/CA-MAD-2121H) that have been previously documented in the UPRR/SR 99 Alternative APE, all of which are either eligible or potentially eligible for NRHP listing and may be affected by ground-disturbing activities during construction of the north-south alignment. In addition, two archaeological sites and four archaeologically sensitive areas that may be eligible for NRHP listing were documented within the UPRR/SR 99 Alternative during this survey. These include archaeological sites HST-H-JL-01 and HST-H/P-TC-01. The four archaeologically sensitive areas include two potential ethnographic villages, one potential burial site, and the Rotary Park area.

In addition, the UPRR/SR 99 Alternative makes multiple stream or river crossings, which are assessed to be sensitive for prehistoric archaeological resources not previously identified. All of these resources or potential resources are subject to construction period impacts, which would be considered an adverse effect under Section 106; an impact with substantial intensity under NEPA; and a significant impact under CEQA.

Construction Cultural Resources Mitigation Measures (Archaeological)

Protective measures, such as archaeological site capping, and recordation of resources would take place prior to construction; other protective measures such as monitoring for archaeological resources during ground-disturbing activities would occur during construction.

- Arch-MM#4: Conduct Archaeological Monitoring in Proximity to Identified Sites or Areas of Sensitivity--Ground-disturbing activities that have the potential to affect archaeological remains may occur in areas that have been identified as either the location of a known archaeological site, or in an area known to be sensitive for the presence of buried cultural resources. The Authority will retain the services of a qualified archaeological monitor who will be present during all ground-disturbing construction activities occurring in native sediments/soils. In the event that cultural resources are exposed during construction, the monitor will temporarily halt activities in the immediate vicinity of the discovery as discussed in MM # 2. If the archaeologist determines that the cultural resources are unique as defined by Section 21083.2 of CEQA, then the archeologist will conduct additional excavations to avoid impacts on these resources as described in MM#2 above See Section 3.17.6.1 of the EIR/EIS for additional details.

- Arch-MM#1: Conduct Archaeological Training--Prior to ground-disturbing activities within the project alternatives, a qualified professional archaeologist, who meets the SOI's Standards for Archaeology, will develop a training program and printed material to be presented to construction personnel. The purpose of this training and accompanying materials will be to familiarize construction personnel with the relevant legal (Section 106/NEPA) context for cultural resources of the project and with the types of cultural sites, features, and artifacts that could be uncovered during construction activities. These

training sessions will be conducted prior to commencing construction within discrete portions of the project alternatives or as needed as construction crews and supervisors may change.

- Arch-MM#2: Halt Work in the Event of an Archaeological Discovery-- If any cultural resources are discovered during ground-disturbing activities, all work within 50 feet of the resources will halt, and the project proponent will consult with a qualified archaeologist to assess the significance of the find under Section 106 and Section 21083.2 of CEQA , and any work may proceed on other parts of the project site while mitigation for historical resources or unique archaeological resources is being carried out. An Unanticipated Discoveries Plan has been developed, in coordination with the consulting parties, to detail the specific procedures to be followed if archaeological materials are found during construction. The California State Lands Commission (CSLC) will be notified if the find is a cultural resource on or in the submerged lands of California, consequently under the jurisdiction of the CSLC. The project proponent will comply with all applicable rules and regulations promulgated by CSLC with respect to cultural resources located in submerged lands, and in accordance with the PA.

- If human remains are encountered, the project proponent will comply with applicable laws and regulations regarding notification and disposition of the remains. If the coroner determines that the remains are Native American, the coroner will notify the NAHC under Health and Safety Code 7050.5.

- If any find is determined to be significant Section 106 or unique under Section 21083.2 of CEQA , the project proponent and the archaeologist will meet to determine the appropriate avoidance measures or other appropriate treatment in conjunction with the SHPO and the MOA signatories. In considering any suggested treatment proposed by the consulting archaeologist to further reduce or avoid impacts on historical resources or unique archaeological resources, a determination will be made whether avoidance is necessary and feasible in light of factors such as the nature of the find, project design, costs, and other similar considerations. All significant cultural materials recovered will be, as necessary and at the discretion of the consulting archaeologist, subject to scientific analysis, professional museum curation, and documentation according to current professional standards as determined in the project MOA. Unless the archaeologist determines that the archaeological resource is "unique" under CEQA or of greater interpretive use than research significance, then an archaeological data recovery program shall be implemented to address the resources in a manner that meets the requirements of Section VI(c)(1) of the Programmatic Agreement, and Section 21083.2 of CEQA

  See Section 3.17.6.1 of the EIR/EIS for additional details.

- Arch-MM#3: Plan an Intentional Site Burial Preservation In-Place.--If project engineering concludes that avoidance is not feasible, a process to determine whether the site can be preserved through intentional site burial will be considered. When complete avoidance is not possible, preservation in-place is the preferred form of mitigation for an "historical resource of an archaeological nature" because it retains the relationships between artifact and context, and may avoid conflicts with groups associated with the site. If intentional site burial in place is necessary, the contracted archaeologist will, in addition to the formal delineation of the site boundaries, prepare and implement a design plan to dictate the conditions of the intentional site burial according to the requirements and recommendations of A Technique to Protect Against National or Mechanical Loss (Thorne 1991).See Section 3.17.6.1 of the EIR/EIS for additional details.

Significance Construction Impacts Cultural Resource (Archaeological)

The impacts with substantial intensity identified in Section 3.17.4.5 of the EIR/EIS and summarized above are considered significant because they have the potential to adversely affect a cultural resource, a term used in this NEPA impact subsection and based upon the definition in CEQ 1508.27.

Soil excavation or compaction demolition, degradation, or unearthing resulting from the use of heavy machinery on the construction site itself or in staging areas may affect the integrity of artifact-bearing deposits associated with known and as yet undiscovered archaeological sites. These impacts would be significant because an archaeological site that has lost its depositional integrity can no longer provide new information with which to formulate a better understanding of prehistory or history.

Creating the potential for archaeological deposits to be revealed, exposing them to potential looting, more traffic, and compaction would also be a significant impact because the loss of some or all of the artifacts from a site prevents us from a complete understanding of the human activities carried out at that site. The affected archaeological site can therefore no longer provide an accurate picture of the past, nor contribute to a better understanding of prehistory or history.

As discussed in Section 3.17.3.4 of the EIR/EIS, although actions determined to have an adverse impact under NEPA may be mitigated and have a lesser effect, for Section 106, the effect determination remains adverse even when mitigated.

Affected Environment (Architectural History and Historical Properties and Resources)

Forty-seven significant historic architectural resources have been identified within the APE. Of these resources, 20 within the APE were listed, have been determined eligible for listing, or appear to be eligible for listing in the NRHP, pending SHPO concurrence. These 20 historic properties are also considered to be historical resources for the purposes of CEQA. The remaining 27 historic architectural resources do not meet the NRHP criteria, but are considered historical resources for the purposes of CEQA. All of these resources are reported in the HPSR (Authority and FRA 2012a), as required in the PA. The 47 historic architectural resources that are either historic properties (Section 106) or historical resources (CEQA), or both, are shown in Table 3.17-6 of the EIR/EIS.

Construction Cultural Resources Impacts (Architectural History and Historical Properties and Resources)

The activities that cause impacts on historical properties and resources are typically associated with the construction of the project: disturbance of the ground, the material or physical alteration of the built environment, or the alteration of the visual setting. Construction activities may cause impacts on cultural resources and can include excavation, staging, heavy equipment usage and movement, drilling, demolition, or relocation, as well as increases in noise or vibration levels, or introduction of new visual elements.

One common potential adverse effect or change is construction noise and vibration; therefore, the project will develop avoidance mitigation to make sure that there would be no indirect adverse effects or indirect substantial adverse change to any historic properties (Section 106) from noise or vibration caused by construction activities for any of the Merced to Fresno Section alternatives. Vibration from impact pile-driving during construction could cause the physical destruction, damage, or alteration of historic properties if the pile-driving is within 25 to 50 feet of the building. The development of alternative construction methods at these locations would avoid adverse effects on historic properties (Section 106). Preconstruction surveys conducted at locations within 50 feet of piling would document existing condition of buildings in case there is an issue during or after construction.

Construction noise also has the potential to cause adverse effects or substantial adverse change to historic properties. Historic properties that are sensitive to noise include resources like residences, parks, libraries, museums, and schools. These types of resources have an inherent quiet nature that is part of their identification as well as their significance. As a precaution, the project would develop avoidance mitigation to avoid adverse effect or substantial adverse change resulting from such construction noises such as impact pile-driving, jackhammering, and truck loading and operations. Avoidance mitigations would include alternative measures, such as low-noise emission equipment and noise-deadening for trucks.

Nine eligible for the NRHP historic resources would be directly or indirectly adversely affected or experience substantial adverse change from construction activities associated with the UPRR/SR 99 Alternative.

The UPRR/SR 99 Alternatives would cause *direct adverse effects* under Section 106 and impacts with substantial intensity under NEPA on the following 4 NRHP eligible properties:

- Robertson Blvd. Tree Row (#14) is in the direct path of both the Ave 24 and Ave 21 wyes. Construction would result in the physical demolition, destruction, damage, or substantial alteration of this linear resource between the two wyes. As a result, the proposed project would cause direct adverse effects under Section 106 and impacts with substantial intensity under NEPA.
- Weber Avenue Overcrossing (#17) is in the direct path of the HST alternative. Construction would result in the physical demolition, destruction, damage, or substantial alteration of the resource. As a result, the proposed project would cause direct adverse effects under Section 106 and impacts with substantial intensity under NEPA.
- Belmont Avenue Subway and Traffic Circle (#18) is in the direct path of these alternatives, which share a common alignment in this location. Construction would result in the physical demolition, destruction, damage, or substantial alteration of the resource. As a result, the proposed project would cause direct adverse effects under Section 106 and impacts with substantial intensity under NEPA.
- The Madera Southern Pacific Railroad Station: APN 007-101-016 (#11) is in the direct path of this alternative, and its construction would result in the physical demolition, destruction, damage, or substantial alteration of the resource. As a result, the proposed project would cause direct adverse effects under Section 106 and impacts with substantial intensity under NEPA.

The UPRR/SR 99 Alternative would cause an *indirect adverse effect* under Section 106 and an impact with moderate intensity under NEPA on the following 4 NRHP eligible properties:

- Roeding Park: APN 450-020-08 (#16) is immediately adjacent to these alternatives, which share a common alignment in this location. Construction would introduce new visual elements that would diminish the integrity of the significant features of this property. As a result, the proposed project would cause an indirect adverse effect under Section 106, an indirect substantial adverse change under CEQA, and an impact with moderate intensity under NEPA. Mitigation options are addressed in further detail in Section 3.15, Parks, Recreation, and Open Space.
- Southern Pacific Railroad Depot: APN 467-030-31 (#31) is located immediately adjacent to these alternatives, which share a common alignment in this location. The project in this location includes construction of a Tulare Street overcrossing that would be adjacent to the southern side of the resource. Construction would introduce new visual elements that would diminish the integrity of the significant features of this property. As a result, the proposed project would cause an indirect adverse effect under Section 106, an indirect substantial adverse change under CEQA, and an impact with moderate intensity under NEPA. The project in this location also includes an option for an undercrossing at Tulare Street and this option would have no adverse effect on this property.
- Bank of America: APN 467-074-01 (#35) is located adjacent to the Tulare Street overcrossing, which includes roadway changes associated with the project. The construction of roadway overpasses within 15 feet of the resource would introduce new visual elements that would diminish the integrity of the significant features of this property. As a result, the proposed project would cause an indirect adverse effect under Section 106, an indirect substantial adverse change under CEQA, and an impact with moderate intensity under NEPA. The project in this location also includes an option for an undercrossing at Tulare Street and this option would have no adverse effect on this property.

- Valley Feed & Fuel Co. (this effect is unique to the UPRR/SR 99 Alternative): APN 007-101-020 (#12) is located immediately adjacent to this alternative, which is elevated through Downtown Madera. Construction of an elevated alignment where structures of this scale do not currently exist would introduce new visual elements that would diminish the integrity of the significant features of this property. As a result, the proposed project would cause indirect adverse effects under Section 106 and impacts with moderate intensity under NEPA. Roeding Park: APN 450-020-08 (#16) is immediately adjacent to these alternatives, which share a common alignment in this location. Construction would introduce new visual elements that would diminish the integrity of the significant features of this property. As a result, the proposed project would cause an indirect adverse effect under Section 106 and a impact with moderate intensity under NEPA. Mitigation options are addressed in further detail in the Parks, Recreation, and Open Space Section of this document.

Construction Cultural Resources Mitigation Measures (Architectural History and Historical Properties and Resources)

Protective measures, such as building stabilization, and recordation of historical resources would take place prior to construction; other protective measures such as vibration monitoring for built historical resources would occur during construction.

- **Hist-MM#1:** Avoid Adverse Construction Vibration Effects--The HST Project will incorporate construction methods (examples are listed below) to avoid indirect adverse effects or indirect substantial adverse change to any historical properties and resources under Section 106 and CEQA from vibration caused by construction activities. Vibration from impact pile-driving during construction could cause the physical destruction, damage, or alteration of historic properties or historical resources if the pile-driving is within 25 to 50 feet of the building. Because this impact pile-driving could cause adverse effects or substantial adverse changes, alternative construction methods causing less than 0.12 peak particle velocity of one inch per second (0.12 PPV in/sec) measured at the receptor would be incorporated for construction activities near historic properties or historical resources if they are determined to be extremely susceptible to vibration damage. If piling is more than 50 feet from buildings, or if alternative methods such as push piling or auger piling can be used, damage from construction vibration would be avoided. Preconstruction surveys conducted at locations within 50 feet of piling would document existing condition of buildings for comparison to during or after construction conditions. All performance standards set forth in FRA's *High Speed Ground Transportation Noise and Vibration Impact Assessment* (2005) for noise and vibration impact evaluations, and set forth in the Built Environment Treatment Plan (BETP) for avoidance of adverse vibration effects on exiting historical properties and resources will be implemented to minimize and mitigate noise and vibration impacts. See Section 3.17.6.2 of the EIR/EIS for additional information.

- **Hist-MM#2:** Develop Protection and Stabilization Measures—Historical Properties and resources subject to this mitigation measure include any that are potentially physically affected, and/or relocated, and/or in close enough proximity to construction of UPRR Alternative improvements to require protection. This mitigation will be used to confirm that adverse effects on historical properties/historical resources will be either avoided entirely, or minimized to the extent possible. This mitigation will be developed in consultation with the landowner and land-owning agencies, as well as the SHPO and the MOA signatories, as required by and in accordance with the standards set forth in the PA. Such measures may include one or more of the following, but will not be limited to: vibration monitoring of construction in the vicinity of historical properties and resources; cordoning off of resources, such as traffic, equipment storage, and personnel, from construction activities; shielding of resources from dust or debris; and stabilization of buildings adjacent to construction. For buildings that are to be moved (see MM#3), such measures will include stabilization of buildings and structures before, during, and after relocation; protection of buildings and structures during temporary storage; and relocation at a new site and during subsequent rehabilitation. Moving buildings could result in minor impacts on air emissions from equipment and vehicles and minor

effects on developed or undeveloped sites. See Section 3.17.6.2 of the EIR/EIS for additional information.

- **Hist-MM#3:** Minimize Adverse Effects through Relocation of Historic Structures--The BETP identifies historical properties/historical resources that will be relocated to help avoid destruction and minimize the direct adverse effect of their physical damage or alteration. The plan for relocation will be developed, and implementation of relocation will take place prior to construction. The relocation of the historical properties/historical resources will take into account the historical site and layout (i.e., the orientation of the buildings to the cardinal directions), as well as their potential re-use. All structures will be thoroughly recorded in a Historic Structure Report (HSR), and the relocation plan will provide for stabilization of the structures before, during, and after the move. The relocation plan will be developed pursuant to and will implement all appropriate best practices applicable to the historical resource and/or property being relocated. See Section 3.17.6.2 of the EIR/EIS for additional information.

- **Hist-MM#5:** Prepare and Submit NRHP Nominations--Specific historic properties/historical resources identified for nomination to the NRHP Program of the National Park Service (NPS). Properties subject to this mitigation will be treated in consultation with the landowner, or land-owning agencies, and the lead agency. Current photographs of the property used in the nomination(s) will be taken prior to the start of project construction. The nomination document may also use other current and/or historic images prepared as part of other mitigation activities. See Section 3.17.6.2 of the EIR/EIS for additional information.

- **Hist-MM#6:** Prepare and Submit CRHR Nominations--Specific historical resources shall be identified for nomination to the CRHR Program at the California OHP consistent with best practices within the professional historic preservation community. Current photographs of the resource used in the nomination(s) will be made prior to the start of construction. The nomination document may also use current and/or historic images prepared as part of other mitigation activities. See Section 3.17.6.2 of the EIR/EIS for additional information. Nominated resources will be protected pursuant to the mitigation measures specified in this document for existing and already listed historical properties and resources.

- **Hist-MM#7:** Prepare and Submit Historic American Building Survey (HABS)/Historic American Engineering Record (HAER)/Historic American Landscape Survey (HALS) Documentation--Specific historical resources that would be physically altered, damaged, relocated, or destroyed by the project in compliance with the HABS/HAER/HALS programs. Consultation with the SHPO, NPS, and the consulting parties will be required if any of the resources must be documented to these standards. Prior to the start of construction, in consultation with the Western Regional Office of the NPS, Oakland, California, large-format (4-inch by 5-inch, or larger, negative-size) black and white photographs will be taken of these historic properties/historical resources showing them in context, as well as details of character-defining features. It is anticipated that the recordation of historic properties will be completed to Level II HABS written data standards, and will include archival and digital reproduction of historic images, plans, and drawings, if available. Copies of the documentation will be offered to the appropriate local governments, historical societies and agencies, and libraries. The documentation will also be offered in printed and electronic form to any repository or organization upon which SHPO, the Authority, and local agency with jurisdiction over the property, through consultation, may agree. See Section 3.17.6.2 of the EIR/EIS for additional information.

- **Hist-MM#8:** Prepare Historic Structure Reports--Historic properties/historical resources that would be physically altered, damaged, or relocated that would be subject to an HSR have been identified in the BETP. The HSR for these resources will be prepared prior to the start of construction. The HSR will follow the general guidelines for such reports as described in the California OHP publication, "Historic Structure Report Format" (OHP n.d.). The scope of each HSR will be developed in consultation with the land-owning agencies, the SHPO, and appropriate consulting parties. The HSR

will include documentation of existing landscaping, if appropriate. The HSRs may be used in the ongoing planning process and re-use of the properties, and may be coordinated with the other mitigation documentation activities, such as HABS/HAER records. See Section 3.17.6.2 of the EIR/EIS for additional information.

- **Hist-MM#9:** Prepare Interpretive Exhibits--Some historic properties/historical resources may be identified for historic interpretation. Interpretive exhibits will provide information regarding the specific historic property or historical resource. The interpretive exhibits will utilize images, narrative history, drawings, or other material produced for the mitigation described above, including the HABS/HAER reports, NRHP and CRHR nominations, or other archival sources, and will be consistent with Best Practices within the professional historic preservation community based on the type of historical resources addressed. The interpretive exhibits may be in the form of, but are not limited to, interpretive display panels and/or printed material for dissemination to the public. The interpretive exhibits may be installed at local libraries, historical societies, or public buildings.

  All historic properties/historical resources demolished by the project will be the subject of informative permanent metal plaques that will be installed at the site of the demolished historic property, or at nearby public locations. The plaques will provide a brief history of the property, its engineering/architectural features and characteristics, and the reasons for and date of its demolition. See Section 3.17.6.2 of the EIR/EIS for additional details.

- **Hist-MM#10:** Plan Repair of Inadvertent Damage--The BETP provides a plan for the repair of inadvertent damage to historical properties/historical resources. The plan has been developed prior to construction, and states that damage resulting from the project to any of the historical properties/historical resources near construction activities will be repaired in accordance with the SOI's Standards for Rehabilitation. The HSR, and/or HABS/HAER, recordation will photographically document the condition of historic properties/historical resources prior to the start of construction to establish the baseline condition for assessing damage. A copy of this photographic documentation will be provided to the landowner or land-owning agencies. Prior to implementation, plans for any repairs to historic properties will be submitted for SHPO review and comment to verify conformance with the SOI's Standards for Rehabilitation. See Section 3.17.6.2 of the EIR/EIS for additional information.

Significance of Construction Cultural Resources Impacts (Architectural History; Historical Properties and Resources)

The impacts with substantial intensity identified in Section 3.17.4.5 of the EIR/EIS and summarized above are considered significant because they have the potential to adversely affect a cultural resource, a term used in this NEPA impact subsection and based upon the definition in CEQ 1508.27.

Physical impacts such as material or structural alteration, especially demolition of an NRHP-listed or eligible historic property, would be an impact with substantial intensity under NEPA. These direct impacts would be significant because the impacts could directly alter the physical integrity, use, or setting. As a result, the historic property may no longer be able to convey its significance through its physical characteristics and, therefore, may no longer be eligible for the NRHP.

Introduction of new visual elements or alteration of the visual setting when it is part of the property's integrity would result in an impact with moderate intensity under NEPA because the historic property may no longer be able to convey its significance and, therefore, may no longer be eligible for the NRHP.

Construction or operational noise that impacts historic properties that have an inherent quiet nature that is part of their identification as well as their significance would cause impacts with moderate intensity under NEPA because they would permanently degrade the elements that make the historic property eligible for the NRHP.

To the extent that visual effects and vibration could degrade the elements that make the resource eligible, these long-term effects would be adverse and of moderate intensity.

As discussed in Section 3.17.3.4 of the EIR/EIS, although actions determined to have an adverse impact under NEPA may be mitigated and have a lesser effect, for Section 106, the effect determination remains adverse even when mitigated. Table 6.3-10 below contains the CEQA significance determinations before and after mitigation.

Table 6.3-10
Summary of Significant Cultural Impacts and Mitigation Measures

Impact	CEQA Level of Significance before Mitigation	Mitigation Measure	CEQA Level of Significance after Mitigation
Arch#1: Effect on Significant Prehistoric and Historic-Era Archaeological Resources During Construction UPRR/SR 99 would affect 11 resources	Significant	**Arch-MM#1:** Conduct Archaeological Training; **Arch-MM #2:** Halt Work in the Event of an Archaeological Discovery; **Arch-MM#3:** Plan an Intentional Site Burial Preservation In-Place; **Arch-MM#4:** Conduct Archaeological Monitoring in Proximity to Identified Sites or Areas of Sensitivity	Less than Significant
Hist#1: Effect on Historically Significant Built-Environment Resources During Construction The UPRR/SR 99 Alternative would adversely affect up to 9 resources listed or eligible for the NRHP (Section 106) and 6 historical resources (CEQA).	Significant	**Hist-MM#1:** Avoid Adverse Vibration Effects; **Hist-MM#2:** Develop Protection and Stabilization Measures; **Hist-MM#3:** Minimize Adverse Effects through Relocation of Historic Structures; **Hist-MM#4:** Minimize Adverse Noise Effects; **Hist-MM#5:** Prepare and Submit NRHP Nominations; **Hist-MM#6:** Prepare and Submit CRHR Nominations; **Hist-MM#7:** Prepare and Submit HABS/ HAER/ HALS Documentation; **Hist-MM#8:** Prepare Historic Structure Reports; **Hist-MM#9**: Prepare Interpretive Exhibits;	Significant and Unavoidable

Impact	CEQA Level of Significance before Mitigation	Mitigation Measure	CEQA Level of Significance after Mitigation
		Hist-MM#10: Plan Repair of Inadvertent Damage	
Hist#2: Effect on Historically Significant Built-Environment Resources During Operation The UPRR/SR 99 Alternative would indirectly adversely affect 2 resources listed or eligible for the NRHP (Section 106) and 0 historical resources (CEQA).	Significant	**PK-MM#4:** Address Noise at Roeding Park with City of Fresno **Hist-MM#4:** Minimize Adverse Noise Effects	Less than Significant with mitigation. It is possible that the City of Fresno would view the projected noise levels as acceptable and preferable to the implementation of mitigation measures. In this case, the impacts on Roeding Park, both as a park and a historic resource, would remain significant under CEQA.

Project Period Archaeological Impacts

Archaeological sites would only be subject to adverse effects during construction activities for the UPRR/SR 99 Alternative, but not during operations. Increasing public access to archaeological sites during operations could lead to their intentional or unintentional disturbance or destruction by people who previously would not have been able to enter the property where the site is located. However, the HST alternatives, including the UPRR Alternative, would not create new access for any areas that contain archaeological resources. In remote areas, the guideway would be fenced; therefore, it would not provide access for persons to loot sites and would not expose sites to the adverse effects of compaction through pedestrian or vehicular traffic. Because the HST System for the UPRR/SR 99 Alternative would allow only maintenance persons or vehicles within the operating corridor, it is unlikely that operation of the HST would affect archaeological sites. The related roadway modifications would not cause more traffic near identified archaeological sites. There is a possibility for new sites to be discovered during construction of the UPRR Alternative, but these would be managed under supervision of a trained archaeologist in accordance with the Section XI of the PA, which details the procedures to be implemented in the event of an unanticipated discovery. The PA is included in Appendix 3.17-A of the EIR/EIS. Therefore, project operation would not result in effects on archaeological resources under NEPA or CEQA. The impact during operations would have negligible intensity under NEPA and would be less than significant under CEQA.

Project Period Archaeological Mitigation Measures

None needed.

Significance of Project Period Archaeological Impacts

Negligible intensity under NEPA and Section 106; Less than Significant under CEQA.

Project Period Architectural History Impacts

Adverse effects on historic architectural resources would largely occur during construction activities associated with all HST alternatives, including the UPRR Alternative. While there is potential for both vibration and noise impacts generated during operation, HST projects, including the UPRR/SR 99 Alterative, typically generate significantly fewer vibration impacts as compared with noise impacts.

There would be no vibration impacts for most locations along the Merced to Fresno Section under any of the HST alternatives, including the UPRR Alternative. This is because of the very inefficient propagation of vibration through the soils in the project vicinity, the low vehicle input force, and the presence of elevated structures, which provide significant attenuation of vibration levels in heavily populated areas where vibration-sensitive receptors are primarily located. In addition, any buildings and structures actually within the construction footprint were not included in the vibration analysis because it is anticipated that they would be destroyed. As a result, there would be no operational vibration effects on historical properties or resources under NEPA (see 3.17.5 and Section 3.4, Noise and Vibration of the EIR/EIS).

Operational noise has the potential to cause adverse effects or substantial adverse change to historical properties and historical resources. Historical properties and historical resources that are sensitive to noise include resources such as residences, parks, libraries, museums and schools. These types of resources have an inherent quiet nature that is part of their identification as well as their significance.

There are two historic properties within the APE that are considered potentially sensitive to increases in noise: Roeding Park and the residence at 24302 Road 15.

The UPRR/SR 99 Alternative would not have any *direct* adverse vibration or noise effects on any historic properties or historic resources as the result of operational activities.

The UPRR/SR 99 Alternative would cause an *indirect adverse effect* under Section 106 and CEQA on the following two historic properties as shown in Table 3.17-9 of the EIR/EIS as a result of operational activities:

- Roeding Park: APN 450-020-08 (#16) is located immediately adjacent to these alternatives, which share a common alignment in this location. According to FRA Noise Impact Criteria, the park would experience severe noise impacts. A substantial increase in the noise levels of the pastoral setting of the passive recreational portion of the park, particularly at those inherently quiet and contributing sites mentioned above, would not be consistent with the historic setting, feeling, and association and would diminish the historic integrity of Roeding Park. As described in Section 3.4 of the EIR/EIS, Noise and Vibration, noise impacts are anticipated to be severe without mitigation, which would be decided in consultation with the City of Fresno (See EIR/EIS Section 3.15, Parks, Recreation, and Open Space).
- Residence at 24302 Road 15: APN 026-233-011 (#13) is located immediately adjacent to the north side of a proposed overpass at Road 15 along the Ave 24 Wye. According to FRA Noise Impact Criteria, the residence would experience severe noise impacts during operation of the HST. As described in Section 3.4 of the EIR/EIS, Noise and Vibration, noise impacts are anticipated to be severe without mitigation.

Project Period Architectural Mitigation Measures

- **Hist-MM#4:** Minimize Adverse Operational Noise Effects--Properties subject to this mitigation will be treated in consultation with the landowner, or land-owning agencies, and the lead agency and noise impacts will generally be mitigated. Preliminary project design options have been developed to help reduce noise impacts and follow FRA methodologies and noise reduction performance standards for noise abatement. These options will be further developed during project design and will be

implemented during construction. Historic properties/historical resources subject to this mitigation measure will be thoroughly recorded in the appropriate format of the Historic American Building Survey (HABS)/Historic American Engineering Record (HAER)/ Historic American Landscape Survey (HALS) programs prior to construction of the HST Project. See Section 3.17.6.2 of the EIR/EIS for additional details.

Significance of Project Period Impacts on Architectural Historical Properties and Resources

Construction or operational noise that impacts historic properties that have an inherent quiet nature that is part of their identification as well as their significance would cause impacts with moderate intensity under NEPA because they would permanently degrade the elements that make the historic property eligible for the NRHP.

To the extent that visual effects and vibration could degrade the elements that make the resource eligible, these long-term effects would be adverse and of moderate intensity.

As discussed in Section 3.17.3.4 of the EIR/EIS, although actions determined to have an adverse impact under NEPA may be mitigated and have a lesser effect, for Section 106, the effect determination remains adverse even when mitigated.

Cumulative Construction Cultural Resource Impacts

Prehistoric sites are common in riverbank and floodplain areas, and burial sites are sometimes encountered during ground-disturbing activities. It is likely that the UPRR Alternative would disturb known archaeological resources as described above, and unknown archaeological resources could also be disturbed, damaged or destroyed during project construction activities. Significant and unavoidable losses of unique archaeological resources or a historical resource could occur when excavations encounter archaeological deposits that cannot be removed or recovered (e.g., under levees) or where recovery would not sufficiently prevent the loss of significant cultural resources. If such permanent losses occurred, cumulative construction impacts would be of moderate intensity under NEPA and significant under CEQA.

Further, under the No Project Alternative, three reasonably foreseeable projects could also adversely affect cultural resources. The Tesoro Viejo Specific Plan (for the area approximately 10 miles northeast of the project) would potentially affect a burial area. The Madera County Dairy Standards Programmatic Final EIR (Madera County 2008) states that this project has the potential to affect cultural resources. The cumulative cultural resource impacts of these projects would be significant *but by law mitigation will be required per regulatory standards so likely mitigated to a level that is less than significant*. The Roeding Regional Park Master Plan and Fresno Chaffee Zoo Facility Master Plans (City of Fresno 2011) would affect cultural resources in the Roeding Park Historic District, but these effects would be less than significant after mitigation.

Future growth under the No Project Alternative would result in the urbanization of land outside of existing urban areas but within urban spheres of influence. Historical architectural resources could also be damaged or require removal from areas in and around the study area. Furthermore, local projects and the secondary effects of redevelopment pressures around the HST stations would potentially result in the removal of historical buildings in Downtown Merced and Downtown Fresno. If these resources meet the definition of a historical resource or a historic resource (as defined in Section 106, 36 CFR 800), their modification or destruction would be significant. Implementation of mitigation measures would reduce the effects on significant cultural resources to a level of less than significant. This assumes future projects will mitigate to standards required by federal state and local regulations. There could be a loss of significant cultural artifacts, and due to this likelihood, cumulative impacts could have substantial intensity under NEPA.

As described in the 2005 Statewide Program EIR/EIS (Authority and FRA 2005) and the 2008 Bay Area to Central Valley Program EIR/EIS (Authority and FRA 2008), the HST System as a whole could have a significant impact on archaeological resources and historical structures, and therefore may contribute to a cumulatively considerable impact. Potential impacts would likely occur in areas that cross formations with paleontological sensitivity, such as the Colma Formation (San Francisco to San Jose Section), and in areas where the HST alternative alignments, including the UPRR Alternative, use existing rail corridors, as these corridors and potential stations in urban centers typically are surrounded by historical structures and districts.

Cumulative Cultural Resource Mitigation Measures

The UPRR Alternative will minimize cumulative impacts on cultural resources by implementing all the mitigation measures described above, and by adhering to federal, state, and local cultural resource protection regulations and providing guidance on the treatment of significant properties (as defined in Section 106 evaluation criteria). Implementation of Mitigation measures for cultural resources summarized above and discussed in Section 3.17.6 of the EIR/EIS and compliance with applicable federal, state and local cultural resources protection regulation will minimize and mitigate the project's contribution to cultural resources impacts to a level that is not cumulatively considerable, thereby reducing cumulative impacts. Although implementation of mitigation measures can reduce cumulative impacts, it cannot avoid them entirely.

Significance of Cumulative Cultural Resources Impacts

The cumulative construction and operations impacts of the project and other reasonably foreseeable projects on cultural resources would have moderate intensity under NEPA and be significant under CEQA, but would be minimized and mitigated to a level that is less than significant.

6.2.6.5 Parks

Affected Environment

The study area for parks, recreation, and open space is defined as 1,000 feet on either side of the north-south alignments and the wyes and 0.5 mile around the station areas, HMFs, and support facilities, with one exception: in areas where an existing transportation corridor, for example SR 99 and the UPRR right-of-way, separates parks, recreational facilities, and open space from project components, the 1,000-foot study area does not extend beyond these transportation rights-of-way because they provide a barrier to potential impacts on park and recreation resources.

Resources are publicly owned properties used for recreation and include one or more of the following: public parks and open spaces, including greenbelts, pedestrian and bicycle trails, playfields, and school district play areas available for public use during non-school hours. Other than the school district properties, the cities of Atwater, Merced, Madera, and Fresno or the counties of Merced and Madera own and maintain most study area resources. The California Department of Fish and Game and the San Joaquin River and Conservation Trust in Fresno own or operate other properties. Figures 3.15-1 through 3.15-4, of the EIR/EIS, depict the location of parks, recreation, and open space resources within the project vicinity.

Table 3.15-2, of the EIR/EIS, identifies the parks, recreation, and open space resources falling within the study area. Project construction and operation would have the most impacts on these parks, particularly those less than 100 feet from the project. The UPRR alternative has 11 park resources within 1000 feet, eight resources within 300 feet, and seven resources within 100 feet of the construction footprint, respectively. Of the 11 parks resources lying within 1,000 feet of the UPRR/SR 99 Alternative, five are in the City of Madera, one is in Madera County, and five are in the City of Fresno.

Most of the identified parks have easy vehicular and pedestrian access to attract users from the surrounding area. These parks are generally small neighborhood parks or urban open spaces. Riverside Park, Sharon Avenue Linear Park, and County Road 27¾ Linear Park in Madera also serve as important pedestrian and bicycle transportation connections. Camp Pashayan, which falls east of the UPRR bridge on the south side of the San Joaquin River in Fresno, is a California Department of Fish and Game (CDFG) property managed by the San Joaquin River Parkway and Conservation Trust and is part of a designated Ecological Reserve. Ecological Reserves are protected by the California Fish and Game Code. San Joaquin River Parkway and Conservation Trust owns the adjacent property, also part of the San Joaquin River Parkway.

Roeding Park, a regional park and the first park in the City of Fresno, is part of a local historic district and is eligible for the National Register of Historic Places (NRHP). The park includes the Fresno Chaffee Zoo, Rotary Storyland and Playland, picnic shelters, folk dance platforms, and a Japanese-American World War II Memorial. The City of Fresno prepared the Final EIR for the master plans for Roeding Regional Park and Fresno Chaffee Zoo (City of Fresno 2011). Projects identified in the Final EIR include a zoo expansion in the southeast park quadrant and the addition of a park entrance from Golden State Boulevard with a relocated water feature. Fresno currently has a deficit of regional parks according to its 2025 General Plan. The City used Land and Water Conservation Funds (Section 6(f)) for development and redevelopment of portions of Roeding Park. Refer to Chapter 4.0, Section 4(f)/Section 6(f) Evaluation, of the EIR/EIS, for more information.

Downtown Merced Station

As described in Table 3.15-4 and shown on Figure 3.15-1, of the EIR/EIS, there are two park resources located within the study area of the Downtown Merced Station. The parks identified in Table 3.15-4 have easy vehicle and pedestrian access and on-street parking.

Downtown Fresno Station

Table 3.15-5, of the EIR/EIS, describes the three resources located within the study area of the Downtown Fresno Station. Figure 3.15-4 shows these parks' locations, which are all outside the immediate station vicinity and have easy pedestrian and residential access. Chukchansi Park is a baseball stadium and event center privately managed on city property. Park use generally requires an entrance fee for events and a rental fee for event sponsors.

Chukchansi Park lies approximately 70 feet from the proposed Downtown Fresno Station and has easy access for pedestrians and vehicles.

Construction Period Impacts

Construction activities for the UPRR/SR 99 Alternative would pass within 1,000 feet of 15 existing parks, including the HST stations. Of these 15 existing parks, 10 are within 300 feet of the construction activities and would have the most effects because of the close proximity of construction to the park and park users. A description of the direct and indirect impacts from construction on each of the parks follows. The UPRR/SR 99 Alternative would also pass within 300 feet of a proposed trail facility (the Vern McCullough Fresno River Trail).

Sharon Avenue Linear Park (City of Madera) –The UPRR/SR 99 Alternative would require temporary use of 0.7 acre of the park for construction of the adjacent HST guideway east of Sharon Avenue, as shown in Figure 3.15-5 of the EIR/EIS. Temporary access restrictions from construction of the HST alignment and the relocation of Sharon Avenue to the east would affect the park, which would be closed during construction.

Riverside Park (City of Madera) – The UPRR/SR 99 Alternative would require temporary use of 0.3 acre at the west end of Riverside Park, as shown in Figure 3.15-5 of the EIR/EIS, for construction of

the adjacent HST guideway east of Sharon Avenue. Noise, dust, visual changes, temporary access restrictions from construction of the HST alignment, and the relocation of Sharon Avenue to the east would affect the park; however, the remainder of Riverside Park would remain open during construction.

Fairmead Toddler Park (Madera County), Rotary Park (City of Madera), and Courthouse Park (Madera County) – All three parks would experience indirect construction impacts from noise, dust, and visual change. Project construction would not diminish the recreational value of Fairmead Toddler Park because of its suburban character, the distance of the park from the alignment (600 feet), and separation by existing houses. Rotary Park, which is 100 feet from the alignment, and Courthouse Park, which is 300 feet from the alignment, are adjacent to existing major transportation facilities. Rotary Park and Courthouse Park are separated from the alignment by major transportation facilities, including UPRR and Gateway Boulevard.

County Road 27¾ Linear Park (City of Madera) – Guideway construction for the UPRR/SR 99 Alternative would cross over this linear park between E Almond Avenue and Road 28. This would require the temporary use of 1.8 acres of parkland, and the park would be closed during construction. Relocating the park east of Road 27¾ to accommodate the HST alignment would provide additional acreage for possible expansion of the park.

Camp Pashayan (City of Fresno) – Only the southern end of the park in the construction zone (the area that would be beneath the HST structure) would be access-restricted to such recreational users as hikers, swimmers, and fishermen during construction, for safety purposes (due to overhead work). The area under the elevated tracks would be available for recreational activities after construction (per the Authority's policy on air-rights consistent with restrictions related to HST operations, maintenance, and security). Although the area of the park that would be affected does not include recreational facilities for activities that require the use of equipment or designated facilities, courses, or fields, the area that would be affected is an area that can currently be actively used and would be completely closed to visitor use for a period of approximately 2 to 4 years while construction takes place in the vicinity of the park.

In order to construct the elevated structure supported by columns across the property, the Authority may need to obtain easement rights through the property to construct the columns and the bridge structure.

San Joaquin River Parkway and Conservation Trust (City of Fresno) – Construction on the adjacent Camp Pashayan property would affect this park because of visual impacts from construction equipment, vegetation removal, noise, and dust at the western edge of the property (see Figure 3.15-9 of the EIR/EIS). These effects would result in minor disruptions to normal use of the immediate area, but would not disrupt the recreational functions of the park.

Roeding Park (City of Fresno) – Construction activities would occur adjacent to the eastern boundary of Roeding Park, but no temporary use of parkland for construction purposes is anticipated. Temporary construction impacts such as noise, dust, and visual change would be minor and would not substantially reduce the value of the resource. Because this park would remain open to the public and the construction period impacts, though perceptible to users, would not prevent the functions of the park from continuing or diminish the ability of people to use the resource, these effects would be of moderate intensity under NEPA.

6.2.6.6 Downtown Merced Station

Bob Hart Square – This park (see Figure 3.15-13 of the EIR/EIS) would experience indirect impacts such as noise, dust, and visual change from construction of the Downtown Merced Station. Because of the existing urban nature of this park, its distance from the HST alignment, and its separation from the alignment by a parking lot, SR 140, a large building, and the UPRR corridor, these impacts would not substantially impair protected activities, features, or resource attributes.

Courthouse Square Park – This park would not experience any construction impacts because the park is located approximately 2,500 feet from the station and three full blocks of multistory buildings and urban development separate the park from the station area.

6.2.6.7 Downtown Fresno Station

Chukchansi Park Stadium – This facility is located within 70 feet of the station construction area (see Figure 3.15-14 of the EIR/EIS), and noise, dust, and visual change could indirectly affect the stadium. However, these indirect impacts are not anticipated to substantially affect normal use because of the existing urban nature of the facility.

Construction Period Impacts

Construction Period Mitigation Measures

PK-MM#1: Compensate for Staging in Park Property for Construction. The Authority will coordinate with the respective jurisdictions to establish appropriate compensation in terms of allowance or additional property to accommodate for displaced park use during construction. Options will include preparing a plan for alternative public recreation resources during the period of closure, and preparing signs and newsletters describing the project, its schedule, and the alternative public recreational opportunities. Alternative parks and recreational resources will include the installation of recreational facilities, trails, and landscaping on lands currently owned by the city but not already developed, or it will include temporary park development on open lands until the park can be reopened. Landscaping replacement will include replacement grass areas, tree replacement on a ratio of two 5-inch caliber trees for every tree removed and two shrubs for every shrub removed. All other facilities will be replaced or moved on a one-for-one ratio, including play equipment, benches, and the like.

The above construction mitigation measure for parks is consistent with mitigation measures for similar scale transportation projects and has proven to be effective in minimizing impacts noted above.

Significance of Construction Period Impacts

According to the NEPA assessment of the UPRR/SR 99 Alternative, four park resources would incur impacts with substantial intensity because of park closures during construction: Sharon Avenue Linear Park, Riverside Park, County Road 27¾ Linear Park, and Camp Pashayan. After mitigation, the impacts on these parks would still have substantial intensity because the temporary use would require the partial or full closure of the parks during construction, a duration of up to 4 years. Construction impacts on the San Joaquin River Parkway and Roeding Park would be of moderate intensity.

Project Period Impacts

Although the Authority made attempts to avoid and minimize property impacts, the UPRR/SR 99 Alternative would require portions of three parks: 0.4 acre at Riverside Park (see Figure 3.15-5 of the EIR/EIS); 1.0 acre at County Road 27¾ Linear Park (see Figure 3.15-8 of the EIR/EIS); and 0.6 acre at Camp Pashayan (see Figure 3.15-9 of the EIR/EIS). This would result in a total impact of 2.0 acres. Where the HST alignment is elevated over park resources, the acquisition numbers reflect a "worst-case" scenario and include the park area under the elevated guideway. Most of the park land would remain available for park/trail use (per the Authority's policy on air-rights consistent with restrictions related to HST operations, maintenance, and security).

Sharon Avenue Linear Park – The elevated guideway associated with the UPRR/SR 99 Alternative would be approximately 60 feet high adjacent to Sharon Avenue Linear Park resulting in a change in the park setting.

Riverside Park – The UPRR/SR 99 Alternative would cross over Riverside Park in an elevated profile, and a column may be placed inside Riverside Park. The area under the elevated guideway could be used to extend the park and provide a shaded area during the hot summer months (per the Authority's policy on air-rights consistent with restrictions related to HST operations, maintenance, and security).

Fairmead Toddler Park – The HST would be approximately 600 feet from the park, and Fairmead Boulevard would be relocated approximately 70 feet east of its current location. Operation of the UPRR/SR 99 Alternative would indirectly affect the Fairmead Toddler Park (Figure 3.15-6 of the EIR/EIS) in Madera County but it would not diminish the current use, nor block scenic views and noise would not be severe.

Rotary Park and Courthouse Park – The UPRR/SR 99 Alternative would include an elevated guideway that would be located approximately 200 to 300 feet from each of the two resources in Madera—Rotary Park (Figure 3.15-5 of the EIR/EIS) and Courthouse Park (Figure 3.15-7 of the EIR/EIS). The UPRR/SR99 Alternative would not diminish the current use, nor block scenic views and noise would not be severe.

County Road 27¾ Linear Park – Although the HST guideway would constitute a visual change and add an elevated visual component adjacent to this linear park (Figure 3.15-8 of the EIR/EIS), it would be consistent with the area's urban nature, which includes the UPRR railway on retained fill along the park's western boundary, and the corridor's transportation function. Noise levels near the park would increase, but would be mitigated by the implementation of noise abatement features. After construction, the area under the guideway would be restored and available again for park use. The elevated guideway over the park would be a substantial visual change, but the guideway would provide shade during the hot summer months (per the Authority's policy on air-rights consistent with restrictions related to HST operations, maintenance, and security).

Camp Pashayan (City of Fresno) – The columns placed within Camp Pashayan would require the acquisition of Camp Pashayan property. The BNSF Alternative would impact 0.6 acre at Camp Pashayan, being elevated approximately 60 feet above the park and the alignment would be designed to lie as close to the UPRR corridor as possible. This acreage reflects a "worst-case" scenario and includes the park area under the elevated guideway. Most of the park land would remain available for park/trail use (per the Authority's policy on air-rights consistent with restrictions related to HST operations, maintenance, and security). Camp Pashayan would also be subject to HST noise effects and change in visual context, but effects would not result in a use of the park land. The area under the elevated guideway could be used as parkland after construction (per the Authority's policy on air-rights consistent with restrictions related to HST operations, maintenance, and security). There would be no closures of existing paved vehicular/bicycle/pedestrian access entry points to the park.

Roeding Park – Effects on Roeding Park would include visual effects and noise effects. The HST alignment would be constructed at-grade adjacent to the eastern boundary of Roeding Park, without impacting the physical park grounds. Along the southern side of Roeding Park, the tracks would descend below ground into a retained cut to cross under SR 180. Vegetation would block partial views of the HST train. The project noise levels would be substantial at 20 to 250 feet away from the HST guideway in the park areas.

Project Period Mitigation Measures

PK-MM#2: Acquire Park Property. Mitigation will include providing financial compensation for purchase and development of replacement park property of at least equivalent value with the property acquired or, where appropriate, enhancement of the existing facility.

PK-MM#3: Improve Area under Elevated Structure over Park. Where the project is elevated over Sharon Avenue Linear Park, County Road 27¾ Linear Park, and Riverside Park, area under the elevated tracks will remain available for park use and mitigation will include installation of landscaping and lighting in

consultation with the City of Madera and per the Authority's policy on air-rights consistent with restrictions related to HST operations, maintenance, and security.

PK-MM#4: Acquire Property for Camp Pashayan. Final design will continue to seek to minimize right-of-way impacts and pier placement in Camp Pashayan. Mitigation will include in-lieu fee for property impacts associated with pier installation as well as revegetation of disturbed areas with native plantings (consistent with the CDFG vegetation/landscaping plans for the reserve).

PK-MM#5: Address Noise at Roeding Park with City of Fresno. The Authority will work with the City of Fresno as the resource owner to address noise impacts. It is possible that the City of Fresno would view the projected noise levels as acceptable and preferable to the implementation of mitigation measures.

To mitigate the noise impacts, a sound barrier approximately 2,800 feet in length will be constructed. It is assumed that a sound barrier will be 10 to 14 feet tall and have aesthetic treatment. A 10-foot-high sound barrier will reduce noise to 64 dBA at 250 feet inside the park and residual noise effects will occur. A 14-foot-high sound barrier will reduce noise effects to within 1 dB of no impact. (See section 3.4 of the EIR/EIS for more details). The sound barrier would result in visual effects, but would not change the existing visual quality. KVP 16 is the view from inside the eastern edge of Roeding Park, approximately 300 feet from Golden State Boulevard, where the HST alignment would replace the roadway. As viewed from KVP 16, trees closer to the viewpoint would partially block views of the sound barrier (Figure 3.15-19 of the EIR/EIS). Although the changes would not be easy to see from this location, the visual character of the eastern part of the park would change as one moved closer to the edge of the park. The sound barrier would block the views toward the existing UPRR corridor and N Weber Avenue (neither of which adds aesthetic value to the park's setting). The landscape character at the park's edge would change with the presence and bulk of the sound barrier compared to the existing chain link fence, flat roadway, and open views. However, the sound barrier with aesthetic treatment would improve the visual quality and park's setting by blocking views of the existing transportation facilities outside the park that detract from its setting. Aesthetic treatment of the sound barrier would be selected with input from the community.

Significance of Project Period Impacts

According to the NEPA assessment of the UPRR Alternative, three park resources would incur project impacts of substantial intensity because of permanent property acquisitions: Riverside Park, County Road 27¾ Linear Park, and Camp Pashayan. Mitigation would reduce the direct and indirect project impacts related to the UPRR Alternative to a level of moderate intensity at Sharon Avenue Linear Park.

HST operations would increase noise levels along the eastern portion of Roeding Park to severe levels. The impact on the park function and the park as a historic resource because of the increased noise levels would have substantial intensity; this would be an impact of substantial intensity on Roeding Park. Discussions with the City of Fresno are underway to determine to what extent the noise would affect park uses. The level of change in visual quality from the project with a sound barrier, combined with the level of viewer sensitivity, would result in an impact of negligible intensity and a less than significant impact under CEQA.

Cumulative Construction Period Impacts

Construction would have impacts with substantial intensity on some parks and recreation resources in the Merced to Fresno Section because of partial or complete park closures. Roeding Park would experience cumulatively considerable impacts from construction of the HST Project, the Roeding Regional Park and Fresno Chaffee Zoo Facility Master Plan (City of Fresno 2011) renovations, and planned auxiliary lanes on SR 99 between Clinton Avenue and Fresno Street.

Cumulative Construction Period Mitigation Measures

PK-MM#1: Compensate for Staging in Park Property for Construction. The Authority will coordinate with the respective jurisdictions to establish appropriate compensation in terms of allowance or additional property to accommodate for displaced park use during construction. Options will include preparing a plan for alternative public recreation resources during the period of closure, and preparing signs and newsletters describing the project, its schedule, and the alternative public recreational opportunities. Alternative parks and recreational resources will include the installation of recreational facilities, trails, and landscaping on lands currently owned by the city but not already developed, or it will include temporary park development on open lands until the park can be reopened. Landscaping replacement will include replacement grass areas, tree replacement on a ratio of two 5-inch caliber trees for every tree removed and two shrubs for every shrub removed. All other facilities will be replaced or moved on a one-for-one ratio, including play equipment, benches, and the like.

Significance of Cumulative Construction Period Impacts

Except for impacts at Roeding Park, construction of other past, present, and reasonably foreseeable infrastructure and development projects would not physically alter parks in the Merced to Fresno Section, and construction -related cumulative impacts on parks would, therefore be of negligible intensity under NEPA.

Cumulatively, the impacts from the projects described above, which would include temporary closure of portions of the park, along with noise, dust, and visual changes within and immediately adjacent to the park, would be considered impacts with substantial intensity under NEPA and significant under CEQA.

Cumulative Project Period Impacts

The UPRR/SR99 Alternative would require approximately 2.0 acres of park resources. Reasonably foreseeable highway projects near the HST alternative could also affect parkland during operation.

Cumulative Project Period Mitigation Measures

All impacts will be mitigated, including replacing park property or providing financial compensation to the jurisdictions for replacement park property. Mitigation measures would be as stated above in "Project Period Mitigation Measures".

Significance of Cumulative Project Period Impacts

The cumulative project period impacts of the project and other reasonably foreseeable projects on parkland projects would be considered of negligible intensity under NEPA for all parks except Roeding Park in Fresno because other projects would not physically alter these parks, and new developments would be required to provide new parks to meet the demands of a growing population.

Roeding Park in Fresno could experience impacts that are considered of substantial intensity under NEPA and cumulatively considerable under CEQA as a result of the projects proposed in the Roeding Regional Park and Fresno Chaffee Zoo Master Plan (City of Fresno 2011), which would convert an existing portion of the park to zoo and amusement park uses; planned auxiliary lanes on SR 99 between Clinton Avenue and Fresno Street, which would possibly encroach on the park; and the HST Project, which would cause severe noise impacts along the eastern portion of the park without mitigation.

The cumulative impacts associated with the UPRR alternative and foreseeable future transportation projects are considered to be of negligible intensity under NEPA for remaining parks and recreational facilities in the Merced to Fresno Section. Mixed-use development projects, quarries, industrial projects, and other activities associated with the foreseeable projects and 2035 cumulative condition are not anticipated to involve the acquisition of parkland.

Because of the HST connections to major economic centers, the project could result in an increase in population and the demand for park and recreation facilities in the communities with HST facilities. However, this increase is insignificant compared to the projected population growth without the project (Authority and FRA 2008). The developers of new TOD projects would be required to contribute park facilities as part of the entitlement process.

As described in the 2005 Statewide Program EIR/EIS (Authority and FRA 2005) and 2008 Bay Area to Central Valley Program EIR/EIS (Authority and FRA 2008), the HST System would have impacts of substantial intensity under NEPA and would be considered cumulatively significant under CEQA to parks, recreation, and open space when viewed on a systemwide basis.

6.2.6.8 Section 4(f)

Section 4(f) Uses

49 U.S.C. 303 (Section 4(f) of the Department of Transportation Act) affords a similar level of protection to publicly owned public parks, recreation areas, wildlife and waterfowl refuges, and to significant historic resources as wetlands are afforded under the Clean Water Act and E.O. 11990.

Within the study areas of the alternatives and stations, there are approximately 20 park and recreation areas evaluated for Section 4(f) use. These are listed on Table 4-2 of the EIR/EIS. For further details regarding Section 4(f), see Section 4 of the EIR/EIS.

Park and Recreation Resources

The UPRR/SR 99 Alternative would use four recreational resources. For details on the text below, please see the Section 6, UPRR/SR 99 Alternative, Parks, in this document and Section 4.0 of the EIR/EIS.

Sharon Avenue Linear Park. Sharon Avenue Linear Park, shown in Figure 4-7 of the EIR/EIS, is 1.5 acres and consists of a paved pathway, benches, and landscaping along the east side of the UPRR corridor. The park is relatively urban in character and is used for pedestrian and bicycling connections from adjacent residential areas to nearby commercial areas. The UPRR/SR 99 Alternative would necessitate the temporary occupancy of approximately 0.7 acre of parkland during construction. The entire park would be temporarily occupied and closed to the public during construction. A benefit of this alternative, as with the Hybrid Alternative, is that the area under the elevated tracks could potentially remain available for park use and will be coordinated with the FRA Office of Safety and the Department of Homeland Security.

Riverside Park. Riverside Park, shown in Figure 4-7 of the EIR/EIS, is 3.3 acres in size. The park follows the north side of the Fresno River in the City of Madera and contains a paved pathway and landscaping. The park is located in a relatively urban setting and is frequently used by pedestrians and bicyclists to connect from adjacent residential areas to nearby commercial areas. The UPRR/SR 99 Alternative would permanently require approximately 0.4 acre for column placement and overhead easement for the elevated HST guideway. The area of parkland to be purchased represents approximately 3% of the park's total area.

County Road 27 ¾ Linear Park. County Road 27 ¾ Linear Park, shown on Figure 4-8 of the EIR/EIS, is 2.8 acres in size and is located between E Almond Avenue and County Road 28 in Madera. The park consists of a paved pathway and landscaping. The UPRR/SR 99 Alternative would use approximately 1.0 acre of parkland to allow for the construction of the elevated guideway. The area of parkland to be purchased represents 70% of the park's total area. The park would also be subject to temporary use during construction.

Camp Pashayan. Camp Pashayan, shown in Figure 4-9 of the EIR/EIS, is 31 acres in size and located in Fresno on the south side of the San Joaquin River. This public facility, which is part of the San Joaquin

River Parkway, includes picnic areas, fishing and boating access, and nature trails. All three alternatives would require approximately 0.6 acre of this park in order to install piers for elevating the guideway.

Historic Resources

The UPRR/SR 99 Alternative would have Section 4(f) uses of the following historic resources:

- A portion of the Robertson Boulevard Tree Row is in the direct path of both the Ave 24 and Ave 21 wyes for all three HST alternatives and construction would result in the physical demolition, destruction, damage, or substantial alteration of this linear resource between the two wyes. This would be a permanent use under Section 4(f).
- The Weber Avenue Overcrossing Bridge in Fresno is in the direct path of all HST alternatives, which share a common alignment in this location. Their construction would result in the physical destruction, damage, or alteration of the resource. This would be a permanent use under Section 4(f).
- The Belmont Avenue Subway and Traffic Circle in Fresno, which is located just southeast of Roeding Park, is in the direct path of all three HST alternatives and associated roadway improvements, and the construction of the project would result in the elimination of this resource. This would be a permanent use under Section 4(f).
- SPRR Station in Madera. Only the UPRR/SR 99 Alternative would result in a Section 4(f) use of the **S**PRR Station (120 N E Street, Madera). This historic station is in the direct path of this alternative, and its construction would result in the physical destruction, damage, or alteration of the resource. This would be a permanent use under Section 4(f).
- For additional details, please see Section 3.17 of the EIR/EIS, Cultural Resources, and Section 4.0 of the EIR/EIS, Section 4(f).

Measures to Minimize Harm

Table 6.3-11 below identifies measures to minimize harm to park, recreation and historical resources. For a complete list, see Table 4-8 in the EIR/EIS.

Table 6.3-11
Section 4(f) Measures to Minimize Harm

Impact	Measures to Minimize Harm
Sharon Avenue Linear Park – UPRR/SR 99 Alternative	
Construction: temporary closure, visual change from construction.	Implement the following: Use construction BMPs to control dust and noise (see Section 3.3, Air Quality and Global Climate Change; Section 3.4, Noise and Vibration). Screen stockpiled material and construction excavations through the use of temporary construction barriers and other screens, where they are exposed to park users. Restore areas affected by construction to preconstruction conditions with landscaping immediately after construction. Use native plant materials for revegetation where appropriate. Work with the City of Madera to keep the park open to bicycle and pedestrian traffic during construction by providing detours to maintain connectivity if construction requires temporary closures. Coordinate construction activities to avoid scheduled weekend activities when appropriate, provide clear signage and direction for alternative access routes and access points, and coordinate with

Impact	Measures to Minimize Harm
	local groups and jurisdictions using a variety of media to communicate the construction schedule. Extend Sharon Avenue Linear Park to the east under the elevated guideway to the relocated Sharon Avenue and install landscaping and lighting in consultation with the City of Madera, and design columns consistent with Crime Prevention through Environmental Design principles where appropriate to improve safety of park area under the guideway (per the Authority's policy on air-rights consistent with restrictions related to HST operations, maintenance, and security). Work with the City of Madera to prepare final design documents that minimize the visual impacts of the proposed HST alignment. This could include decorative barriers, landscaping, architectural lighting, or other acceptable design features
County Road 27¾ Linear Park – UPRR/SR 99 Alternative	
Construction: temporary acquisition, park would be closed during construction. Project: permanent acquisition, alignment would be over the linear park with columns in the park. Construction footprint: 1 acre	Implement the following: Use construction BMPs to control dust and noise (see Section 3.3, Air Quality and Global Climate Change; Section 3.4, Noise and Vibration). Where exposed to park users, screen stockpiled material and construction excavations through the use of temporary construction barriers and other screens. Restore areas affected by construction to preconstruction conditions with landscaping immediately after construction. Use native plant materials for revegetation where appropriate. Work with the City of Madera to keep the park open to bicycle and pedestrian traffic during construction by providing detours to maintain connectivity if construction requires temporary closures. Coordinate construction activities to avoid scheduled weekend activities when appropriate, provide clear signage and direction for alternative access routes and access points, and coordinate with local groups and jurisdictions using a variety of media to communicate the construction schedule. Coordinate with the City of Madera regarding compensation for acquisition of property through direct purchase, purchase and development of replacement park property, or enhancement of the existing facility. Coordinate with the City of Madera to plan for using the area under the elevated tracks as available parkland (per the Authority's policy on air-rights consistent with restrictions related to HST operations, maintenance, and security). Work with the City of Madera to prepare final design documents that minimize the visual impacts of the proposed HST alignment. This could include decorative barriers, landscaping, architectural lighting, or other acceptable design features.
Roeding Park – All HST Alternatives	
Project: operational noise and visual impacts.	The Authority will work with the City of Fresno as the resource owner to address potential noise and/or visual impacts. It is possible that the City of Fresno may accept the noise impacts and then no further mitigation would be utilized. Construct a sound barrier approximately 2,800 feet in length. It is assumed that a sound barrier would be 10 to 14 feet tall and have aesthetic treatment. A 10-foot-high sound barrier would reduce noise to 64 decibels on an A-weighted scale (dBA) at 250 feet inside the park and residual noise effects would occur. A 14-foot-high sound barrier would reduce noise effects to within 1 decibel of no impact. The sound barrier with aesthetic treatment would improve the park's visual quality and setting by blocking views of the existing transportation facilities outside the park that detract from its setting. Aesthetic treatment of the sound barrier will be selected with input from the community.

Impact	Measures to Minimize Harm
All Section 4(f) Historic Architectural Resources	
Hist-MM#1: Avoid adverse vibration effects.	The HST Project will develop construction methods to avoid indirect adverse effects or indirect substantial adverse change to any historic properties (Section 106) or historical resources (CEQA) from vibration caused by construction activities. Vibration from impact pile-driving during construction is anticipated to reach up to 0.12 peak particle velocity of one inch per second (PPV in/sec) at 135 feet from the project centerline, a level that would could cause the physical destruction, damage, or alteration of historic properties or historical resources if the pile-driving were within 80 to 140 feet of the building. Because this impact pile-driving could cause adverse effects or substantial adverse changes, alternative construction methods causing less than 0.12 PPV in/sec measured at the receptor will be developed for construction activities near historic properties or historical resources if they are determined to be extremely susceptible to vibration damage (Authority and FRA 2012d). The development of alternative construction methods at these locations would avoid indirect adverse vibration effects on historic properties (Section 106) and would avoid substantial adverse vibration changes to historical resources (CEQA). A BETP has been prepared that provides additional detail on the methodology for the avoidance of adverse vibration effects, and how that will be implemented during the project. The BETP was developed in coordination with the project's consulting parties to ensure that all parties are part of the generation of this plan. Performance tracking of this mitigation measure is based upon successful implementation and the approval of the documentation by the SHPO and appropriate consulting parties.
Hist-MM#2: Develop Protection and Stabilization Measures.	The BETP identifies historic properties/historical resources that will require protection and/or stabilization prior to the start of construction of the project. Properties subject to this mitigation activity include any that are physically affected by and/or require relocation because of construction, and/or are in close enough proximity to require protection. This mitigation ensures that adverse effects on historic properties/historical resources will be either avoided entirely or minimized to the extent possible. This mitigation will be developed in consultation with the landowner or the land-owning agencies, as well as SHPO and the Memorandum of Agreement signatories, as required by the Programmatic Agreement. Such measures will include, but are not necessarily limited to, vibration monitoring of construction in the vicinity of historic properties; cordoning off resources from construction activities such as traffic, equipment storage, and personnel; shielding resources from dust or debris; and stabilization of buildings adjacent to construction. For buildings that are to be moved, such measures will include stabilization of buildings and structures before, during, and after relocation; protection of buildings and structures during temporary storage; and relocation at a new site and during subsequent rehabilitation. Moving buildings could result in minor impacts on air emissions from equipment and vehicles and minor effects on developed or undeveloped sites. Protection and stabilization measures proposed for impacted resources are presented in more detail in the BETP, a plan that was developed with critical input from all of the project's consulting parties. Performance tracking of this mitigation measure is based upon successful implementation and the approval of the documentation by the SHPO and appropriate consulting parties.
Hist-MM#3: Minimize Adverse Effects through Relocation of Historic Structures.	The BETP identifies historic properties/historical resources that will be relocated to help avoid destruction and minimize the direct adverse effect of their physical damage or alteration. The plan for relocation and implementation of relocation will take place prior to construction. The relocation of the historic properties/historical resources will take into account the historic site and layout

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	(i.e., the orientation of the buildings to the cardinal directions), as well as their potential re-use. All structures will be thoroughly recorded in a Historic Structure Report (HSR) (see Hist-MM#8), and the relocation plan will provide for stabilization of the structures before, during, and after the move. The relocation of historic structures section of the BETP was developed with significant input from all of the project's consulting parties, to ensure that a comprehensive and thorough approach was developed that would meet the needs of the parties as well as the resources. Performance tracking of this mitigation measure is based upon successful relocation of resources and the approval of the process by the SHPO and appropriate consulting parties.
Hist-MM#4: Minimize Adverse Noise Effects.	The BETP identifies historic properties/historical resources that will be subject to treatment to help minimize indirect adverse effects caused by operational noise of the HST Project. Properties subject to this mitigation are identified in the BETP and will be treated in consultation with the landowner or land-owning agencies and the CEQA lead agency. Preliminary project design options have been developed to help reduce noise impacts and follow FRA methodologies for noise abatement. These options will be further developed during project design and will be implemented during construction. Historic properties/historical resources subject to this mitigation measure will be thoroughly recorded in the appropriate format of the Historic American Building Survey (HABS)/Historic American Engineering Record (HAER)/Historic American Landscape Survey (HALS) programs (see Hist-MM#7) prior to construction of the HST Project. The measures proposed to help minimize adverse effects caused by operational noise are presented in more detail in the BETP, a plan that was developed with critical input from all the project's consulting parties. Performance tracking of this mitigation measure is based upon successful implementation and the approval of the documentation by the SHPO and appropriate consulting parties.
Hist-MM#5: Prepare and Submit NRHP Nominations.	The BETP identifies specific historic properties/historical resources for nomination to the NRHP program of the NPS. Properties subject to this mitigation will be treated in consultation with the landowner, or land-owning agencies, and the CEQA lead agency. Current photographs of the property used in the nomination(s) will be taken prior to the start of project construction. The nomination document may also use other current and/or historic images prepared as part of other mitigation activities. Performance tracking of this mitigation measure is based upon successful implementation and the approval of the documentation by the SHPO and appropriate consulting parties.
Hist-MM#6: Prepare and Submit CRHR Nominations.	The BETP identifies specific historical resources for nomination to the CRHR Program at the California Office of Historic Preservation (OHP). Current photographs of the resource used in the nomination(s) will be taken prior to the start of project construction. The nomination document may also use current and/or historic images prepared as part of other mitigation activities. Properties subject to this mitigation will be treated in consultation with the landowner, or land-owning agencies, and the CEQA lead agency. Performance tracking of this mitigation measure is based upon successful implementation and the approval of the documentation by the SHPO and appropriate consulting parties.
Hist-MM#7: Prepare and Submit Historic American Building Survey (HABS)/Historic American Engineering Record (HAER)/Historic American	The BETP identifies specific historical resources that would be physically altered, damaged, relocated, or destroyed by the project and that may be documented in compliance with the HABS/HAER/HALS programs. Consultation with the SHPO, NPS, and the consulting parties will be required if any of the resources must be documented to these standards.

Impact	Measures to Minimize Harm
Landscape Survey (HALS) Documentation.	Prior to the start of construction, in consultation with the Western Regional Office of the NPS in Oakland, California, large-format (4 x 5 inch or larger, negative-size) black and white photographs will be taken of these historic properties/historical resources showing them in context, as well as details of their character-defining features. The photographs will be processed for archival permanence in accordance with HABS/HAER/HALS photographic specifications. Each view will be fully captioned, and if necessary, be corrected for perspective. Oblique aerial photography would be considered as a photographic recordation option in these coordination efforts. The recordation will follow the NPS HABS/HAER/HALS guidelines; the report format, views, and other documentation details will be coordinated with the NPS. It is anticipated that the recordation of historic properties will be completed to Level II HABS written data standards, and will include archival and digital reproduction of historic images, plans, and drawings, if available. Copies of the documentation will be offered to the appropriate local governments, historical societies and agencies, and libraries. The documentation will also be offered in printed and electronic form to any repository or organization upon which SHPO, the Authority, and local agency with jurisdiction over the property, through consultation, may agree. The electronic copy of the report may also be placed on an agency or organization's web site. Performance tracking of this mitigation measure is based upon successful implementation and the approval of the documentation by the SHPO and appropriate consulting parties
Hist-MM#8: Prepare Historic Structure Reports.	The BETP identifies historic properties/historical resources that would be physically altered, damaged, or relocated and would be subject to an HSR. The HSR will be prepared prior to the start of construction. The HSR will follow the general guidelines for such reports as described in the California OHP *Historic Structure Report Format* (OHP n.d.). The scope of each HSR will be developed in consultation with the land-owning agencies, the SHPO, and appropriate consulting parties. The HSR will include, if appropriate, documentation of existing landscaping. The HSRs may be used in the ongoing planning process and re-use of the properties, and may be coordinated with the other mitigation documentation activities, such as HABS/HAER records. Performance tracking of this mitigation measure is based upon successful implementation and the approval of the documentation by the SHPO and appropriate consulting parties.
Hist-MM#9: Prepare Interpretive Exhibits.	Some historic properties/historical resources may be identified in the BETP for historic interpretation. Interpretive exhibits will provide information regarding the specific historic property or historical resource. The interpretive exhibits will use images, narrative history, drawings, or other material produced for the mitigation described above, including the HABS/HAER reports, NRHP and CRHR nominations, or other archival sources. The interpretive exhibits may be in the form of, but are not necessarily limited to, interpretive display panels and/or printed material for dissemination to the public. The interpretive exhibits may be installed at local libraries, historical societies, or public buildings. All historic properties/historical resources demolished by the project will be the subject of informative permanent metal plaques that will be installed at the site of the demolished historic property, or at nearby public locations. The plaques will provide a brief history of the property, its engineering/architectural features and characteristics, and the reasons for and date of its demolition. Performance tracking of this mitigation measure is based upon successful implementation and the approval of the documentation by the SHPO and appropriate consulting parties.

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Hist-MM#10: Plan Repair of Inadvertent Damage.	The BETP provides a plan for the repair of inadvertent damage to historic properties/historical resources. The plan has been developed prior to project construction, and states that damage resulting from the project to any of the historic properties/historical resources near construction activities will be repaired in accordance with the Secretary of the Interior's Standards for Rehabilitation. The HSR and/or HABS/HAER recordation will photographically document the condition of historic properties/historical resources prior to the start of construction to establish the baseline condition for assessing damage. A copy of this photographic documentation will be provided to the landowner or land-owning agencies. Prior to implementation, provide the plans for any repairs to historic properties for SHPO review and comment to ensure conformance with the Secretary of the Interior's Standards for Rehabilitation. Performance tracking of this mitigation measure is based upon successful repair of any damage to historic properties/historical resources and the approval of that work by the SHPO and appropriate consulting parties.
All Section 4(f) Archaeological Resources	
Arch-MM#1: Conduct Archaeological Training.	Prior to ground-disturbing activities within the HST alternatives, a qualified professional archaeologist will develop a training program and printed material to be presented to construction personnel. The purpose of this training and accompanying materials will be to familiarize construction personnel with the relevant legal (NEPA/CEQA) context for cultural resources of the project and with the types of cultural sites, features, and artifacts that could be uncovered during construction activities. These training sessions will be conducted prior to commencing construction within discrete portions of the HST alternatives or as needed because construction personnel crews and supervisors may change.
Arch-MM#2: Data Recovery as Required by the Draft Programmatic Agreement.	If it is infeasible to avoid impacts on archaeological sites that have been determined to be eligible for listing on the NRHP, additional research including, but not necessarily limited to, archaeological excavation will be conducted [CCR Section 15126.4 (b)(3)(C)] prior to ground-disturbing activities. This work will be conducted by a qualified archaeologist and will include preparation of a research design; additional archival and historical research; archaeological excavation; analysis of artifacts, features, and other attributes of the resource; and preparation of a technical report documenting the methods and results of the investigation in accordance with the California OHP *Guidelines for Archaeological Research Design* (OHP 1991). The purpose of this work is to recover a sufficient quantity of data to compensate for damage to, or destruction of, the resource. The procedures to be employed in this data recovery program will be determined in consultation with responsible agencies, including SHPO, and interested parties, as appropriate. Where necessary, Native American input and consultation will be carried out.
Arch-MM#3: Plan an Intentional Site Burial or Avoidance for Preservation in Place.	Resources may be avoided through project design. If project engineering concludes that avoidance is not feasible, a process to determine whether the site can be preserved through intentional site burial will be considered. When complete avoidance is not possible, preservation in place is the preferred form of mitigation for a "historical resource of an archaeological nature" because it retains the relationships between artifact and context, and may avoid conflicts with groups associated with the site (PRC 15126.4[b][3][A]). To avoid or cap a site, it will be necessary to conduct test excavations to determine the vertical and horizontal extent of the identified resources. Therefore, if excavations have not yet been conducted for the purposes of evaluating the sites for eligibility in accordance with the Section 106 Programmatic Agreement, a qualified archaeologist will be contracted with to conduct a formal excavation of the site to delineate the site boundaries as well as determine the site's eligibility for the

Impact	Measures to Minimize Harm
	CRHR or NRHP. If avoidance is feasible, the resource boundary information will be placed on construction drawings to facilitate the avoidance of adverse effects. During construction, the contracted archaeologist will cordon off the site and conduct monitoring of the construction activity in the vicinity of the sensitive area to ensure inadvertent impacts are avoided. If avoidance through project design is not feasible, consideration will be given to intentional site burial. In this case, the contracted archaeologist will, in addition to performing the formal delineation of the site boundaries, prepare and implement a design plan to dictate the conditions of the intentional site burial according to the recommendations discussed in the *National Park Service Technical Brief Number 5, Intentional Site Burial: A Technique to Protect Against National or Mechanical Loss* (NPS 1991). Among the requirements of an effective capping, the mechanical process of burying the site must be designed in a manner that protects the site matrix during the placement process and during the operation of the HST. Preconstruction testing can be used to determine the construction equipment and fill-material load limits that are allowable without causing compression or warpage of the artifact and feature components of the site. If the preconstruction testing determines that compression or warpage of the site is probable and this mitigation would not effectively reduce the effects of the project to less-than-significant levels, additional mitigation, such as data recovery (**Arch-MM#2**), will be necessary. Furthermore, if it is determined that the engineering requirements of the construction and operation of the HST at the location of the site prohibit the effective avoidance of the site, or if the surrounding conditions prohibit the protection or preservation of the archaeological components, the mitigation of data recovery would be the only feasible mitigation (see **Arch-MM#2**). In addition, provisions will be made with the contracted archaeologist to monitor the site after the burial process is completed.
Arch-MM#4: Halt Work in the Event of an Archaeological Discovery.	If any prehistoric or historic subsurface cultural resources are discovered during ground-disturbing activities, all work within 50 feet of the resources will halt, and the project proponent will consult with a qualified archaeologist to assess the significance of the find, according to CEQA Guidelines Section 15064.5, and any work may proceed on other parts of the project site while mitigation for historical resources or unique archaeological resources is being carried out. If any find is determined to be significant, the project proponent and the archaeologist would meet to determine the appropriate avoidance measures or other appropriate mitigation. All significant cultural materials recovered will be, as necessary and at the discretion of the consulting archaeologist, subject to scientific analysis, professional museum curation, and documentation according to current professional standards. In considering any suggested mitigation proposed by the consulting archaeologist to mitigate impacts on historical resources or unique archaeological resources, it will be determined whether avoidance is necessary and feasible in light of factors such as the nature of the find, project design, costs, and other considerations. If in consultation with the consulting archaeologist, it is determined that a significant archaeological resource is present and that the resource could be adversely affected by the proposed project, the following actions will be followed: • Redesign the project to avoid any adverse effect on the significant archaeological resource. • Implement **Arch-MM#3**, Intentional Site Burial for Site Preservation. • Implement an archaeological data recovery program (ADRP) (unless the archaeologist determines that the archaeological resource is of greater interpretive use than research significance and that interpretive use of the

Impact	Measures to Minimize Harm
	resource is feasible). If the circumstances warrant an ADRP, such a program will be conducted. Together with a project archaeologist, determine the scope of the ADRP. The archaeologist will prepare a draft ADRP. The ADRP will identify how the proposed data recovery program will preserve the significant information that the archaeological resource is expected to contain. That is, the ADRP will identify the scientific/historical research questions that are applicable to the expected resource, the data classes the resource is expected to possess, and how the expected data classes would address the applicable research questions. Data recovery, in general, should be limited to the portions of the historical property that could be adversely affected by the proposed project. Destructive data recovery methods will not be applied to portions of the archaeological resources if nondestructive methods are practical.

Considering the foregoing discussion of the HST project's potential use of Section 4(f) properties, there would be no prudent avoidance alternatives to the use of land from one park property: Camp Pashayan. If the UPRR/SR 99 Alternative were selected, there would be no prudent avoidance alternative to the use of land from two additional park properties: Sharon Avenue Linear Park and County Road 27¾ Linear Park in Madera. As described, the project includes all possible planning identified to date to minimize harm to Section 4(f) properties resulting from use, as required by 49 U.S.C. 303(c)(2).

The UPRR/SR 99 Alternative would potentially have a Section 4(f) use of Riverside Park and Camp Pashayan (according to 49 U.S.C. Section 303(d)). Measures to minimize harm, such as avoidance, minimization, mitigation, and enhancement measures, will be incorporated into the HST project based on consultation with the agencies with jurisdiction.

6.3 BNSF Alternative

6.3.1 BNSF Alternative Description

The BNSF Alternative generally follows the existing BNSF mainline. This alternative would remain at-grade through Merced and would cross under SR 99 at the south end of the city. Just south of SR 99/East Childs Avenue interchange, the BNSF Alternative would cross over SR 99 and UPRR once more as it begins to curve to the east, crossing over the East Mission Avenue Interchange. In would then travel east to the vicinity of Le Grand, where it would turn south and travel adjacent to the BNSF tracks. The BNSF Alternative, includes several design options: the Mariposa Ave, Mission Ave, and Le Grand design options. See Section 2.4.3 of the EIR/EIS for additional detail regarding the BNSF Alternative.

6.3.2 Practicability of BNSF Alternative

The 404(b)(1) Guidelines state that an alternative is practicable "if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of the overall project purposes" (40 CFR 230.10(a)(2)).

6.3.2.1 Cost

In terms of cost, the BNSF Alternative falls between the Hybrid Alternative, at the low end, and the UPRR/SR 99 Alternative at the high end. With the Ave 21 Wye design option, the BNSF Alternative would cost an estimated $4.4 billion on the low end, and would cost an estimated $4.8 billion with the Ave 24 Wye design option. The lower cost option, Avenue 21 Wye, is approximately 14 percent higher than the lowest cost option Hybrid with the Avenue 24 Wye. As stated in the California High Speed Rail Program Draft 2012 Business Plan, the Authority has secured $3.5 billion as part of the American Recovery and

Reinvestment Act of 2009 (Recovery Act or ARRA) and the potential for $9.5 billion from the sale of bonds authorized under Proposition 1A. It is extremely important to note that these funding sources apply to the estimated total 800 plus miles of the California High Speed Rail network. Thus, the BNSF Alternative's potential total cost of up to $4.8 billion would consume about one-third of the total currently available funding for the entire program. See Section 8 for the discussion of capital costs for all HST alternatives.

6.3.2.2 Logistics

One major logistical consideration for the proposed project is constructability and maintainability. Some of the major factors involved in both are:

- Total length of track
- Total length of elevated structures
- Complex crossing angles
- Number and type of crossings over/under existing highways and roadways and rail lines
- Number of river crossings
- Number of high risk and low risk utility conflicts

The BNSF Alternative would present several constructability challenges. It has the longest total track length of all alternatives ranging between 92 miles with Avenue 21 Wye and up to 95 miles with the Avenue 24 Wye (see Table 6.3-1). This results in more track work and construction. The alignment of the BNSF Alternative is relatively inefficient in that it extends farther to the east and then back to the west to join the UPRR/SR99 alignment. BNSF extends approximately 5.5 miles west of the UPRR/SR99 leaving Merced

The BNSF Alternative has one crossing that would have a small skewed crossing angles over the SR99; the location is south of Merced, exiting Merced Station and traveling east toward the BNSF railroad, south of Chowchilla. As discussed in Section 6.2 for the UPRR/SR 99 Alternative, crossings that would occur nearly parallel with the feature they are crossing (small skew angle of crossing) present the most design and construction difficulties and would raise serious concerns for Caltrans with respect to safety of operations of the State Highway System. Not including highway/roadway crossings common to all alternatives, the BNSF Alternative would require the following crossings:

- Small angle crossing of SR99, south of Merced
- Perpendicular crossing of Fresno River and SR145

It is unknown at this time whether Caltrans would issue an encroachment permit for the proposed highway crossings associated with the BNSF Alternative. The safety and design standards for the HST facilities as well as for the highway and roadway facilities must be taken into consideration. These considerations include the placement of columns and other HST features such that they do not pose safety hazards for motorists, the careful planning of construction methods and timing of construction over live traffic (for worker and motorist safety), the need to keep people and goods moving along the highways and roadways, and the need to accommodate the ultimate build-out of the facilities.

The BNSF Alternative, depending on option, has between 94 and 103 utility conflicts. Between 14 and 19 of these conflicts are considered high risk conflicts; this includes conflicts with electrical transmission and power lines, natural gas distribution lines, petroleum and fuel pipelines, and substations. Approximately 77 to 84 low risk utility conflicts would occur, which includes conflicts with cable lines, telephone lines, fiber optic lines, irrigation canals, water lines, sewer lines, stormwater retention ponds, and stormwater pipelines. Utility relocations pose logistic difficulties with temporary outages and can also cause additional natural and community resource impacts. Service outages for rerouting major gas and petroleum pipelines would require coordination with local communities and local public and emergency services. Utility relocation may cause additional impacts to biological resources, farmlands, residential and commercial properties, and parks.

Another substantial concern with the constructability of the BNSF Alternative is its impact to a dairy farm, for which there is no feasible avoidance alternative. The BNSF alignment also crosses the community of Le Grand to join the existing railroad corridor. Design options through the town would require additional elevated structures to minimize the BNSF's community cohesion impacts. In effect, this could divide Le Grand into two separate, ultimately distinct communities. A Le Grand bypass option would require two additional crossings of the existing railroad tracks in order to go to the east of Le Grand and back again to the west. A bypass option would require extended elevated structures to travel over BNSF rails to the east, and then back west after bypassing Le Grand. This adds to the complexity and the cost of the elevated structures. The need to maintain BNSF operation during construction only adds to the constructability concerns. The Avenue 24 Wye connection with the BNSF alterative passes very closely to the CDCG prison facility which raises operational and security concerns for the facility. The roadway overpass of the at-grade HST alignment at Road 21, near the property boundary would provide an elevated vantage point for anyone intending to disrupt prison operations and security. The distance to the overpass (including public access to it) and the prison operations provide challenges for prison security personnel for monitoring activities on the overpass and to prevent any disrupting activities. The BNSF Alternative is the only alternative that would have that effect.

In addition to environmental sensitivity, water crossings pose additional construction constraints to ensure permit conditions are satisfied, and safety of public and workers are ensured during construction. The majority of waterways in the project area flow east to west, while the project is required to run north/south. The BNSF design options have between 88 to 109 water crossings, including the only federal flood control project levee crossing over Owens Creek Diversion Canal (Waterbody Crossings #1126 and #1156). When crossing an existing flood control structure, such as a levee, there are minimum requirements for vertical clearance, horizontal setback, and access. The HST project design intends to minimize impacts on this flood control project, by elevating the profile over the levees and clear spanning the horizontal clearance. This adds to the complexity of design at this location, adding to construction complexity and the cost of the crossing

6.3.3 Aquatic Resources

6.3.3.1 Affected Environment Summary

There are eight design option combinations under the BNSF Alternative (Table 6.4-1). The WSA for the BNSF Alternative North-South alignment with the Ave 21 design option supports a total of approximately 179 acres of jurisdictional waters with the Mariposa Way Le Grand design option combination and 195 acres with the Mariposa Way East of Le Grand design option combination. With the Ave 24 design option, the Mariposa Way Le Grand design option combination supports approximately 165 acres of jurisdictional waters and the Mariposa Way East of Le Grand design option combination supports nearly 170 acres of jurisdictional waters. The Mission Avenue Le Grand design options support approximately 175 acres and 174 acres, respectively, with the Ave 21 and Ave 24 design option combinations; and a total of 186 acres and 184 acres, respectively, with the Mission Avenue East of Le Grand Ave 21 and Ave 24 design option combinations respectively. Table 6.4-1 summarizes the permanent direct, permanent indirect, and temporary direct impacts on each jurisdictional water type that would result from implementing the BNSF Alternative and each design option combination. The WSA for the BNSF Alternative conservatively assumes that all aquatic resources present within the 100-foot wide at-grade construction footprint would

Table 6.4-1
Impacts on Jurisdictional Waters Under the BNSF Alternative

North-South Alignment Isolated and with Wye Design Option	Mariposa Way Design Options				Mission Ave Design Options			
	Le Grand	East of Le Grand	Le Grand	East of Le Grand	Le Grand	East of Le Grand	Le Grand	East of Le Grand
	(Ave 21)		(Ave 24)		(Ave 21)		(Ave 24)	
Vernal Pools								
Direct Permanent Effects (acres)								
North-South Alignment	15.45	11.66	15.35	11.56	16.17	15.88	16.07	15.77
Ave 24 Wye	NA	NA	0.39	0.39	NA	NA	0.39	0.39
Ave 21 Wye	0.23	0.23	NA	NA	0.23	0.23	NA	NA
Total Direct Permanent Effects (acres)	**15.69**	**11.90**	**15.74**	**11.95**	**16.41**	**16.11**	**16.46**	**16.16**
Indirect Permanent Effects (acres)								
North-South Alignment	35.73	38.84	35.63	38.74	33.00	39.76	32.90	39.66
Ave 24 Wye	NA	NA	0.83	0.83	NA	NA	0.83	0.83
Ave 21 Wye	2.53	2.53	NA	NA	2.53	2.53	NA	NA
Total Indirect Permanent Effects (acres)	**38.26**	**41.37**	**36.46**	**39.57**	**35.53**	**42.29**	**33.73**	**40.49**
Seasonal Wetlands								
Direct Permanent Effects (acres)								
North-South Alignment	1.64	1.54	1.64	1.54	1.64	1.62	1.64	1.62
With Ave 24	NA	NA	0.00	0.00	NA	NA	0.00	0.00

North-South Alignment Isolated and with Wye Design Option	Mariposa Way Design Options				Mission Ave Design Options			
	Le Grand	East of Le Grand	Le Grand	East of Le Grand	Le Grand	East of Le Grand	Le Grand	East of Le Grand
	(Ave 21)		(Ave 24)		(Ave 21)		(Ave 24)	
With Ave 21	0.00	0.00	NA	NA	0.00	0.00	NA	NA
Total Direct Permanent Effects (acres)	**1.64**	**1.54**	**1.64**	**1.54**	**1.64**	**1.62**	**1.64**	**1.62**
Indirect Permanent Effects (acres)								
North-South Alignment	1.81	1.87	1.67	1.73	1.81	1.98	1.67	1.84
With Ave 24	NA	NA	0.47	0.47	NA	NA	0.47	0.47
With Ave 21	0.47	0.47	NA	NA	0.47	0.47	NA	NA
Total Indirect Permanent Effects (acres)	**2.28**	**2.34**	**2.14**	**2.20**	**2.28**	**2.45**	**2.14**	**2.31**
Freshwater Marsh								
Direct Permanent Effects (acres)								
North-South Alignment	0.26	0.26	0.26	0.26	0.26	0.24	0.26	0.24
With Ave 24	NA	NA	0.14	0.14	NA	NA	0.14	0.14
With Ave 21	0.04	0.04	NA	NA	0.04	0.04	NA	NA
Total Direct Permanent Effects (acres)	**0.30**	**0.30**	**0.39**	**0.39**	**0.30**	**0.28**	**0.40**	**0.38**
Direct Temporary Effects (acres)								
North-South Alignment	0.03	0.26	0.04	0.03	0.03	0.03	0.03	0.03
With Ave 24	NA	NA	0.00	0.00	NA	NA	0.00	0.00
With Ave 21	0.01	0.01	NA	NA	0.01	0.01	NA	NA
Total Direct Temporary Effects (acres)	**0.04**	**0.27**	**0.04**	**0.03**	**0.04**	**0.04**	**0.03**	**0.03**
Indirect Permanent Effects (acres)								

North-South Alignment Isolated and with Wye Design Option	Mariposa Way Design Options				Mission Ave Design Options			
	Le Grand	East of Le Grand	Le Grand	East of Le Grand	Le Grand	East of Le Grand	Le Grand	East of Le Grand
	(Ave 21)		(Ave 24)		(Ave 21)		(Ave 24)	
North-South Alignment	1.40	1.40	1.39	1.39	1.90	1.38	1.89	1.37
With Ave 24	NA	NA	0.14	0.14	NA	NA	0.13	0.13
With Ave 21	0.15	0.15	NA	NA	0.15	0.15	NA	NA
Total Indirect Permanent Effects (acres)	**1.55**	**1.55**	**1.53**	**1.53**	**2.05**	**1.53**	**2.02**	**1.50**
Palustrine Forested Wetlands								
Direct Permanent Effects (acres)								
North-South Alignment	0.80	1.77	0.80	1.77	0.36	1.53	0.37	1.53
With Ave 24	NA	NA	0.00	0.00	NA	NA	0.00	0.00
With Ave 21	0.00	0.00	NA	NA	0.00	0.00	NA	NA
Total Direct Permanent Effect (acres)	**0.80**	**1.77**	**0.80**	**1.77**	**0.36**	**1.53**	**0.37**	**1.53**
Direct Temporary Effects (acres)								
North-South Alignment	0.28	1.77	0.28	0.33	0.06	0.27	0.06	0.27
With Ave 24	NA	NA	0.00	0.00	NA	NA	0.00	0.00
With Ave 21	0.00	0.00	NA	NA	0.00	0.00	NA	NA
Total Direct Temporary Effects(acres)	**0.28**	**1.77**	**0.28**	**0.33**	**0.06**	**0.27**	**0.06**	**0.27**
Indirect Permanent Effects (acres)								
North-South Alignment	8.80	9.32	8.80	9.32	2.18	3.23	2.18	3.23
With Ave 24	NA	NA	0.00	0.00	NA	NA	0.00	0.00
With Ave 21	0.00	0.00	NA	NA	0.00	0.00	NA	NA

North-South Alignment Isolated and with Wye Design Option	Mariposa Way Design Options				Mission Ave Design Options			
	Le Grand	East of Le Grand	Le Grand	East of Le Grand	Le Grand	East of Le Grand	Le Grand	East of Le Grand
	(Ave 21)		(Ave 24)		(Ave 21)		(Ave 24)	
Total Indirect Permanent Effects (acres)	**8.80**	**9.32**	**8.80**	**9.32**	**2.18**	**3.23**	**2.18**	**3.23**
Natural Watercourses								
Direct Permanent Effects (acres)								
North-South Alignment	4.58	5.59	4.89	5.90	4.94	5.18	5.25	5.49
With Ave 24	NA	NA	1.88	1.88	NA	NA	1.88	1.88
With Ave 21	1.09	1.09	NA	NA	1.09	1.09	NA	NA
Total Direct Permanent Effects (acres)	**5.67**	**6.68**	**6.76**	**7.77**	**6.03**	**6.27**	**7.12**	**7.37**
Direct Temporary Effects (acres)								
North-South Alignment	5.31	5.59	5.26	5.49	4.88	4.89	4.83	4.84
With Ave 24	NA	NA	0.36	0.36	NA	NA	0.36	0.36
With Ave 21	0.05	0.05	NA	NA	0.05	0.05	NA	NA
Total Direct Temporary Effects (acres)	**5.36**	**5.64**	**5.62**	**5.85**	**4.93**	**4.94**	**5.19**	**5.21**
Indirect Permanent Effects (acres)								
North-South Alignment	23.65	23.12	20.53	19.99	17.57	17.98	14.45	14.85
With Ave 24	NA	NA	1.88	1.88	NA	NA	7.81	7.81
With Ave 21	7.92	7.92	NA	NA	7.92	7.92	NA	NA
Total Indirect Permanent Effects (acres)	**31.57**	**31.04**	**22.40**	**21.87**	**25.50**	**25.90**	**22.26**	**22.67**

North-South Alignment Isolated and with Wye Design Option	Mariposa Way Design Options				Mission Ave Design Options			
	Le Grand	East of Le Grand	Le Grand	East of Le Grand	Le Grand	East of Le Grand	Le Grand	East of Le Grand
	(Ave 21)		(Ave 24)		(Ave 21)		(Ave 24)	
Constructed Watercourses								
Direct Permanent Effects (acres)								
North-South Alignment	4.44	4.23	4.55	4.34	7.67	8.12	7.78	8.24
With Ave 24	NA	NA	6.56	6.56	NA	NA	6.56	6.56
With Ave 21	6.11	6.11	NA	NA	6.11	6.11	NA	NA
Total Direct Permanent Effects (acres)	**10.55**	**10.34**	**11.11**	**10.90**	**13.78**	**14.24**	**14.34**	**14.79**
Direct Temporary Effects (acres)								
North-South Alignment	0.81	4.23	0.81	0.82	1.05	1.21	1.05	1.21
With Ave 24	NA	NA	0.95	0.95	NA	NA	0.95	0.95
With Ave 21	0.12	0.12	NA	NA	0.12	0.12	NA	NA
Total Direct Temporary Effects (acres)	**0.93**	**4.35**	**1.75**	**1.76**	**1.17**	**1.33**	**1.99**	**2.16**
Indirect Permanent Effects (acres)								
North-South Alignment	10.46	12.16	10.42	12.12	12.21	13.80	12.17	13.76
With Ave 24	NA	NA	6.56	6.56	NA	NA	8.74	8.74
With Ave 21	11.25	11.25	NA	NA	11.25	11.25	NA	NA
Total Indirect Permanent Effects (acres)	**21.71**	**23.41**	**16.98**	**18.68**	**23.45**	**25.04**	**20.91**	**22.50**
Constructed Basins								
Direct Permanent Effects(acres)								
North-South Alignment	5.33	5.78	5.33	5.78	5.65	5.58	5.65	5.58

North-South Alignment Isolated and with Wye Design Option	Mariposa Way Design Options				Mission Ave Design Options			
	Le Grand	East of Le Grand	Le Grand	East of Le Grand	Le Grand	East of Le Grand	Le Grand	East of Le Grand
	(Ave 21)		(Ave 24)		(Ave 21)		(Ave 24)	
With Ave 24	NA	NA	1.36	1.36	NA	NA	1.36	1.36
With Ave 21	1.21	1.21	NA	NA	1.21	1.21	NA	NA
Total Direct Permanent Effects (acres)	**6.54**	**6.99**	**6.69**	**7.14**	**6.86**	**6.80**	**7.01**	**6.94**
Direct Temporary Effects (acres)								
North-South Alignment	0.14	5.78	0.14	0.11	0.24	0.24	0.24	0.24
With Ave 24	NA	NA	0.54	0.54	NA	NA	0.54	0.54
With Ave 21	0.04	0.04	NA	NA	0.04	0.04	NA	NA
Total Direct Temporary Effects (acres)	**0.18**	**5.83**	**0.68**	**0.65**	**0.29**	**0.29**	**0.78**	**0.78**
Indirect Permanent Effects (acres)								
North-South Alignment	18.49	20.54	17.65	19.70	24.10	23.47	23.26	22.62
With Ave 24	NA	NA	1.36	1.36	NA	NA	5.55	5.55
With Ave 21	2.40	2.40	NA	NA	2.40	2.40	NA	NA
Total Indirect Permanent Effects (acres)	**20.89**	**22.94**	**19.01**	**21.05**	**26.50**	**25.87**	**28.82**	**28.18**
Open Water								
Direct Permanent Effects (acres)								
North-South Alignment	2.38	1.70	2.40	1.72	2.40	2.33	2.42	2.35
With Ave 24	NA	NA	0.34	0.34	NA	NA	0.34	0.34
With Ave 21	0.16	0.16	NA	NA	0.16	0.16	NA	NA
Total Direct Permanent Effects (acres)	**2.54**	**1.86**	**2.75**	**2.07**	**2.57**	**2.49**	**2.77**	**2.69**

North-South Alignment Isolated and with Wye Design Option	Mariposa Way Design Options				Mission Ave Design Options			
	Le Grand	East of Le Grand	Le Grand	East of Le Grand	Le Grand	East of Le Grand	Le Grand	East of Le Grand
	(Ave 21)		(Ave 24)		(Ave 21)		(Ave 24)	
Indirect Permanent Effects (acres)								
North-South Alignment	3.22	3.21	3.22	3.21	3.32	3.30	3.32	3.30
With Ave 24	NA	NA	0.13	0.13	NA	NA	0.13	0.13
With Ave 21	0.07	0.07	NA	NA	0.07	0.07	NA	NA
Total Indirect Permanent Effects	**3.29**	**3.28**	**3.35**	**3.34**	**3.39**	**3.37**	**3.45**	**3.43**
Summary of Total Effects on all Waters								
Total Direct Permanent Effects (acres)	**43.73**	**41.38**	**45.88**	**43.53**	**47.95**	**49.34**	**50.11**	**51.48**
Total Direct Temporary Effects (acres)	**6.79**	**17.86**	**8.37**	**8.62**	**6.49**	**6.87**	**8.05**	**8.45**
Total Indirect Permanent Effects (acres)	**128.35**	**135.25**	**110.67**	**117.56**	**120.88**	**129.68**	**115.51**	**124.31**
TOTAL DIRECT AND INDIRECT PERMANENT EFFECTS (acres)	**172.08**	**176.63**	**156.55**	**161.09**	**168.83**	**179.02**	**165.62**	**175.79**

be directly and permanently lost. For elevated segments, a 60-foot wide footprint is assumed, and temporary impacts are assumed to occur in the 20-foot wide area to either side of the project footprint.[2] It is further assumed that all aquatic resources within 250 feet of the project footprint would be subject to permanent indirect impacts. Potential indirect impacts on jurisdictional waters that could result from implementing the project include reduction in water quality caused by runoff, erosion, and siltation; changes in hydrologic regime caused by damage to the hardpan soil layer, sedimentation, stream or wetland fragmentation, soil compaction, disruption of the upland micro watershed area, barriers to water flow (e.g., the rail bed); and changes in wetland plant communities from introduction or spread of invasive plant species. Because all jurisdictional waters present within the WSA are considered to be impacted, either directly or indirectly, the Mission Avenue East of Le Grand with Ave 21 design option combination represents the worst-case scenario, with regards to direct and indirect permanent impacts on jurisdictional waters (179 acres), under the BNSF Alternative. The best-case scenario under the BNSF Alternative would be the Mariposa Way Le Grand with Ave 24 design option combination with a total of approximately 156 acres of direct and indirect permanent impacts on jurisdictional waters In terms of direct but temporary impacts, the best-case scenario is the Mission Avenue Le Grand with the Ave 21 design option with a total of 6.49 acres of direct temporary impacts while the worst-case scenario is the Mariposa Way East of Le Grand with the Avenue 21 design option with a total of 17.86 acres of direct temporary impacts.

When considering permanent direct impacts versus permanent indirect impacts, the Mission Avenue East of Le Grand with Ave 24 design option combination has the greatest permanent direct impacts (51.48 acres) on jurisdictional waters while the Mariposa Way East of Le Grand with Ave 21 design option combination has the least permanent direct impacts (41.38 acres). The Mariposa Way East of Le Grand with Ave 21 design option combination has the greatest permanent indirect impacts (135.25 acres) while the Mariposa Way Le Grand with Ave 24 design option combination has the least permanent indirect impacts (110.67 acres). Permanent direct impacts on vernal pools under the BNSF Alternative range from approximately 12 acres with the Mariposa Way East of Le Grand and either the Ave 21 or Ave 24 design option combination, to approximately 16 acres under every other design option combination. Permanent indirect impacts on vernal pools range from approximately 34 acres under the Mission Ave Le Grand with Ave 24 design option combination to approximately 42 acres under the Mission Ave East of Le Grand with Ave 21 design option combination. Permanent direct and permanent indirect impacts on seasonal wetlands are very similar among all of the BNSF Alternative design option combinations.

6.3.3.2 Construction Period Impacts

The BNSF Alternative footprint contains the following plant communities and land cover types associated with aquatic ecosystems: Great Valley mixed riparian forest, other riparian habitat, vernal pools, other seasonal wetlands, coastal and valley freshwater marsh, and natural and constructed watercourses. As described above, some of these communities are special-status and are regulated or require mitigation because of their habitat value (e.g., Great Valley mixed riparian forest). Great Valley mixed riparian forest and other riparian habitat is considered a sensitive natural community due to their relative scarcity and importance in sustaining biological resources; as such, this habitat is regulated by the CDFG, USFWS, and USACE. Any impacts that result in reduction of riparian habitat values would be considered impacts with substantial intensity under NEPA and significant under CEQA.

Because construction of the BNSF Alternative has the potential to adversely affect riparian habitat, other sensitive natural communities, and federally protected wetlands for reasons identified above, the impact is considered an impact with moderate intensity under NEPA and significant under CEQA. The moderate intensity of the effect relates to the lower number of acres located within the construction footprint.

[2] Because all construction activity will be contained within the 100-foot wide footprint for at-grade segments, no temporary impacts are anticipated outside the 100-foot wide footprint for at-grade segments.

Habitats of Concern

Jurisdictional Waters: Natural and constructed watercourses, vernal pools, other seasonal wetlands, and coastal and valley freshwater marsh are present within and adjacent to the construction footprint. Jurisdictional waters are considered sensitive natural communities due to their relative scarcity and importance in sustaining biological resources and are also regulated by USACE. Any impacts that result in reduction of jurisdictional waters are considered impacts of moderate to substantial intensity under NEPA and significant under CEQA. The moderate intensity of the effect relates to the relatively low number of acres located within the construction footprint versus acreages that may have more far-reaching regional implications.

Because construction of the BNSF Alternative has the potential to result in direct and indirect impacts to jurisdictional waters as described above, the impact is considered an impact with moderate intensity under NEPA and significant under CEQA.

Construction Period Mitigation Measures

Construction period mitigation measures are those that are designed to minimize the extent of temporary impacts to wetland features and those designed to restore temporarily impacted features to their original functions and values after the completion of construction. The mitigation measures listed here are summaries of mitigation measures included in the final EIR/EIS. Consult that document for a complete description of these mitigation measures:

- **Bio-MM#1: Designate Project Biologist(s), Contractor's Biologist(s), and Project Biological Monitor(s).** During contract procurement and for construction management and Contractor selection and prior to ground-disturbing activities, the Authority or its designee will designate a Project Biologist(s), a Contractor's Biologist(s), and a Project Biological Monitor(s) responsible for conducting biological monitoring, overseeing regulatory compliance requirements, and monitoring restoration activities associated with ground-disturbing activities in accordance with the adopted mitigation measures and applicable laws.

- **Bio-MM#2: Regulatory Agency Access.** If requested, before, during, or upon completion of ground-disturbing activities, the Contractor will allow access by USFWS, USACE, RWQCB, and CDFG staff to the construction site. Due to safety concerns, all visitors will check in with the Resident Engineer prior to accessing the construction site. The final product will be a memorandum prepared by the Project Biologist within 1 day documenting agency access and issues raised during the field meeting and submitted to the Mitigation Manager. Any non-compliance issues will be reported to the Authority or its designee.

- **Bio-MM#3: Prepare and Implement a Worker Environmental Awareness Program**. Prior to ground-disturbing activities, the Mitigation Manager or designee will prepare and implement a WEAP for construction crews. WEAP training materials will include the following: discussion of the federal ESA, CESA, BGEPA, and the MBTA; consequences and penalties for violation or 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; hazardous substance spill prevention and containment measures; the contact person in the event of the discovery of a dead or injured wildlife species; and review of mitigation measures. In the WEAP, the Mitigation Manager will detail construction timing in relation to habitat and species' life stage requirements and discuss project maps, showing areas of planned minimization and avoidance measures.

- **Bio-MM#4: Prepare and Implement a Weed Control Plan.** Prior to ground-disturbing activities, the contractor will prepare and implement a Weed Control Plan to minimize or avoid the spread of weeds during ground-disturbing activities. This will be accomplished by removing all invasive plants

on a monthly basis so that invasive species are not allowed to become established. The Weed Control Plan will address the following:

- Identify weed control treatments including permitted herbicides, and manual and mechanical methods for application. Restrict herbicide application from use in environmentally sensitive areas (ESAs).
- Determine timing of the weed control treatment for each plant species.
- Identify fire prevention measures.

The contractor will implement the Weed Control Plan during the construction period and require that maintenance crews follow the guidelines in the Weed Control Plan during the project period. The Authority or its designee will appoint the responsible party during the operations period. A monthly memorandum will be prepared by the Project Biologist to document the progress of the Plan and its implementation.

- **Bio-MM#5: Prepare and Implement a Biological Resources Management Plan.** During final design, the Project Biologist will prepare the Biological Resources Management Plan (BRMP), and assemble the biological resources mitigation measures. In the BRMP, the Project Biologist will include terms and conditions from applicable permits and agreements and make provisions for monitoring assignments, scheduling, and responsibility. The BRMP will also include habitat replacement and revegetation, protection during ground-disturbing activities, performance (growth) standards, maintenance criteria, and monitoring requirements for temporary and permanent native plant community impacts. The BRMP will form the parameters for the biology mitigation measures from this EIR/EIS, including terms and conditions as applicable from the USFWS, USACE, RWQCB, and CDFG permits.
- **Bio-MM#6: Prepare and Implement a Restoration and Revegetation Plan.** During final design, the Contractor's Biologist will prepare a restoration and revegetation plan (RRP) for upland communities and verified by the Project Biologist. This is a complement for site restoration in addition to the temporary effects for riparian plant communities (Bio-MM#15) and for jurisdictional waters (Bio-MM#43). In the RRP, address impacts on habitat subject to temporary ground disturbances that will require decompaction or regrading, if appropriate.
- **Bio-MM#7: Delineate Environmentally Sensitive Areas and Environmentally Restricted Areas (on plans and in-field).** Prior to ground-disturbing activities, to the extent practicable, the Project Biologist will verify that environmental sensitive areas (ESAs) and ERAs are delineated as appropriate. ESAs are areas within the construction zones containing suitable habitat for special-status species and habitats of concern that may allow construction activities, but have restrictions based on the presence of special-status species or habitats of concern at the time of construction. ERAs are areas outside the construction footprint that must be protected in-place during all construction activities.
- **Bio-MM#8: Equipment Staging Areas.** Prior to ground-disturbing activities, the Contractor will locate staging areas for construction equipment outside sensitive biological resources including habitat for special-status species, habitats of concern(i.e. wetlands, waters of the U.S., riparian communities, etc.), and wildlife movement corridors, to the maximum extent possible. The Project Biologist will submit memoranda to the Mitigation Manager documenting compliance.
- **Bio-MM#10: Vehicle Traffic.** During ground-disturbing activities, the Contractor will restrict project-related vehicle traffic, within the construction area, to established roads, construction areas, and other designated areas. Establish vehicle traffic locations disturbed by previous activities to prevent further adverse effects. Observe a 20 mph speed limit for construction areas with potential special-status species habitat. Clearly flag and mark access routes and prohibit off-road traffic. The

Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance on a weekly basis.

- **Bio-MM#14: Post-Construction Compliance Reports.** After each construction period is completed, the Project Biologist will submit post-construction compliance reports consistent with the appropriate agency (e.g., USFWS, NMFS and CDFG) protocols, including compliance with resource agency permits (i.e., Section 7 of FESA, Section 2081 of CESA and Section 401 and 404 of FCWA and 1600 of Fish and Game Code). The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance. The frequency of the memorandum compilation and submission will be consistent with regulatory compliance permits.

- **Bio-MM#15: Restore Temporary Riparian Impacts.** During post-construction, the Contractor's Biologist will revegetate all disturbed riparian areas using appropriate plants and seed mixes. The Project Biologist will monitor restoration activities consistent with provisions in the Habitat Mitigation and Monitoring Plan (HMMP) as described in Bio-MM#57. The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance and other reporting requirements in the 1600 Streambed Alteration Agreement.

- **Bio-MM#43: Restore Temporary Impacts on Jurisdictional Waters.** During or post-construction, the Contractor will restore disturbed jurisdictional waters using stockpiled and segregated soils. The Contractor's Biologist will conduct revegetation using appropriate plants and seed mixes, and conduct maintenance monitoring consistent with the provisions in the HMMP (Bio-MM#57). The Project Biologist will document compliance with memorandum submitted to the Mitigation Manager.

- **Bio-MM#44: Monitor Construction Activities within Jurisdictional Waters.** During ground-disturbing activities, the Project Biological Monitor will conduct monitoring within and adjacent to jurisdictional waters, including monitoring of the installation of protective devices (silt fencing, sandbags, fencing, etc.), installation and/or removal of creek crossing fill, construction of access roads, vegetation removal, and other associated construction activities. The Project Biological Monitor will conduct biological monitoring to document adherence to habitat avoidance and minimization measures addressed in the project mitigation measures and as listed in the USFWS, CDFG, RWQCB, and USACE permits conditions.

- **Bio-MM#57: Prepare and Implement a Habitat Mitigation and Monitoring Plan.** As part of the USFWS, USACE, RWQCB, and CDFG permit applications and prior to ground-disturbing activities, the Authority or its designee will prepare an HMMP to mitigate for temporary and permanent impacts on jurisdictional waters and state streambeds. In the HMMP, detail performance standards, including percent cover of natives, survivability, tree height requirements, wildlife utilization, the acreage basis, restoration ratios, and the combination of onsite and/or offsite mitigation; give preference to conduct the mitigation within the same watershed where the impact occurs. Work with the USACE, RWQCB, and CDFG to develop appropriate avoidance, minimization, mitigation, and monitoring measures to be incorporated into the HMMP. In the HMMP, outline the intent to mitigate for the lost functions and values of impacts on jurisdictional waters and state streambeds consistent with resource agency requirements and conditions presented in Sections 404 and 401 of the CWA and Section 1600 of the CFGC.

Other measures that potentially apply to aquatic resources include:

- **AQ-MM#1**: Reduce Fugitive Dust by Watering.
- **AQ-MM#3**: Reduce Fugitive Dust from Material Hauling.

Significance of Construction Period Impacts

Construction of the BNSF Alternative has the potential to result in direct and indirect temporary impacts to jurisdictional waters during the construction period. However, these impacts are, by definition, temporary and will be restored after the completion of construction. Therefore, the impact is considered an impact with moderate intensity under NEPA and significant under CEQA.

6.3.3.3 Project Period Impacts

The BNSF Alternative footprint contains the following plant communities and land cover types associated with aquatic ecosystems: Great Valley mixed riparian forest, other riparian habitat, vernal pools, other seasonal wetlands, coastal and valley freshwater marsh, and natural and constructed watercourses. Some of these communities are special-status and are regulated or require mitigation because of their habitat value (e.g., Great Valley mixed riparian forest). Great Valley mixed riparian forest and other riparian habitat is considered a sensitive natural community due to their relative scarcity and importance in sustaining biological resources; as such, this habitat is regulated by the CDFG, USFWS, and USACE. Any impacts that result in reduction of riparian habitat values would be considered to have moderate to substantial intensity under NEPA and significant under CEQA.

Because implementation of the BNSF Alternative has the potential to adversely affect riparian habitat, other sensitive natural communities, and federally protected wetlands for reasons identified above, the impact is considered an impact with moderate intensity under NEPA and significant under CEQA. The moderate intensity of the effect relates to the low number of acres located within the construction footprint.

Habitats of Concern: Jurisdictional Waters

Natural and constructed watercourses, vernal pools, other seasonal wetlands, and coastal and valley freshwater marshes are present within the surrounding area of the BNSF Alternative. Jurisdictional waters are considered sensitive natural communities due to their relative scarcity and importance in sustaining biological resources and are also regulated by USACE. Any impacts that result in reduction of jurisdictional waters would be considered to have moderate to substantial intensity under NEPA and be significant under CEQA.

Project period impacts to jurisdictional wetlands are those that occur after the completion of construction and are associated with the operation of the project. These impacts are conservatively considered permanent direct impacts for those jurisdictional features within the project footprint and permanent indirect impacts for those features within 250 feet of the edge of the project footprint. The project footprint for at-grade segments is 100 feet wide. The project footprint for elevated segments is 60 feet wide, with an additional 20 feet to either side of the 60-foot wide footprint assumed to be temporarily impacted during construction.[3]

Because implementation of the BNSF Alternative has the potential to result in direct and indirect impacts to jurisdictional waters as described above, the impact is considered an impact with substantial intensity under NEPA and significant under CEQA.

Project Period Mitigation Measures

The following mitigation measures apply to mitigation for impacts of jurisdictional wetland features from the project period:

[3] The area of permanent direct impact for elevated segments is conservatively assumed to be 100 feet wide for impacts to vernal pools.

- **Bio-MM#56: Conduct Delineation of Jurisdictional Waters and State Streambeds.** The Authority or its designee, prior to final design, prepare a jurisdictional delineation, documenting jurisdictional waters and state streambeds consistent with USACE, RWQCB, and CDFG guidance. As part of the delineation, determine the functions and values of the jurisdictional waters using accepted methods such as the California Rapid Assessment Method so that the functions and values have been replaced and that no net loss of jurisdictional waters and state streambed values occurs. Develop habitat replacement guidelines to identify and quantify habitats that are to be removed and identify the locations for restoring or relocating habitats. The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance.

- **Bio-MM#57: Prepare and Implement a Habitat Mitigation and Monitoring Plan.** As part of the USFWS, USACE, RWQCB, and CDFG permit applications and prior to ground-disturbing activities, the Authority or its designee will prepare an HMMP to mitigate for temporary and permanent impacts on jurisdictional waters and state streambeds. In the HMMP, detail performance standards, including percent cover of natives, survivability, tree height requirements, wildlife utilization, the acreage basis, restoration ratios, and the combination of onsite and/or offsite mitigation; give preference to conduct the mitigation within the same watershed where the impact occurs. Work with the USACE, RWQCB, and CDFG to develop appropriate avoidance, minimization, mitigation, and monitoring measures to be incorporated into the HMMP. In the HMMP, outline the intent to mitigate for the lost functions and values of impacts on jurisdictional waters and state streambeds consistent with resource agency requirements and conditions presented in Sections 404 and 401 of the CWA and Section 1600 of the CFGC.

- **Bio-MM#58: Compensate for Permanent Impacts on Jurisdictional Waters.** The Authority or its designee will mitigate permanent wetland impacts through compensation determined in consultation with the USACE, RWQCB, USFWS, and CDFG, in order to be consistent with the HMMP (Bio-MM#57). Regulatory compliance for jurisdictional waters includes relevant terms and conditions from the USACE 404 Permit, RWQCB 401 Permit, and CDFG 1600 Streambed Alteration Agreement. The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance. Compensation will include one or more of the following:

  - Purchase of credits from an agency-approved mitigation bank.
  - Fee-title-acquisition of natural resource agency-related property.
  - Purchase or establishment of a conservation easement with an endowment for long-term management of the property-specific conservation values.
  - In-lieu fee contribution determined through negotiation and consultation with the various natural resource regulatory agencies.

  Base compensation for permanent impacts on the following ratios (acres of mitigation to acres of impact), pending agency confirmation:

  - Vernal pools and other seasonal wetlands: 2:1 Preservation and 1:1 Creation.
  - Coastal and Valley Freshwater Marsh: 1:1.
  - Other Wetlands: Between 1.1:1 and 1.5:1 (1:1 onsite and 0.1 to 0.5:1 offsite), based on function and values temporarily lost.

The ratios will be determined in consultation with the appropriate agencies.

Significance of Project Period Impacts

Jurisdictional waters are considered sensitive natural communities due to their relative scarcity and importance in sustaining biological resources and are also regulated by USACE. Any impacts that result in reduction of jurisdictional waters would be considered to have moderate to substantial intensity under NEPA and to be significant under CEQA.

Because implementation of the BNSF Alternative has the potential to result in direct and indirect impacts to jurisdictional waters as described above, the impact is considered an impact with substantial intensity under NEPA and significant under CEQA.

6.3.3.4 Cumulative Construction Period Impacts

The proposed project, in conjunction with reasonably foreseeable projects, would increase the extent and concentration of invasive plant species. Without weed control measures, potential impacts resulting from the spread of these species could have substantial intensity under NEPA and be cumulatively considerable under CEQA.

The proposed project, in conjunction with reasonably foreseeable projects, could contribute to potential cumulative impacts on wetlands and other Waters of the United States and state (e.g., vernal pools and creeks with a riparian corridor). The BNSF Alternative would have the greatest potential for cumulative impacts because it would have the greatest impacts on biological resources and wetlands.

Wetlands may be affected by the project and other foreseeable projects. Potential wetland losses would be small relative to the quantity of existing wetland habitat in the study area but would contribute to the net loss of wetland habitat within the California Central Valley. Therefore, cumulative impacts would likely have substantial intensity under NEPA and be cumulatively considerable under CEQA. Avoidance, minimization, and mitigation measures would minimize impacts on wetlands.

Cumulative Construction Period Mitigation Measures

There are no specific mitigation measures proposed to address cumulative impacts to jurisdictional features during the construction period.

Significance of Cumulative Construction Period

After implementing avoidance and minimization measures, and mitigation measures for unavoidable impacts summarized previously, the cumulative construction and operational impacts on biological resources will remain impacts with moderate intensity under NEPA and cumulatively considerable under CEQA.

6.3.3.5 Cumulative Project Period Impacts

The HST System as a whole would have significant impacts on sensitive biological resources and wetlands. Portions of the HST System located in new corridors could result in disturbance of sensitive habitats, as described in the 2005 Statewide Program EIR/EIS (Authority and FRA 2005) and the 2008 Bay Area to Central Valley Program EIR/EIS (Authority and FRA 2008). The HST System could also pose a significant barrier to the movement of wildlife in areas where it severs wildlife movement corridors, such as those in the East Bay to Central Valley and the San Jose to Central Valley corridors.

Wetlands may be affected by the project and other foreseeable projects. Potential wetland losses would be small relative to the quantity of existing wetland habitat in the study area but would contribute to the net loss of wetland habitat within the California Central Valley. Therefore, cumulative impacts would likely have substantial intensity under NEPA and be cumulatively considerable under CEQA. Avoidance, minimization, and mitigation measures would minimize impacts on wetlands.

Cumulative Project Period Mitigation Measures

Beyond the mitigation measures summarized above to minimize and mitigate impacts to jurisdictional waters and aquatic habitats, there are no additional mitigation measures proposed specifically to address cumulative impacts to jurisdictional features during the project period.

Significance of Cumulative Project Period

After implementing avoidance and minimization measures, and mitigation measures for unavoidable impacts, the cumulative construction and operational impacts on biological resources will remain impacts with moderate intensity under NEPA and cumulatively considerable under CEQA.

6.3.4 Non-Aquatic Biological Resources

Non-aquatic biological resources that could potentially be affected the by the BNSF Alternative include special-status plant species, special-status wildlife species, sensitive habitat types including riparian habitats, designated critical habitat, and wildlife movement corridors.

The BNSF Alternative is the only alternative that is expected to result in impacts to designated critical habitat for Conservancy fairy shrimp, vernal pool tadpole shrimp, vernal pool fairy shrimp, Greene's tuctoria, succulent owl's clover, and San Joaquin Orcutt grass near the town of Le Grand. Critical habitat is a specific geographic area that the U.S. Fish and Wildlife Service or the National Marine Fisheries Service has designated, through formal notice-and-comment rulemaking, as essential for the conservation of a listed species and that may require special management and protection. A critical habitat designation protects areas that are necessary for the conservation of the species by requiring Federal agencies to consult with USFWS and/or NMFS on actions they carry out, fund, or authorize to ensure that their actions will not destroy or adversely modify designated critical habitat for any listed species.

6.3.4.1 Special-Status Plant Species

Affected Environment

The affected environment for special-status plant species on the BNSF Alternative is similar to the description provided for the UPRR/SR 99 Alternative. The footprint and area of indirect impact for the BNSF Alternative contains suitable habitat for 36 special-status plant species. No special-status plant species have been found to date within the area available for direct, focused survey. The estimate of impacts to special-status plant species described below is based on suitable habitat available for special-status plant species known to occur in the vicinity of the footprint of the BNSF Alternative. Because the BNSF Alternative crosses some areas of lesser disturbed habitat than the UPRR/SR 99 Alternative, there is a higher potential of suitable habitat to be occupied by Special-status plants.

Table 6.4-2 below provides potential impacts in acres to special-status aquatic plant species within the footprint of the BNSF Alternative.

Table 6.4-2
Impacts to Special Status Aquatic Plant Species under the BNSF Alternative

North-South Alignment Isolated and with Wye Design Option	BNSF Alternative							
	Mariposa Way Design Options				Mission Ave Design Options			
	Le Grand	East of Le Grand	Le Grand	East of Le Grand	Le Grand	East of Le Grand	Le Grand	East of Le Grand
	(Ave 21)		(Ave 24)		(Ave 21)		(Ave 24)	
Colusa grass								
Direct Permanent Effect (acres)								
North-South Alignment	0.01	0.07	0.01	0.07	0.13	0.13	0.13	0.13
Ave 24 Wye	NA	NA	0.00	0.00	NA	NA	0.00	0.00
Ave 21 Wye	0.00	0.00	NA	NA	0.00	0.00	NA	NA
Total Direct Permanent Effect (acres)	**0.01**	**0.07**	**0.01**	**0.07**	**0.13**	**0.13**	**0.13**	**0.13**
Indirect Permanent Effects (acres)								
North-South Alignment	1.24	1.37	1.24	1.37	0.74	0.74	0.74	0.74
Ave 24 Wye	NA	NA	0.00	0.00	NA	NA	0.00	0.00
Ave 21 Wye	0.00	0.00	NA	NA	0.00	0.00	NA	NA
Total Indirect Permanent Effect (acres)	**1.24**	**1.37**	**1.24**	**1.37**	**0.74**	**0.74**	**0.74**	**0.74**
San Joaquin Valley Orcutt grass								
Direct Permanent Effect (acres)								
North-South Alignment	17.72	13.14	17.63	13.06	18.46	18.07	18.38	17.98
Ave 24 Wye	NA	NA	0.40	0.40	NA	NA	0.40	0.40

North-South Alignment Isolated and with Wye Design Option	BNSF Alternative							
	Mariposa Way Design Options				Mission Ave Design Options			
	Le Grand	East of Le Grand	Le Grand	East of Le Grand	Le Grand	East of Le Grand	Le Grand	East of Le Grand
	(Ave 21)		(Ave 24)		(Ave 21)		(Ave 24)	
Ave 21 Wye	0.27	0.27	NA	NA	0.27	0.27	NA	NA
Total Direct Permanent Effect (acres)	**17.99**	**13.41**	**18.04**	**13.46**	**18.73**	**18.33**	**18.78**	**18.38**
Indirect Permanent Effects (acres)								
North-South Alignment	16.84	17.38	16.81	17.36	17.05	20.50	17.03	20.48
Ave 24 Wye	NA	NA	0.54	0.54	NA	NA	0.54	0.54
Ave 21 Wye	0.73	0.73	NA	NA	0.73	0.73	NA	NA
Total Indirect Permanent Effect (acres)	**17.57**	**18.11**	**17.36**	**17.90**	**17.79**	**21.24**	**17.57**	**21.02**
Hairy Orcutt grass								
Direct Permanent Effect (acres)								
North-South Alignment	7.20	7.20	7.22	7.22	7.32	7.32	7.35	7.35
Ave 24 Wye	NA	NA	0.25	0.25	NA	NA	0.25	0.25
Ave 21 Wye	0.24	0.24	NA	NA	0.24	0.24	NA	NA
Total Direct Permanent Effect (acres)	**7.44**	**7.44**	**7.47**	**7.47**	**7.57**	**7.57**	**7.60**	**7.60**
Indirect Permanent Effects (acres)								
North-South Alignment	6.87	6.87	6.84	6.84	6.37	6.37	6.35	6.35
Ave 24 Wye	NA	NA	0.51	0.51	NA	NA	0.51	0.51
Ave 21 Wye	0.47	0.47	NA	NA	0.47	0.47	NA	NA

North-South Alignment Isolated and with Wye Design Option	BNSF Alternative							
	Mariposa Way Design Options				Mission Ave Design Options			
	Le Grand	East of Le Grand	Le Grand	East of Le Grand	Le Grand	East of Le Grand	Le Grand	East of Le Grand
	(Ave 21)		(Ave 24)		(Ave 21)		(Ave 24)	
Total Indirect Permanent Effect (acres)	**7.34**	**7.34**	**7.35**	**7.35**	**6.84**	**6.84**	**6.86**	**6.86**
Greene's tuctoria								
Direct Permanent Effect (acres)								
North-South Alignment	16.29	11.71	16.31	11.73	17.03	16.64	17.05	16.66
Ave 24 Wye	NA	NA	0.40	0.40	NA	NA	0.40	0.40
Ave 21 Wye	0.24	0.24	NA	NA	0.24	0.24	NA	NA
Total Direct Permanent Effect (acres)	**16.53**	**11.96**	**16.71**	**12.14**	**17.27**	**16.88**	**17.45**	**17.06**
Indirect Permanent Effects (acres)								
North-South Alignment	14.70	15.24	14.72	15.26	14.91	18.36	14.94	18.39
Ave 24 Wye	NA	NA	0.54	0.54	NA	NA	0.54	0.54
Ave 21 Wye	0.47	0.47	NA	NA	0.47	0.47	NA	NA
Total Indirect Permanent Effect (acres)	**15.17**	**15.71**	**15.26**	**15.81**	**15.38**	**18.84**	**15.48**	**18.93**
Succulent owl's-clover								
Direct Permanent Effect (acres)								
North-South Alignment	13.21	8.64	13.10	8.53	13.95	13.56	13.84	13.45
Ave 24 Wye	NA	NA	0.15	0.15	NA	NA	0.15	0.15
Ave 21 Wye	0.03	0.03	NA	NA	0.03	0.03	NA	NA

North-South Alignment Isolated and with Wye Design Option	BNSF Alternative							
	Mariposa Way Design Options				Mission Ave Design Options			
	Le Grand	East of Le Grand	Le Grand	East of Le Grand	Le Grand	East of Le Grand	Le Grand	East of Le Grand
	(Ave 21)		(Ave 24)		(Ave 21)		(Ave 24)	
Total Direct Permanent Effect (acres)	**13.24**	**8.66**	**13.25**	**8.68**	**13.98**	**13.58**	**14.00**	**13.60**
Indirect Permanent Effects (acres)								
North-South Alignment	13.30	13.84	13.30	13.84	13.51	16.97	13.52	16.97
Ave 24 Wye	NA	NA	0.03	0.03	NA	NA	0.03	0.03
Ave 21 Wye	0.26	0.26	NA	NA	0.26	0.26	NA	NA
Total Indirect Permanent Effect (acres)	**13.56**	**14.10**	**13.33**	**13.88**	**13.78**	**17.23**	**13.55**	**17.00**

Construction Period Impacts

Direct impacts on special-status plant species may occur as a result of construction crews removing vegetation within and adjacent to the construction footprint, and from construction vehicles and personnel in the area disturbing the vegetation (i.e., trampling and crushing). Vegetation removed to accommodate construction operations (access, laydown area, etc.) would be restored after construction activities are completed.

Indirect impacts on special-status plant species would potentially include: erosion, siltation, and runoff into natural and constructed watercourses; soil and water contamination from construction equipment leaks; construction-related dust affecting plants by reducing their photosynthetic capability (especially during flowering periods); and an increased risk of fire (e.g., construction equipment use and smoking by construction workers) in adjacent open spaces.

Construction Period Mitigation Measures

The construction period mitigation measures described in the UPRR/SR 99 Alternative would also apply to the BNSF Alternative.

Significance of Construction Period Impacts

All suitable habitats for special-status plants are assumed to be occupied by populations of special-status plants. Special-status plant populations are regulated by both CDFG and USFWS. The loss of habitat could impair the survival of self-sustaining populations. Consequently, the impact to the potential loss of habitat would be considered impacts with moderate intensity under NEPA and significant under CEQA.

Project Period Impacts

Direct impacts on special-status plant species would result from the permanent removal of vegetation from within the HST system footprint. In addition, special-status plants would be affected by increased pedestrian access/activity in the area, which would trample or crush them; and exposure to accidental spills including contaminants/pollutants. During ongoing operation and maintenance activities (e.g., routine inspection and maintenance of the HST right-of-way) vehicle or foot traffic would also trample or crush the native vegetation.

Indirect impacts on special-status plant species are anticipated to include: increased erosion, sedimentation, siltation from runoff, and hydrology that could affect adjacent aquatic habitats; wind erosion effects (including from unvegetated rights-of-way and passing HSTs); an increased risk of fire in adjacent open spaces due to increased human activity; and the introduction of noxious plant species (nonnative, detrimental species) from increased human activity. Indirect impacts would be less during the project period of the HST as project design features would be in place to direct water flow.

Project Period Mitigation Measures

The project period mitigation measures described in the UPRR/SR 99 Alternative would also apply to the BNSF Alternative.

Significance of Project Period Impacts

Implementation of the BNSF Alternative would result in potential direct and indirect impacts to 36 special-status plant species. Because implementation of the BNSF Alternative has the potential to result in the loss of or damage to all 36 special-status plant species and their habitats for reasons identified above, the impact is considered an impact with moderate intensity under NEPA and significant under CEQA.

Cumulative Construction Period Impacts

Implementation of the BNSF Alternative has the potential to result in the loss of or damage to all 36 special-status plant species and their habitats. No special-status plant species have been found to date in areas that have been available for survey. Therefore, the exact extent of cumulative construction period impacts is unknown.

Cumulative Construction Period Mitigation Measures

No specific mitigation measures are proposed for cumulative impacts to special-status plant occurring during the construction period.

Significance of Cumulative Construction Period

After implementing avoidance and minimization measures, and mitigation measures for unavoidable impacts provided, the cumulative construction impacts on biological resources will remain impacts with moderate intensity under NEPA and cumulatively considerable under CEQA.

Cumulative Project Period Impacts

Implementation of the UPRR/SR 99 Alternative has the potential to result in the loss of or damage to all 36 special-status plant species and their habitats. No special-status plant species have been found to date in areas that have been available for survey. Therefore, the exact extent of this impact is unknown.

Cumulative Project Period Mitigation Measures

Beyond the mitigation measures summarized above to minimize and mitigate impacts to special status plant species, there are no specific additional mitigation measures proposed specifically to address cumulative impacts.

Significance of Cumulative Project Period

Because implementation of the UPRR/SR 99 Alternative has the potential to result in the loss of or damage to all 36 special-status plant species and their habitats for reasons identified above, the impact is considered an impact with moderate intensity under NEPA and significant under CEQA.

6.3.4.2 Special Status Wildlife Species

Affected Environment

The natural and semi-natural grassland communities within the BNSF Alternative provide high-quality habitat for a number of special-status species. The prevalence of relatively undisturbed vernal pools and other seasonal wetlands in these grasslands provides potentially suitable habitat for several of the plant and animal species listed in Appendix 3.7-A, Attachments 1 and 2.

The Mission Ave and Mariposa Way design options occur primarily within agricultural lands. Agricultural lands provide suitable habitat for special-status bird and bat species (same as those listed in UPRR/SR 99 section). The Mission Ave and Mariposa Way design options cross Miles and Mariposa creeks, respectively, which provide riverine, riparian, and wetland habitats for numerous special-status wildlife species. The East Le Grand portion of the design options crosses areas of California annual grasslands, vernal pools, and other seasonal wetlands that provide habitat for several listed species.

Although the same special-status wildlife species have the potential to occur along the BNSF Alternative as along the UPRR/SR 99 Alternative, the greater extent and relatively higher quality of California annual grassland and vernal pool habitat associated with the BNSF Alternative results in a higher likelihood that special-status species dependent on these habitat types would occur.

Construction Period Impacts

Construction period impacts to special-status wildlife species would be expected to be similar to those described for the UPRR/SR 99 Alternative. However, for reasons discussed above, the degree of impacts to wildlife may be expected to be higher because of the quality of habitats potentially impacted by the BNSF Alternative.

Construction Period Mitigation Measures

The proposed construction period mitigation measures for special-status wildlife are the same as those listed for the UPRR/SR 99 Alternative.

Significance of Construction Period Impacts

Because construction of the BNSF Alternative would temporarily affect special-status wildlife both directly and indirectly as described above, the impact is considered an impact with moderate intensity under NEPA and significant under CEQA.

Project Period Impacts

Project period impacts to special-status wildlife species are expected to be similar to those listed for the UPRR/SR 99 Alternative. As discussed earlier, the degree or extent of those impacts may be greater for the BNSF Alternative because of the relatively undisturbed nature of some suitable habitat within the BNSF footprint.

Project Period Mitigation Measures

Project period mitigation measures for special-status wildlife would be the same as those listed for the UPRR/SR 99 Alternative.

Significance of Project Period Impacts

The potential permanent impact to suitable habitat for special-status wildlife species would be considered impacts with moderate intensity under NEPA and significant under CEQA.

Cumulative Construction and Project Period Impacts

Construction and project period cumulative impacts on most biological resources would have moderate intensity under NEPA and be cumulatively considerable under CEQA because most impacts would not result in the loss of species populations. Impacts on the San Joaquin kit fox would have moderate intensity under NEPA and be cumulatively considerable under CEQA because disruption to linkages and movement corridors may result in isolated populations that are at greater risk of extirpation.

Cumulative Construction and Project Period Mitigation Measures

Beyond the mitigation measures summarized above to minimize and mitigate impacts to special status wildlife species, there are no specific additional mitigation measures proposed specifically to address cumulative impacts.

Cumulative Construction and Project Period Significance

After implementing avoidance and minimization measures, and mitigation measures for unavoidable impacts, the cumulative construction impacts on biological resources, including special-status wildlife species will remain impacts with moderate intensity under NEPA and cumulatively considerable under CEQA.

6.3.4.3 Other Biological Resources (Wildlife Corridors)

Affected Environment

Within the Eastman Lake – Bear Creek ECA, the BNSF Alternative intersects approximately 6 miles of the ECA and, depending on design option, would cross five to nine watercourses. All of the watercourses crossed by the BNSF Alternative within the ECA are natural watercourses, such as Deadman Creek, Dutchman Creek, Mariposa Creek, the Chowchilla River, Ash Slough, and Berenda Slough. However, within other modeled wildlife corridors that are present near the Berenda Slough and the Fresno River channels, the BNSF Alternative intersects 3.6 to 9.1 miles of the corridor and, depending on design option, would cross four to eight watercourses. All of these watercourses crossed by the BNSF Alternative within the other modeled wildlife corridors are constructed watercourses, such as canals.

All BNSF design options within the ECA, with the exception of the Mission Ave design option with Ave 24 Wye and Ave 21 Wye, include both elevated and at-grade crossings. In addition, all BNSF design options within the modeled wildlife corridors include both elevated and at-grade crossings. All crossings include both the mainline of the tracks as well as other permanent project features that cross the watercourse at other locations. All of the crossings within the ECA include single-span or multi-span bridges at natural watercourses, such as Deadman Creek, Dutchman Creek, Mariposa Creek, the Chowchilla River, Ash Slough, and Berenda Slough. Most of the bridge crossings contain limited/scattered riparian habitat, where only three bridges contain well-developed riparian habitat. However, all the crossings within the modeled wildlife corridors are constructed watercourses that include culverts and have no riparian habitat. All design options provide free-ranging mammals with opportunities (some more limited than others, particularly those that include culverts) to disperse across the ECA and the modeled wildlife corridors.

The Mission Ave design option with Ave 24 Wye and Ave 21 Wye has five multi-span bridges, with only one at-grade crossing within the ECA. However, the Mission Ave design option with Ave 24 Wye and Ave 21 Wye includes five multi-span bridges (one along Deadman Creek, one along Dutchman Creek, one along Chowchilla River, one along Ash Slough, and one along Berenda Slough) which may facilitate wildlife movement most effectively based on the more expansive opening. With the exception of the bridge crossing at Dutchman Creek, most of the bridge crossings contain limited/scattered to well-developed riparian habitat. This design option with Ave 24 and Ave 21 provides free-ranging mammals with some opportunities to disperse across the ECA.

The design option that offers the largest number of multi-span bridge crossings within the ECA is the Mariposa Way East of Le Grand design option with Ave 24 Wye and Ave 21 Wye. This design option includes seven multi-span bridges (one along Deadman Creek, three along unnamed streams, one along Chowchilla River, one along Ash Slough, and one along Berenda Slough). However, the three multi-span bridge crossings along unnamed streams contain no riparian habitat, whereas the remaining four multi-span bridges contain limited/scattered to well-developed riparian habitat. This design option with Ave 24 and Ave 21 provides free-ranging mammals with some opportunities to disperse across the ECA.

Within the other modeled wildlife corridors, all of the elevated and at-grade crossings are associated with canals which include a culvert, with the exception of three multi-span bridges. The crossings at the multi-span bridges are elevated; however, the multi-span bridges each cross over a canal that does not have riparian habitat. The project design features associated with the constructed watercourses are expected to provide some limited opportunities for free-ranging mammals to disperse under HST as the expanse of the culvert is limited, although the bridge structures provide a better opportunity.

In addition, the BNSF Alternative would expose wildlife to noise levels that could exceed 100 dBA Sound Exposure Level (SEL) for at-grade watercourse crossings within the Eastman Lake – Bear Creek ECA and within the other modeled wildlife corridors. The 100-dBA SEL criterion would be exceeded, but for only a short distance (i.e., traversed) within immediate proximity to the at-grade watercourse crossings. Refer

to Section 3.4, Noise and Vibration, for more information concerning noise exposure impacts to wildlife and mitigation measures (such as sound barriers).

Construction Period Impacts

Direct Impacts During Construction

Temporary impacts from placement of barriers during construction activities would affect the ability of San Joaquin kit fox and other free-ranging animals to move freely within the Eastman Lake – Bear Creek ECA and other modeled wildlife corridors.

Indirect Impacts During Construction

Construction of the project would result in concentrated heavy vehicle and equipment use. Construction-related activities occurring at or in the vicinity of wildlife movement corridors, such as the Eastman Lake – Bear Creek ECA, may result in indirect disruption of wildlife movement through lighting, noise, motion, and startle effects. Construction activities would also potentially affect wildlife in adjacent habitats by interfering with movement patterns or by causing wildlife to temporarily avoid areas adjacent to the construction areas.

Construction Period Mitigation Measures

The construction period mitigation measures for wildlife corridors would be the same as listed for the UPRR/SR 99 Alternative.

Significance of Construction Period Impacts

Because construction of the BNSF Alternative has the potential to interfere with the movement of wildlife species within the Eastman Lake – Bear Creek ECA and other modeled wildlife corridors for reasons identified above, the impact is considered an impact with moderate intensity under NEPA and significant under CEQA.

Project Period Impacts

The BNSF Alternative has the most crossings of all of the alternatives along the watercourses and has the most length of barrier effect within the ECA. The Mission Ave East of Le Grand with both Wye options has the fewest crossings and would likely have less conflict with wildlife movement compared to the other design options. No culverts or bridges are provided in the other modeled wildlife corridor limits.

Overall, the BNSF Alternative would increase barriers to wildlife movement and could result in temporary avoidance behavior by wildlife at locations where culverts and bridges are placed within the ECA and within other modeled wildlife corridors although over time they may be used by free-ranging mammals as designed. Because implementation of the BNSF Alternative has the potential to interfere with the movement of wildlife species within the Eastman Lake – Bear Creek ECA and other modeled wildlife corridors for reasons identified above, the impact is considered an impact with moderate intensity under NEPA and significant under CEQA.

Project Period Mitigation Measures

The project period mitigation measures for wildlife corridors would be the same as listed for the UPRR/SR 99 Alternative.

Significance of Project Period Impacts

Because construction of the BNSF Alternative has the potential to interfere with the movement of wildlife species within the Eastman Lake – Bear Creek ECA and other modeled wildlife corridors for reasons

identified above, the impact is considered an impact with moderate intensity under NEPA and significant under CEQA.

Cumulative Construction and Project Period Impacts

Overall, the BNSF Alternative would increase barriers to wildlife movement and could result in temporary avoidance behavior by wildlife at locations where culverts and bridges are placed within the ECA and within other modeled wildlife corridors although over time they may be used by free-ranging mammals as designed. Because implementation of the BNSF Alternative has the potential to interfere with the movement of wildlife species within the Eastman Lake – Bear Creek ECA and other modeled wildlife corridors for reasons identified above, the impact is considered an impact with moderate intensity under NEPA and significant under CEQA.

Cumulative Construction and Project Period Mitigation Measures

Beyond the mitigation measures summarized above to minimize and mitigate impacts to wildlife movement corridors, there are no specific additional mitigation measures proposed specifically to address cumulative impacts.

Significance of Cumulative Construction and Project Period Impacts

Impacts on movement of the San Joaquin kit fox would have moderate intensity under NEPA and cumulatively considerable under CEQA because disruption to linkages and movement corridors may result in isolated populations that are at greater risk of extirpation.

6.3.4.4 Critical Habitat

Affected Environment

The BNSF Alternative contains designated critical habitat for Conservancy fairy shrimp, vernal pool tadpole shrimp, vernal pool fairy shrimp, Greene's tuctoria, succulent owl's clover, and San Joaquin Orcutt grass near the town of Le Grand. Critical habitat is a specific geographic area that the U.S. Fish and Wildlife Service or the National Marine Fisheries Service has designated, through formal notice-and-comment rulemaking, as essential for the conservation of a listed species and that may require special management and protection. A critical habitat designation protects areas that are necessary for the conservation of the species by requiring Federal agencies to consult with USFWS and/or NMFS on actions they carry out, fund, or authorize to ensure that their actions will not destroy or adversely modify designated critical habitat for any listed species. Impacts to federally designated critical habitat also affects the planning, policies, and regulations under CEQA. Consequently, the impact of the BNSF Alternative on designated critical habitat is considered an impact with moderate intensity under NEPA and significant under CEQA.

Construction Period Impacts

Because implementation of the BNSF Alternative has the potential to result in direct and indirect impacts to critical habitat as described above, the impact is considered an impact with moderate intensity under NEPA and significant under CEQA.

Construction Period Mitigation Measures

HST impacts associated with threatened and endangered species, including critical habitat, occupied habitat, and suitable habitat for special-status species is addressed through the coordination process, outlined under Section 7 of the Federal ESA. After a Biological Assessment has been accepted, the USFWS will render a Biological Opinion. The Authority or its designee will coordinate with the USFWS

related to threatened and endangered species, including critical habitat, occupied habitat and suitable habitat for special-status species.

The individual mitigation measures addressed for special-status species are anticipated to result in compliance with appropriate mitigation for Conservancy fairy shrimp, vernal pool tadpole shrimp, vernal pool fairy shrimp, and San Joaquin Orcutt grass critical habitat.

The following measures potentially apply to critical habitat:

- AQ-MM#1: Reduce Fugitive Dust by Watering.
- AQ-MM#3: Reduce Fugitive Dust from Material Hauling.
- Bio-MM#2: Regulatory Agency Access.
- Bio-MM#3: Prepare and Implement a Worker Environmental Awareness Program.
- Bio-MM#4: Prepare and Implement a Weed Control Plan.
- Bio-MM#5: Prepare and Implement a Biological Resources Management Plan.
- Bio-MM#7: Delineate Environmentally Sensitive Areas and Environmentally Restricted Areas (on plans and in-field).
- Bio-MM#8: Equipment Staging Areas.
- Bio-MM#10: Vehicle Traffic.
- Bio-MM#11: Entrapment Prevention.
- Bio-MM#12: Work Stoppage.
- Bio-MM#13: 'Take' Notification and Reporting.
- Bio-MM#14: Post-Construction Compliance Reports.
- Bio-MM#15: Restore Temporary Riparian Impacts.
- Bio-MM#17: Conduct Pre-construction Surveys for Special-Status Plant Species.
- Bio-MM#18: Prepare and Implement Plan for Salvage, Relocation and/or Propagation of Special-Status Plant Species.
- Bio-MM#19: Conduct Preconstruction Sampling and Assessment for Vernal Pool Fauna.
- Bio-MM#20: Seasonal Vernal Pool Work Restriction.
- Bio-MM#21: Implement and Monitor Vernal Pool Protection.
- WR-MM#1: Construction Stormwater Pollution Prevention Plan.
- WR-MM#2: Central Valley Regional Water Quality Board, Order No. 5-00-175, Waste Discharge Requirements General Order for Dewatering and Other Low Threat Discharges to Surface Waters.

Significance of Construction Period Impacts

The impact to critical habitat is considered an impact with moderate intensity under NEPA and significant under CEQA.

Project Period Impacts

Because implementation of the BNSF Alternative has the potential to result in direct and indirect impacts to critical habitat as described above, the impact is considered an impact with moderate intensity under NEPA and significant under CEQA.

Project Period Mitigation Measures

No specific mitigation measures are proposed for project period impacts to designated critical habitat. HST impacts associated with threatened and endangered species, including critical habitat, occupied habitat, and suitable habitat for special-status species is addressed through the coordination process, outlined under Section 7 of the federal ESA. After a Biological Assessment has been accepted, the USFWS will render a Biological Opinion. Coordinate with the USFWS related to threatened and endangered species, including critical habitat, occupied habitat and suitable habitat for special-status species.

Significance of Project Period Impacts

The impact is considered an impact with moderate intensity under NEPA and significant under CEQA.

Cumulative Construction and Project Period Impacts

Implementation of the BNSF Alternative has the potential to result in direct and indirect impacts to critical habitat as described above.

Cumulative Construction and Project Period Impacts

The cumulative impact on designated critical habitat is considered an impact with moderate intensity under NEPA and significant under CEQA.

Cumulative Construction and Project Period Mitigation Measures

Beyond the mitigation measures summarized above to minimize and mitigate impacts to designated critical habitat, there are no specific additional mitigation measures proposed specifically to address cumulative impacts to designated critical habitat.

Significance of Cumulative Construction and Project Period Impacts

Because implementation of the BNSF Alternative has the potential to result in direct and indirect impacts to critical habitat, the cumulative impact is considered an impact with moderate intensity under NEPA and significant under CEQA.

6.3.5 Other Significant Environmental Consequences

This section discusses the other significant environmental consequences that help to differentiate the BNSF Alternative from the other alternatives.

6.3.5.1 Noise BNSF Alternative

Affected Environment

The BNSF Alternative corridor is the same as the UPRR/SR 99 Alternative corridor for portions of the study area. The noise environments where the corridor differs from the UPRR/SR 99 Alternative are discussed below. The noise environments for the City of Merced and the City of Fresno are the same as the UPRR/SR 99 Alternative.

The BNSF Alternative shares the same corridor as the UPRR/SR 99 Alternative as far as the south end of the City of Merced, where the BNSF Alternative moves east into rural unincorporated areas by following one of four design options: Mariposa Way, Mariposa Way East of Le Grand, Mission Ave, and Mission Ave East of Le Grand. The City of Le Grand has a small population and is mainly residential; therefore, it is considered suburban. After Le Grand, the design options merge and the BNSF Alternative continues south toward Madera Acres. This portion of the alignment runs through farmland with a noise environment dominated by rural activities. Madera Acres is just north of Madera and also is mainly residential, so it is considered suburban. The BNSF Alternative continues through the suburban areas of Madera Acres and Madera until it moves west back toward the UPRR/SR 99 Alternative just before the Madera County line. Traffic on local roadways is likely the greatest contributor of noise, added to by agricultural activity and aircraft noise during the growing and harvesting season. The alternatives continue to share the corridor to the proposed Fresno HST station.

Wye Design Options

The Ave 24 Wye and the Ave 21 Wye are in a rural, unincorporated portion of Madera County. The existing noise environment is dominated by natural sounds, distant traffic, and agricultural activities.

Significance Criteria (NEPA and CEQA)

The same significance criteria for noise impacts were used for all alternatives; therefore, see Section 6, UPRR/SR 99 Alternative, Noise, Significance Criteria, above.

Construction Period Impacts

By using the FTA criteria provided in Table 3.4-1 of the EIR/EIS and the noise projections in Table 3.4-13 of the EIR/EIS, and assuming that construction noise reduces by 6 dB for each doubling of distance from the center of the site, it is possible to estimate the screening distances for potential construction noise impact. These estimates suggest that the potential for construction noise impact would be minimal for commercial and industrial land use, with impact screening distances of 79 feet and 45 feet, respectively. For residential land use, the potential for temporary construction noise impact would be limited to locations within approximately 141 feet of the alignment. However, the potential for noise impact from nighttime construction could extend to residences as far as 446 feet, but the Authority will work to minimize this potential impact. These impacts would be temporary during. For residences within 141 feet of the alignment, or within 446 feet during nighttime, construction impacts would have moderate intensity under NEPA.

Construction Period Mitigation Measures

During construction, noise levels will be monitored to verify compliance with the FTA construction noise limits. The contractor will have the flexibility to meet the FTA construction noise limits in the most efficient and cost-effective manner. The contractor would have the flexibility of either prohibiting certain noise-generating activities during nighttime hours or providing additional noise control measures to meet the noise limits. To meet required noise limits, the following noise control mitigation measures will be implemented as necessary, for nighttime and daytime:

- Install a temporary construction site sound barrier near a noise source.
- Avoid nighttime construction in residential neighborhoods.
- Locate stationary construction equipment as far as possible from noise-sensitive sites.
- Re-route construction-related truck traffic along roadways that will cause the least disturbance to residents.
- During nighttime work, use smart back-up alarms, which automatically adjust the alarm level based on the background noise level, or switch off back-up alarms and replace with spotters.
- Use low-noise emission equipment.
- Implement noise-deadening measures for truck loading and operations.
- Monitor and maintain equipment to meet noise limits.
- Line or cover storage bins, conveyors, and chutes with sound-deadening material.
- Use acoustic enclosures, shields, or shrouds for equipment and facilities.
- Use high-grade engine exhaust silencers and engine-casing sound insulation.
- Prohibit aboveground jackhammering and impact pile driving during nighttime hours.
- Minimize the use of generators to power equipment.
- Limit use of public address systems.
- Grade surface irregularities on construction sites.
- Use moveable sound barriers at the source of the construction activity.
- Limit or avoid certain noisy activities during nighttime hours.

Construction Period Significance

Construction noise and vibration impacts could have substantial intensity for all alternatives. These impacts would be significant because the magnitude of the noise increase that would result in a severe impact under FRA criteria is considered highly annoying by the general population. Construction noise impacts under CEQA are less than significant after mitigation.

Project Period Impacts

Table 6.4-3 below summarizes potential direct noise impacts related to operation of HSTs under the BNSF Alternative during the design year (2035) for both the ballast and tie and slab track construction alternatives. The table shows the total number of noise impacts projected to occur under all of the BNSF Alternative design options. See Figures 3.4-9 through 3.4-12 of the EIR/EIS for the locations of noise impacts with ballast and tie track and Figures 3.4-13 through 3.4-16 of EIR/EIS for the locations of noise impacts with slab track under the BNSF Alternative without mitigation during the design year (2035).

Table 6.4-3
Potential Noise Impacts under the BNSF Alternative without Mitigation for Design Year 2035

BNSF Alternative	Total Number of Impacts for Ballast & Tie Track		Total Number of Impacts for Slab Track	
	Moderate	Severe	Moderate	Severe
Impacts by Project Combination				
BNSF north-south alignment with Ave 24 Wye	795 residences, 1 hotel; 3 churches	433 residences, 3 hotels, 1 park	1,108 residences, 2 hotels, 2 churches, 1 school, 1 park	771 residences, 4 hotels, 1 park, 1 church
BNSF north-south alignment with Ave 21 Wye	738 residences, 1 hotel, 3 churches	401 residences, 3 hotels, 1 park	1,067 residences, 2 hotels, 2 churches, 1 school, 1 park	709 residences, 4 hotels, 1 park, 1 church
Le Grand Design Options				
Mariposa Way	464 residences, 1 church	17	188 residences, 2 churches, 1 school	331
Mariposa Way East of Le Grand	50	25	66	50
Mission Ave	457	19	241 residences, 2 churches, 1 school, 1 cemetery	250
Mission Ave East of Le Grand	58	28	58 residences, 1 cemetery	48
Impacts by Project Combination				
BNSF Alternative with Ave 24 Wye	845 to 1,259 residences, 1 hotel, 3 to 4 churches	451 to 461 residences, 3 hotels, 1 park	1,169 to 1,351 residences, 2 hotels, 2 to 4 churches, 1 to 2 schools, 0-1 cemetery, 1 park	819 to 1,102 residences, 4 hotels, 1 park, 1 church

BNSF Alternative	Total Number of Impacts for Ballast & Tie Track		Total Number of Impacts for Slab Track	
	Moderate	Severe	Moderate	Severe
BNSF Alternative with Ave 21 Wye	788 to 1,202 residences, 1 hotel, 3 to 4 churches	418 to 429 residences, 3 hotels, 1 park	1,126 to 1,308 residences, 2 hotels, 2 to 4 churches, 1 to 2 schools, 0-1 cemetery, 1 park	757 to 1,040 residences, 4 hotels, 1 park, 1 church
Range of Impacts under the BNSF Alternative	**788 to 1,259 residences, 1 hotel, 3 to 4 churches**	**418 to 461 residences, 3 hotels, 1 park**	**1,126 to 1,351 residences, 2 hotels, 2 to 4 churches, 1 to 2 schools, 0-1 cemetery, 1 park**	**757 to 1,102 residences, 4 hotels, 1 park, 1 church**
Source: Authority and FRA (2012).				

Ballast and Tie Track Construction Alternative

For ballast and tie track, Table 6.4-3 indicates that regardless of the design options between Merced and Le Grand, severe noise impacts are projected at approximately the same number of residences, ranging from 451 with the Mariposa Way design option to 461 with the Mission Ave East of Le Grand design option for the Ave 24 design options. In each case, severe impacts are also projected at 3 hotels and Roeding Park. Under the four Ave 21 Wye design options, the number of severe noise impacts projected at residences would range from 418 with the Mariposa Way design option to 429 with the Mission Ave East of Le Grand option. In each case, severe impacts are also projected at 3 hotels and Roeding Park. The number of noise impacts with moderate intensity would vary among the design options.

In the Merced vicinity, no severe noise impacts are projected to occur within the City of Merced because there are already relatively high existing noise levels and significantly fewer HST operations north of the wyes. South of Merced to the Chowchilla River, severe noise impacts are projected at 18 residences with the Mariposa Way design option, 25 residences with the Mariposa Way East of Le Grand design option, 20 residences with the Mission Ave design option, and 28 residences with the Mission Ave East of Le Grand design option.

In the Chowchilla and Madera vicinities, the Ave 24 Wye design option is projected to have severe noise impacts at 168 residences in this area, whereas with the Ave 21 Wye, severe noise impacts are projected at 171 residences. In the Madera Acres vicinity at SR 145, there is an HST alignment design option that would raise the alignment a maximum additional 8 feet above grade. This option would not change the number of impacts as the change in noise level at the nearest sensitive receptors would be less than 1 dB.

In the Downtown Fresno Station vicinity, severe noise impacts are projected at 171 residences, 3 hotels, and Roeding Park. Severe noise impacts are projected at 94 residences in the area along the Ave 24 Wye and 59 residences in the area along the Ave 21 Wye.

Slab Track Construction Alternative

For slab track, Table 6.4-3 indicates that under the four Ave 24 Wye design options, the number of severe noise impacts projected at residences would range from 1,102 with the Mariposa Way design option to 819 with the Mission Ave East of Le Grand option. In each case, severe impacts are also

projected at 4 hotels, 1 church and Roeding Park. Under the four Ave 21 Wye design options, the number of severe noise impacts projected at residences would range from 1,040 with the Mariposa Way design option to 757 with the Mission Ave East of Le Grand option. In each case, severe impacts are also projected at 4 hotels, 1 church and Roeding Park.

The number of noise impacts with moderate intensity would vary among the design options.

In the Merced vicinity, no severe noise impacts are projected to occur. South of Merced to the Chowchilla River, severe noise impacts are projected at 331 residences with the Mariposa Way design option, 50 residences with the Mariposa Way East of Le Grand design option, 250 residences with the Mission Ave design option, and 48 residences with the Mission Ave East of Le Grand design option. With both the Mariposa Way and Mission Ave design options, an impact with moderate intensity is projected at Le Grand Elementary School.

In the Chowchilla and Madera vicinities, the Ave 24 Wye design option would experience severe noise impacts at 279 residences in this area, whereas with the Ave 21 Wye, severe noise impacts are projected at 284 residences. In the Madera Acres vicinity at SR 145, there is an HST alignment design option that would raise the alignment a maximum additional 8 feet above grade. This option would not change the number of impacts as the change in noise level at the nearest sensitive receptors would be less than 1 dB.

In the Fresno vicinity, severe noise impacts are projected to occur at 362 residences, 4 hotels, 1 church, and Roeding Park. Moderate noise impact is projected at Addams Elementary School. Severe noise impacts are projected at 130 residences in this area along the Ave 24 Wye and 63 residences in this area along the Ave 21 Wye.

Project Period Mitigation Measures

- **N&V-MM#3:** Implement Proposed California High-Speed Train Project Noise and Vibration Mitigation Guidelines. Figures 3.4-18 through 3.4-21 of the EIR/EIS show the locations where the noise mitigation guidelines will be applied for ballast and tie track. Figures 3.4-22 through 3.4-25 of the EIR/EIS show the locations where the noise mitigation guidelines will be applied for slab track. Various options exist to address the potentially severe noise effects from HSTs. With input from local jurisdictions and balancing technological factors, such as structural and seismic safety, cost, number of affected receptors, and effectiveness, mitigation measures will be selected and implemented. For example, where moderate increases in noise affect receptors, noise-reducing measures could be implemented, even though not required. Conversely, in rural areas devoid of receptors where severe noise effects are anticipated, it might be appropriate and acceptable not to apply any noise-reducing treatments. The mitigation measure or suite of mitigation measures for severe noise impacts will be designed to reduce the noise level from HST operations from "severe" to "moderate" according to the provisions of the FRA noise and vibration manual (FRA 2005). The noise guidelines include the following mitigation measures:
    - Install sound barriers. Depending on the height and location relative to the tracks, sound barriers can achieve between 5 and 15 dB of noise reduction. The primary requirements for an effective sound barrier are that the barrier must (1) be high enough and long enough to break the line-of-sight between the sound source and the receiver, (2) be of an impervious material with a minimum surface density of 4 pounds per square foot, and (3) not have any gaps or holes between the panels or at the bottom. Because many materials meet these requirements, aesthetics, durability, cost, and maintenance considerations usually determine the selection of materials for sound barriers. Depending on the situation, sound barriers can become visually intrusive. Typically, the sound barriers style is selected with input from the local jurisdiction to reduce the visual effect of barriers on adjacent lands uses. For example, sound barriers could be solid or transparent, of various colors, materials, and surface treatments.

- The maximum sound barrier height would be 14 feet for at-grade sections; however, all sound barriers would be designed to be as low as possible while still achieving a substantial noise reduction. Berm and berm/wall combinations are the preferred types of sound barriers where space and other environmental constraints permit. On aerial structures, the maximum sound barrier height would also be 14 feet, but barrier material would be limited by engineering weight restrictions for barriers on the structure. Sound barriers on the aerial structure should still be designed to be as low as possible while still achieving a substantial noise reduction. Sound barriers on aerial structures and at-grade could consist of solid, semitransparent, and transparent materials.
- Work with the communities to determine how the use and height of sound barriers would be determined using jointly developed performance criteria. Other solutions may result in higher numbers of residual impacts than reported herein. Options may be to reduce the height of sound barriers and combine barriers with sound insulation or to accept higher than the FRA's current noise thresholds.
- Install building sound insulation. Sound insulation of residences and institutional buildings to improve the outdoor-to-indoor noise reduction is a mitigation measure that can be provided when the use of sound barriers is not feasible in providing a reasonable level (5 to 7 dB) of noise reduction. Although this approach has no effect on noise in exterior areas, it may be the best choice for sites where sound barriers are not feasible or desirable and for buildings where indoor sensitivity is of most concern. Substantial improvements in building sound insulation (on the order of 5 to 10 dB) can often be achieved by adding an extra layer of glazing to windows, by sealing holes in exterior surfaces that act as sound leaks, and by providing forced ventilation and air conditioning so that windows do not need to be opened. Establish performance criteria to balance existing noise events and ambient roadway noise conditions as factors for determining mitigation measures.
- Acquire easements on properties severely affected by noise. Another option for mitigating noise impacts is for the Authority to acquire easements on residences likely to be affected by HST operations in which the homeowners would accept the future noise conditions. This approach is usually taken only in isolated cases where other mitigation options are infeasible, impractical, or too costly.

- **N&V-MM#4: Vehicle Noise Specification**. In the procurement of an HST vehicle technology, the Authority will require bidders to demonstrate that their offered technology constitutes "quietest available" technology that will emit a minimum of 3 dB less noise at 220 mph than the FRA model that was used for noise analysis in the EIR/EIS (i.e., the train technology that formed the basis for the EIR/EIS analysis). Depending on the available technology, this could significantly reduce the number of impacts throughout the corridor.
- **N&V-MM#5: Special Trackwork at Crossovers and Turnouts**. Because the impacts of HST wheels over rail gaps at turnouts increases HST noise by approximately 6 dB over typical operations, turnouts can be a major source of noise impact. If the turnouts cannot be moved from sensitive areas, the project can use special types of trackwork that eliminate the gap.
- **N&V-MM#6: Additional Noise Analysis During Final Design**. If final design or final vehicle specifications results in changes to the assumptions underlying the noise analysis, reassess noise impacts and recommendations for mitigation and provide supplemental environmental documentation, as required by CEQA and NEPA.

Project Period Significance

Table 6.4-4 shows the number and length of sound barriers for the Merced to Fresno Section alternatives that meet the noise mitigation guidelines for both ballast and tie and slab track construction alternatives

for the UPRR/SR99 Alternative. Figure 3.4-27 through 3.4-30 in the EIR/EIS show the locations of proposed sound barriers along the HST alternatives for both ballast and tie and slab track construction alternatives. With slab track construction, noise levels prior to mitigation would be 3 dB higher than with ballast and tie track, so there would be more residual severe impacts behind sound barriers.

Table 6.4-4
Proposed BNSF Alternative Sound Barriers

HST Alternative	Number of Cost-Effective Barriers	Total Length of All Barriers (ft)	Number of Severe Impacts Eliminated[a]	Number of Severe Impacts Remaining
Ballast and Tie Track	6	22,100	180	5
Slab Track	15	71,450	1,056	60

[a] With the sound barrier, the noise effect is reduced from a severe to a moderate level.

The impacts with substantial intensity identified above are considered significant according to CEQ Regulation 1508.27.

With sound barriers as mitigation, the number of significant noise impacts could be reduced as the barriers would shield HST noise. With full implementation of the guidelines, most significant noise impacts would be eliminated. Severe noise effects would remain for some receptors because they are located outside of the area where the barrier is fully effective or the sound barrier does not fully mitigate the effect (i.e., noise is reduced by 5 dB but not below the severe threshold). Furthermore, severe noise effects would remain for receptors mitigated only with indoor sound insulation or when covered by noise easements.

Cumulative Construction Impacts

Construction would result in noise and vibration effects that would be managed and limited in duration. There are a few areas where SR 99 and other roadway improvements may result in cumulative construction noise and vibration impacts. It is likely that multiple projects would be under construction at the same time in the cities of Merced and Fresno, but construction on these projects would typically occur during daytime hours or with the addition of noise control measures to stay within required noise limits, and would be temporary. Because construction would typically occur during daytime hours and remain within required noise limits, cumulative noise impacts would have negligible intensity under NEPA.

Cumulative Construction Mitigation Measures

Mitigation measures for noise and vibration provided in Section 3.4.7 of the EIR/EIS and described above under Project Period Mitigation Measures will be implemented.

To minimize the potential cumulative effects of overlapping construction activities within the same area, the Authority would work with local jurisdictions to identify construction schedules of other nearby projects and coordinate construction and project activities. This may reduce cumulative construction noise impacts of multiple projects whose noise impacts may be individually minor but cumulatively considerable.

Significance of Cumulative Construction Impacts

The cumulative impact of the project and other reasonably foreseeable projects on noise during construction would have negligible intensity under NEPA because construction would typically occur during daytime hours and remain within required noise limits.

Cumulative Project Period Impacts

The noise analysis compares conditions under an HST alternative with the existing condition, which is conservative, because noise is expected to be higher with population growth and expanded highways. The alternative is located in an existing transportation corridor which has high noise levels caused by traffic and freight train operations, and the downtown areas of Fresno and Merced have high noise levels from multiple sources. Generally, noise levels would likely increase with the inclusion of the 2035 increases in population and accompanying development. Several planned and potential transportation projects are within the project corridor along the proposed UPRR/SR 99 Alternative alignment. The UPRR estimates that freight traffic may increase. However, these facilities (SR 99 and the railroads) would need to double their capacity to noticeably increase noise levels for the average person (i.e., an increase of 3 dBA).

The Roeding Regional Park and Fresno Chaffee Zoo Facility Master Plans (City of Fresno 2011) environmental review analysis lists the potential for significant cumulative noise impacts in conjunction with the HST alternative. Without mitigation, noise impacts resulting from new and expanded park uses proposed in the master plan, in conjunction with the noise impacts resulting from the HST alternative in the vicinity of Roeding Park, would have substantial intensity under NEPA.

The HST System would operate more than 200 trains per day after full build-out of the HST System. In rural areas, where typical noise is approximately 60 dBA, passing trains would result in an average noise increase of 11 dBA. In urban areas, the increases would range from 0 to 7 dBA. Noise mitigation (e.g., sound attenuation walls) may be balanced with other objectives of more importance to the adjoining land uses, such as visual aesthetics and integration with the community context. Therefore, there is the possibility of residual severe noise effects during HST operations along the alignment and at the HST stations, which could be cumulatively considerable with other foreseeable projects in the area.

Without mitigation, cumulatively considerable noise and vibration impacts with substantial intensity would result from the project in conjunction with other planned projects, increased development associated with foreseeable projects, and the cumulative condition of the No Project Alternative. The UPRR/SR 99 Alternative has greatest potential for cumulative noise impacts due to the potential increases in noise from SR 99 and the UPRR railroad.

Cumulative Project Period Mitigation Measures

The primary form of noise mitigation for transportation projects is noise barriers. The project and the reasonably foreseeable highway improvements would not benefit from shared noise barriers because of the differences in profile and project location. There would be potential shared benefits, such as the HST guideway shielding traffic noise in locations where the tracks are on a berm. However, even with mitigation measures in place for individual projects, areas of cumulatively considerable impacts with substantial intensity are likely to remain.

Mitigation of land development projects associated with the No Project Alternative could be required. For example, if residential developments are built near transportation infrastructure, they will require shielding from noise sources.

Significance of Project Period Cumulative Impacts

Cumulative impacts during operations may include impacts with substantial intensity under NEPA without mitigation.

6.3.5.2 Displacements BNSF

Affected Environment

Information on community and neighborhood characteristics for Downtown Merced and Downtown Fresno and the Ave 24 Wye and Ave 21 Wye are the same as those described under the UPRR/SR 99 Alternative. Because much of the study area for the BNSF Alternative is located in rural and unincorporated areas of Merced and Madera counties where agricultural land uses predominate, there are few residences and community services for much of the alignment study area. Characteristics specific to the BNSF Alternative are described below.

After leaving the City of Merced, the proposed north-south alignment for the BNSF Alternative curves to the east to connect to the BNSF corridor via one of four design options: (1) Mission Ave, (2) Mission Ave East of Le Grand, (3) Mariposa Way, and (4) Mariposa Way East of Le Grand, as shown in Figure 3.12-2 and described in Chapter 2, Alternatives, in the EIR/EIS.

Construction Period Impacts

The construction period of the project also includes purchasing of the right-of-way and testing of HST vehicles, in addition to the heavy construction (e.g., grading, excavating, and laying the HST railbed and guideway).Refer to Chapter 2, Alternatives, for information on the construction period timeframe. Although property acquisitions would occur prior to construction, the impacts would be permanent and are discussed in the Project Impacts section below. The assumption that displacements would be permanent provides a conservative, worst-case estimate.

Project Period Impacts

Attachment 8 provides a detailed breakdown of the number of displacements caused by each alternative and its associated routing options. The detailed breakdown is discussed in more detail in Section 8 as well. See Table 6.3-6 for an aggregated range of displacements for the BNSF Alternative.

With the BNSF Alternative, the majority of the residential and business displacements identified in the table above would occur in Le Grand, Madera Acres, and the City of Fresno. Additional rural residential displacements would occur primarily between Merced and Le Grand, along the Mission Ave and Mariposa Way design options. The East of Le Grand design option would result in fewer displaced residences and businesses than the design options that go through Le Grand, because the East of Le Grand design option would not travel through town.

For all three HST alternatives, most of the businesses that would likely be affected are within the alignment rights-of-way, including the HST station footprints. These businesses include auto dealerships, restaurants, gas stations, motels, businesses that serve the surrounding agricultural community, and industrial and warehouse facilities. The majority of the businesses that would be affected are located in the downtown areas of Merced, Madera, and Fresno. There are no business districts (e.g., a cluster of stores) within these downtown areas that would be negatively affected by the acquisitions. In the urban areas, where such businesses are located, the guideway would be elevated, minimizing the amount of required right-of-way to construct the project. It is also likely that some businesses would be able to relocate under the guideway after construction is complete, which would minimize impacts. In rural areas, the guideway would pass through agricultural land. The largest industries, based on the number of employees, in the three counties are associated with agriculture, services, and government.

In addition to the potential direct impacts on businesses, the HST alternatives may result in physical deterioration of areas if property values decline because of the project. Physical deterioration is not expected in the downtown areas of Merced and Fresno, because the HST stations would likely be a catalyst for new development and redevelopment in those areas. In areas where there is no HST station, such as downtown Madera, the elevated guideways could have a negative impact on businesses; however, as previously discussed, implementation of mitigation measures may result in beneficial effects for the downtown area. Refer to Appendix 3.13-B, Land Use and Communities, for additional information on the adjacent land uses and how development would not be precluded in these areas.

Project Period Mitigation Measures

The project would comply with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Uniform Relocation Act). The Uniform Relocation Act and its amendments provide mandatory rules and requirements on how federal, state, and local agencies compensate for impacts on property owners or tenants who need to relocate if they are displaced by a federally funded project. In addition, housing of last resort would be available, if required. Housing of last resort may require replacement housing payments that exceed the maximum amounts allowed under the Uniform Relocation Act or other methods of providing comparable decent, safe, and sanitary housing within the displaced person's financial means.

- **SO-MM#2: Develop a relocation mitigation plan.** Before any acquisitions occur, the Authority will develop a relocation mitigation plan, in consultation with affected cities and counties. In addition to establishing a program to minimize the economic disruption related to relocation, the relocation mitigation plan will be written in a style that also enables it to be used as a public information document. The plan will be intended to meet the following objectives:
  - Provide affected property and business owners and tenants a high level of individualized assistance in situations when relocation is necessary.
  - Make a best effort to minimize the permanent closure of displaced businesses and non-profit agencies as a result of relocations.
  - Within the limits established by law and regulation, minimize the economic disruption caused to tenants and residents by relocation.
  - In individual situations where warranted, consider the cost of obtaining the entitlement permits necessary to relocate to a suitable location and take those costs into account when establishing the fair market value of the property.
  - Provide those business owners who require complex permitting (such as dairies) with regulatory compliance assistance.

  The relocation mitigation plan will include the following components:

  - A description of the appraisal, acquisition, and relocation process that describes the activities of the appraisal and relocation specialists, for the benefit of the reader.
  - A means of assigning appraisal and relocation staff to affected property owners, tenants, or other residents on an individual basis.
  - Individualized assistance to affected property owners, tenants, or other residents in applying for funding, including research to summarize loans, grants, and federal aid available, and research of demographically similar areas for relocation.

- Creation of an ombudsman's position to act as a single point of contact for property owners, residents, and tenants with questions about the relocation process. The ombudsman would also act to address property owners', tenants', and other residents' concerns about the relocation process as it applies to their situations.

Relocation Mitigation Plans are commonly used for large infrastructure projects that remove a large number of residences and businesses, such as this project, and are considered successful in minimizing the impact to individual property owners.

- **SO-MM#4: Implement measures to reduce impacts associated with the relocation of community facilities.** Minimize impacts associated with the acquisition of the homeless shelter in Merced, which is affected by all alternatives, and Joe Stefani Elementary School, Merced Lao Family Community, Merced Senior Center, McCombs Youth Center, which are affected by the Castle Commerce Center HMF, by conducting outreach and coordinating with the facility prior to acquisition. Coordinate with the respective parties prior to land acquisition to reconfigure or relocate facilities, as necessary, to minimize disruption to activities. To reduce disruption to the use of these community facilities, the Authority will make sure that reconfiguring of land uses or buildings or relocating of community facilities is completed before the demolition of any existing structures. Work with the City of Merced and Merced City School District to facilitate the construction of the facilities prior to demolition of the existing structures. During the design process, the Outreach Team will conduct targeted outreach efforts for these facilities to understand and determine their needs for siting criteria. This mitigation measure will be effective in minimizing the impacts of the project by completing new facilities prior to relocation being necessary, and by involving affected facilities in the process of identifying new locations for their facilities.

- **SO-MM#6: Avoid displacements or consider housing options in Franklin-Beachwood, Le Grand, Fairmead, and rural areas.** Displaced residents in these minority communities and rural areas may be unable to relocate within the same community because comparable replacement housing may not be available or limited at the time of acquisition. During property acquisition in these communities and rural areas, the Authority will consider all comparable replacement housing options to allow displaced residents to remain in their communities, including but not limited to the following:

  - Construct new housing on vacant lots within the communities.
  - For any large parcels, relocate the residential structure or structures on the property if that is feasible and would move them outside the project area.
  - Move the residential structures to nearby vacant parcels.

This mitigation measure will be effective by minimizing the distances that residences or businesses have to relocate within these communities and by working to keep them within their current community.

Project Period Significance

At the regional level, the overall impacts of property acquisitions would have moderate intensity under NEPA and be less than significant under CEQA because of the number of housing displacements within the three counties and the availability of a number of suitable relocation opportunities.

Impacts on agricultural enterprises, farm businesses, and specialized industries including quarries, granaries, and processor facilities would have substantial intensity under NEPA because relocation would be disruptive, and some businesses might not be able to relocate. The project's economic effects are not effects on the physical environment. Therefore, no significance determination is required under CEQA.

6.3.5.3 Farmlands BNSF Alternative

Affected Environment

Section 3.14 of the EIR/EIS describes the regulatory setting and affected environment for agricultural lands and identifies potential project impacts on these lands and associated mitigation measures.

The Central Valley is the state's largest agricultural area. Many of the state's most agriculturally productive counties, including Merced and Madera counties, are in the Central Valley. Almonds are a key regional crop; 80% of the world's almonds come from California, primarily from the San Joaquin Valley. Approximately 1.2 million bee colonies pollinate the almonds during the 2- to 4-week pollination period (Almond Board of California 2007). In addition to farmlands, California currently has 1,600 to 1,800 dairies; 80% of the dairies are in the Central Valley.

According to the most recent Census of Agriculture profile information for Merced County (USDA 2007), in 2007, a total of 2,607 farms occupied more than 1 million acres, with an average farm size of 399 acres. More than 51% of farmland was devoted to crops and about 44% was pasture (other uses accounted for about 4.5% of total farmland). In 2007, the county's agricultural product market value was more than $2 billion: 38% from crop sales and 62% from livestock sales. The largest crop acreages were devoted to forage, almonds, corn (for silage), vegetable crops, and cotton. In order of sales value, the most important agricultural commodities in Merced County are milk and other dairy products; fruits, tree nuts, and berries; poultry and eggs; vegetables, melons, and potatoes; and cattle.

In 2007, Madera County had 1,708 farms occupying nearly 700,000 acres, with an average farm size of 398 acres. Nearly 43% of farmland was devoted to crops and about 51% was pasture (other uses accounted for about 6% of total farmland). In 2007, the county's agricultural market value was more than $990 million: 63% from crop sales and 37% from livestock sales.

In 2007, Fresno County had 6,081 farms occupying more than 1.6 million acres of land, with an average farm size of 269 acres. More than 67% of farmland was devoted to crops and about 29% was pasture (other uses accounted for about 4% of total farmland). In 2007, the county's agricultural market value was more than $3 billion: 67% from crop sales and 33% from livestock sales.

According to the FMMP data, there are more than 2.3 million acres of Important Farmland in Merced, Madera, and Fresno counties combined (refer to Table 6.3-7). In addition, there are nearly 1.8 million acres of Grazing Land in the three counties. The FMMP defines Grazing Land as land that has existing vegetation that is suitable for livestock grazing (DOC 2004).

Although each county in the project study area has policies to protect agricultural lands, according to the DOC farmland conversion reports, conversions of Important Farmland continue to occur. Table 6.3-7 presented the change in acreages of Important Farmland and Grazing Land between 2000 and 2008. In Merced County, there was a net increase in Important Farmland acreage between 2000 and 2008; however, in 2008, county boundaries were redrawn between Fresno and Merced counties, which might have increased the Important Farmland acreage in Merced County. Madera and Fresno counties reported a reduction in Important Farmland acreage of 3% and 2%, respectively, during this period. Population growth and the associated pressure for rural "ranchettes" and urban development primarily drive the loss of Important Farmland; however, losses also can occur if land goes into habitat conservation or confined animal facilities. Gains in Important Farmland also can occur, for example, when grazing land goes into crop production (e.g., increased area planted to almonds). Nevertheless, one of the leading regions in the state that is losing Important Farmland to urban or other nonfarming uses is the San Joaquin Valley (DOC 2008b). Over time, construction of railroads, state highways, and local roads divided some farms, creating irregularly shaped parcels.

Either the Williamson Act or Farmland Security Zone (FSZ) contracts in Merced, Madera, and Fresno counties protect Farmland and Grazing Land. A higher proportion of protected land exists in Madera

County than in Merced County, and no protected farmland exists in the northern portion of the City of Fresno. Protected farmlands also include lands zoned for agricultural use and lands with agricultural conservation easements. Most of the Important Farmland in the area is zoned for agriculture.

The majority of farms are family-owned and range from several hundred to several thousand acres. Often, large farm owners only farm a portion of the land themselves; others farm none. Large farm owners hire agricultural management and specialized service firms (e.g., for pesticide application, bee pollination, or harvesting). Farm infrastructure typically includes irrigation and drainage systems, field access roads, storage structures (e.g., silos and barns) power distribution systems, and residences.

Construction Period Impacts

Some agricultural land outside of the permanent right-of-way would be used for construction activities, such as staging and material laydown areas. This land would be leased from the landowner and used for approximately 1 to 3 years during construction. After construction, the land would be restored and returned to the owner.

Construction of the alignment alternatives and related improvements (e.g., road realignments) would affect productive farmland. Each farm maintains a system of onsite utilities needed for operations, such as irrigation systems (e.g., ditches, drains, pipelines, and wells), access roads, and power supplies disrupted by the project during construction. Utility disruptions could jeopardize farm productivity and place some farmland at risk for conversion to nonagricultural use.

Construction of the project would generate noise and vibration from construction equipment and vehicles (e.g., clearing, grading, track installation). Noise levels from project construction are estimated to be 89 dBA L_{eq} at 50 feet for an 8-hour workday (refer to Section 3.4, Noise and Vibration). Some construction activities (e.g., clearing and grading) would occur to the edge of the alignment. Noise generated during construction could temporarily disturb livestock (such as dairy cows) near the HST alignment.

Construction Period Mitigation Measures

No mitigation measures are proposed. Losses in farm productivity from these effects may be considered an economic impact that could be addressed during the right-of-way acquisition process.

Significance of Construction Period Impacts

Construction period impacts would have negligible intensity under NEPA and be less than significant under CEQA because the land would be used temporarily and restored; and the land would not be permanently converted to a nonagricultural use. Because the utility disruptions would likely be resolved during the right of way acquisition process, it is unlikely that it would result in the conversion of farmland to nonagricultural use; therefore, the impact would have negligible intensity under NEPA, and be less than significant under CEQA. The indirect noise and vibration impacts of construction on livestock would have negligible intensity under NEPA and be less than significant under CEQA because there would be sufficient distance between construction noise sources and livestock areas.

Project Period Impacts

The BNSF alternative would result in permanent conversion of agricultural land to nonagricultural use (including potential conversion from parcel severance), permanent access severance, conflicts with farmland protection contracts (e.g., Williamson Act), and indirect effects on dairies. None of the HST alternatives would cause adverse wind effects on adjacent agricultural lands nor would they interfere with aerial spraying of the crops.

Table 6.4-5 from the EIR/EIS presents estimates of the permanent conversion of Important Farmland that would result from the BNSF Alternative, including the potential effects of severing parcels into fragments.

Table 6.4-5
Farmland Types Potentially Affected by the BNSF Alternative

BNSF Alternative	Important Farmland				
	Prime Farmland (acres)[a]	Farmland of Statewide Importance (acres)[a]	Unique Farmland (acres)[a]	Farmland of Local Importance (acres)[a]	Total (acres)[a]
Impacts of North-South Alignments with Wye Options[b]					
BNSF Alternative North-South Alignment with Ave 24 Wye	169	275	590	110	1,144
BNSF Alternative North-South Alignment with Ave 21 Wye	257	220	526	121	1,123
Le Grand Design Options					
Mission Ave	149	71	42	77	339
Mission Ave East of Le Grand	194	64	47	19	325
Mariposa Way	177	31	34	52	294
Mariposa Way East of Le Grand	217	22	50	28	318
Impact of Components Combined					
Total BNSF Alternative	318 to 473	242 to 346	560 to 640	129 to 198	1,417 to 1,483

[a]Acreage rounded to the nearest whole number.
Source: DOC (2008a).

The BNSF Alternative also would affect between 136 acres and 184 acres of Grazing Land, differentiated primarily by the wye options (the Ave 24 Wye would have the greatest impact).

Generally, where the BNSF Alternative includes a curved guideway there is a greater potential for parcel severance and related impacts. The Mission Ave and Mariposa Way design options, which generally are straight portions of HST, would result in parcel severance because these design options are not adjacent to roadways. The Mission Ave design option is 1,200 feet away from Mission Avenue, and the Mariposa Way design option is 1,100 feet away from Mariposa Way. The BNSF Alternative could sever 80 to 120 large farm parcels with the two Mission Ave design options and between 90 and 124 large farm parcels with the two Mariposa Way design options. The design options east of the Community of Le Grand would result in more parcel severances than the design options adjacent to the BNSF railway through Le Grand. South of Le Grand, the north-south alignment of the BNSF Alternative would result in few parcel severances until it veers from the BNSF to parallel the UPRR.

The BNSF Alternative would result in permanently closing 27 to 42 roadways, mostly along the wyes, the Mission Ave and Mariposa Way design options, and in the area where the BNSF Alternative reconnects

with the UPRR, south of Madera Acres. Large farm equipment that is not street-legal might not be able to use the detours, overpasses, or underpasses on public roadways.

The project would result in the conversion of land used for confined animal operations, ranging from less than 2 acres (Ave 21 Wye with either Mariposa Way design option) to approximately 10 acres (Ave 24 Wye with either Mission Ave design option). Based on an overlay of the alignments onto existing dairy facilities, land conversion would impact the operations at one dairy along the Mission Ave Design Option, three confined animal facilities along the Ave 24 Wye, and one dairy along the Ave 21 Wye. Severe impacts would occur at the dairy along the Mission Ave design option such that continued operation would not be possible. The dairy would be bisected by the BNSF alignment.

Some property acquisition would occur at the three sites along the Ave 24 Wye and the site along the Ave 21 Wye, but the loss of facilities is not anticipated to preclude continued operation. The remaining facilities at these confined animal operations would be located more than 100 feet away from the tracks, and therefore noise levels would not exceed the 100-dBA SEL threshold. In addition, two other confined animal operations would be close to the alignment but no acquisition would be required. At these sites, noise levels would not exceed the 100-dBA SEL threshold because facilities would be more than 100 feet away from the tracks.

Project Period Mitigation Measures

- **Ag-MM#1 Preserve the Total Amount of Prime Farmland, Farmland of Statewide Importance, Farmland of Local Importance, and Unique Farmland (Section 3.14-7 of the EIR/EIS). The** Authority will enter into an agreement with the DOC California Farmland Conservancy Program to implement the preservation of farmland. The Authority will fund the California Farmland Conservancy Program's work to identify suitable agricultural land for mitigation of impacts and to fund the purchase of agricultural conservation easements from willing sellers. The performance standards for this measure are to preserve Important Farmland in an amount commensurate with the quantity and quality of the converted farmlands, within the same agricultural regions as the impacts occur, at a replacement ratio of not less than 1.5:1. The California Farmland Conservancy Program will work with local, regional, or statewide entities whose purpose includes the acquisition and stewardship of agricultural conservation easements.

  The Authority and California Farmland Conservancy Program will develop selection criteria under this agreement to guide the pursuit and purchase of conservation easements. These will include, but are not limited to, provisions to ensure that the easements will conform to the requirements of Public Resources Code Section 10252 and to prioritize the acquisition of willing seller easements on lands that are adjacent to other protected agricultural lands or that would support the establishment of greenbelts and urban separators.

This mitigation measure would be effective given the nationwide and local success of farmland preservation programs using agricultural conservation easements and the experience of the DOC California Farmland Conservancy program.

- **Ag-MM#2 Consolidate Non-Economic Remnants (Section 3.14-7 of the EIR/EIS).** The Authority will establish and administer a farmland consolidation program to sell remnant parcels to neighboring landowners for consolidation with adjacent farmland properties. In addition, the program will assist the owners of remnant parcels in selling those remnants to adjacent landowners, upon request. The goal of the program is to provide for continued agricultural use on the maximum feasible amount of remnant parcels that otherwise may be non-economic to farm. The program will focus on severed remainder parcels, including those that were under Williamson Act or Farmland Security Act contract at the time of right-of-way acquisition and have become too small to remain in the local Williamson Act or Farmland Security Act program. The program will assist landowners in obtaining lot line adjustments where appropriate to incorporate remnant parcels into a larger parcel

that is consistent with size requirements under the local government general plan. The program will operate for a minimum of 5 years after construction of the section is completed.

The Authority and FRA expect that productive farmland would be farmed in some manner, and not left idle in perpetuity. However, the Authority and FRA recognize that constructing the Merced to Fresno HST Project will have a disruptive effect on farm ownership that would temporarily idle some remainder parcels. The intent of this mitigation measure is to take responsibility for the disruptive effects and proactively work to restore remainder parcels to productive agricultural use (and not rely on market forces to accomplish the same result).

Significance of Project Period Impacts

Table 6.4-5 presents estimates of the permanent conversion of Important Farmland that would result from the BNSF Alternative, including the potential effects of severing parcels into fragments. This would be an impact with substantial intensity under NEPA and a significant impact under CEQA.

Each of the HST alternatives would have impacts that would have negligible intensity from severing large farm parcels because severance of large parcels would not result in a permanent conversion of farmland to a nonagricultural use. Each of the HST alternatives would affect lands that are subject to Williamson Act or FSZ contracts. There would be no impact because additional farmland conversion would not occur. Each of the HST alternatives would result in the closure of several dairies and the acquisition of property from several other dairies. Because dairies are not classified as Important Farmland, there would be no loss of Important Farmland. Minor farmland conversion associated with replacement facilities would have impacts with substantial intensity. HST operations would result in noise and vibration impacts that would have negligible intensity on farm animals at two dairies and no impacts at other confined animal facilities. The HST-generated wind would not render agricultural land unusable for farming under any of the HST alternatives. Therefore, it would not result in an effect. Similarly, the HST vertical structures would not interfere with aerial application of pesticides and would not render agricultural lands unusable for farming. As a result, there would be no adverse impact from HST-generated wind.

Cumulative Construction Period Impacts

Approximately 145 to 261 acres of Important Farmland would be leased for temporary use as laydown areas, staging areas, and concrete prefabrication yards during construction of the HST alternative. Construction of other past, present, and reasonably foreseeable projects could also result in the temporary conversion of farmland for construction-related uses. It is anticipated that this land would be restored and returned to agricultural use after construction is completed. Therefore, cumulative construction impacts on farmland would have negligible intensity under NEPA.

Cumulative Construction Period Mitigation Measures

No mitigation measures are proposed.

Significance of Cumulative Construction Period Impacts

Approximately 166 to 292 acres of Important Farmland would be leased for temporary use as laydown areas, staging areas, and concrete prefabrication yards during construction of the HST alternative. Construction of other past, present, and reasonably foreseeable projects could also result in the temporary conversion of farmland for construction-related uses. It is anticipated that this land would be restored and returned to agricultural use after construction is completed. Therefore, cumulative construction impacts on farmland would have negligible intensity under NEPA and no impact under CEQA.

Cumulative Project Period Impacts

Approximately 1% of the Important Farmland and Grazing Land in Merced, Madera, and Fresno counties was converted to nonagricultural uses between 2000 and 2006. This trend is expected to continue in the future because more urbanization would continue to occur under the No Project Alternative. By 2035, an additional 23,200 acres of farmland is projected to be converted to urban uses. Although conversion to urban uses in many cases is consistent with local plans and policies that identify areas for planned future growth, loss of Important Farmland would be an impact with substantial intensity under NEPA and cumulatively considerable under CEQA. The BNSF Alternative would require the acquisition of up to approximately 1,450 acres of farmland, and conversion of farmland to nonagricultural uses is considered a cumulatively considerable impact.

The BNSF Alternative would have a less than significant effect regarding Williamson Act conflicts. Most of the reasonably foreseeable projects identified are not under active Williamson Act contracts because they are within city spheres of influence that are planned for urbanization. Outside the sphere of influence of local jurisdictions, Williamson Act protections discourage the early conversion of agricultural lands. Although the Los Banos Bypass project would affect land contracted under the Williamson Act, those effects are not significant because the land required for the project would be removed from Williamson Act contracts, and the contracts would not be cancelled if minimum acreage requirements were met. Conflicts with Williamson Act contracts are not cumulatively considerable, and no additional mitigation is required.

Impacts would result from direct conversion of agricultural lands to transportation uses, as well as indirect loss resulting from division of agricultural parcels. Impacts would be greatest in the Central Valley, such as along the Merced to Bakersfield Section, and least in the urbanized corridors, such as the San Francisco to San Jose Section.

Cumulative Project Period Mitigation Measures

Mitigation measures above would be implemented to preserve the total amount of Prime Farmland, Farmland of Statewide Importance, Farmland of Local Importance, and Unique Farmland, thereby reducing cumulative impacts. However, even with the implementation of mitigation measures, farmland impacts will remain significant under NEPA and CEQA because of the large amount of farmland conversion.

Cumulative Project Period Significance

The BNSF alternative could have a significant impact on agricultural lands, therefore contributing to a cumulatively significant impact. Impacts would result from direct conversion of agricultural lands to transportation uses, as well as indirect loss resulting from division of agricultural parcels. Impacts would be greatest in the Central Valley, such as along the Merced to Bakersfield Section, and least in the urbanized corridors, such as the San Francisco to San Jose Section.

6.3.5.4 Cultural Resources

Because this project is a federal undertaking, Section 106 of the NHPA, 36 CFR 800.4(a)(1), requires establishing a project APE. The APE is the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist.

The California State Historic Preservation Officer concurred with the initial version Merced to Fresno Section APE on August 16, 2010, prior to the refinement of alternatives. The initial APE was defined as a band centered on the project alternatives, expanding approximately 250 feet on either side of the centerline. The APE included the footprint of actual facilities that would be built (e.g., tracks, stations, switchyards, and maintenance facilities). Following SHPO concurrence with the initial versions of the

archaeological and built environment APEs, alternatives were refined and revised. The revised built environment APE was prepared in accordance with the guidance included within Attachment B of the PA. Updated APEs based upon current designs and impacts were prepared and submitted for review and SHPO subsequently concurred with the revised APEs. All cultural resources studies to support this document (HPSR, HASR, and ASR [Authority and FRA 2012a,b,c, respectively]) were undertaken within the updated APEs. See Section 3.17.3.1 of the EIR/EIS for additional information.

Affected Environment (Archaeological)

There are 13 significant and/or potentially significant archaeological resources within the boundaries of the APEs for the three build alternatives. Five of these sites were previously recorded, three are newly identified sites, and five are archaeologically sensitive areas identified as areas of concern through consultation with property owners and with Native American contacts.

Construction Cultural Resources Impacts (Archaeological).

Soil excavation or compaction resulting from the use of heavy machinery, installation of improvements, and installation or relocation of utilities and infrastructure on the construction site itself or in staging areas may affect the integrity of artifact-bearing deposits associated with known and as-yet undiscovered archaeological sites within the APE. Common to all alternatives, unknown or unrecorded archaeological resources, including subsurface buried archaeological deposits, may exist, but are currently unknown. Construction areas related to ground disturbance could contain both recorded and unknown archeological resources. Disturbance and removal of archaeological resources could result in adverse effects on archaeological resources under Section 106 and could cause substantial adverse changes in the significance of an archaeological resource pursuant to Section 15064.5 and is therefore considered a substantial effect under NEPA and a significant impact under CEQA.

The BNSF Alternative has the potential to affect up to eight archaeological resources (four on the north-south alignment, one on the wye alignment, and three on the HMF site). These resources include four prehistoric sites (P-24-001862, HST-H-JL-01, HST-H-JL-02, HST-H/P-TC-01), the Kojima Development property (HST-H-JL-02), and three potential, but as-yet-unconfirmed, prehistoric sites (two potential ethnographic villages and one potential burial site). Numerous named and unnamed stream or river crossings are considered sensitive for archaeological sites, which may be affected by construction activities along this alternative. All of these resources or potential resources are subject to construction period impacts, which would be considered an adverse effect under Section 106; an impact with substantial intensity under NEPA; and a significant impact under CEQA.

Construction Cultural Resources Mitigation Measures (Archaeological)

Protective measures, such as archaeological site capping, and recordation of resources would take place prior to construction; other protective measures such as monitoring for archaeological resources during ground-disturbing activities would occur during construction.

- **Arch-MM#4:** Conduct Archaeological Monitoring in Proximity to Identified Sites or Areas of Sensitivity--Ground-disturbing activities that have the potential to affect archaeological remains may occur in areas that have been identified as either the location of a known archaeological site, or in an area known to be sensitive for the presence of buried cultural resources. The Authority will retain the services of a qualified archaeological monitor who will be present during all ground-disturbing construction activities occurring in native sediments/soils. In the event that cultural resources are exposed during construction, the monitor will temporarily halt activities in the immediate vicinity of the discovery as discussed in MM # 2 above. If the archaeologist determines that the cultural resources are unique as defined by Section 21083.2 of CEQA, then the archeologist will conduct additional excavations to avoid impacts on these resources as described in MM#2 above See Section 3.17.6.1 of the EIR/EIS for additional details.

- **Arch-MM#1:** Conduct Archaeological Training--Prior to ground-disturbing activities within the project alternatives, a qualified professional archaeologist, who meets the SOI's Standards for Archaeology, will develop a training program and printed material to be presented to construction personnel. The purpose of this training and accompanying materials will be to familiarize construction personnel with the relevant legal (Section 106/NEPA) context for cultural resources of the project and with the types of cultural sites, features, and artifacts that could be uncovered during construction activities. These training sessions will be conducted prior to commencing construction within discrete portions of the project alternatives or as needed as construction crews and supervisors may change.

- **Arch-MM#2:** Halt Work in the Event of an Archaeological Discovery-- If any cultural resources are discovered during ground-disturbing activities, all work within 50 feet of the resources will halt, and the project proponent will consult with a qualified archaeologist to assess the significance of the find under Section 106 and Section 21083.2 of CEQA , and any work may proceed on other parts of the project site while mitigation for historical resources or unique archaeological resources is being carried out. An Unanticipated Discoveries Plan has been developed, in coordination with the consulting parties, to detail the specific procedures to be followed if archaeological materials are found during construction. The California State Lands Commission (CSLC) will be notified if the find is a cultural resource on or in the submerged lands of California, consequently under the jurisdiction of the CSLC. The project proponent will comply with all applicable rules and regulations promulgated by CSLC with respect to cultural resources located in submerged lands, and in accordance with the PA.

  If human remains are encountered, the project proponent will comply with applicable laws and regulations regarding notification and disposition of the remains. If the coroner determines that the remains are Native American, the coroner will notify the NAHC under Health and Safety Code 7050.5.

  If any find is determined to be significant Section 106 or unique under Section 21083.2 of CEQA , the project proponent and the archaeologist will meet to determine the appropriate avoidance measures or other appropriate mitigation in conjunction with the SHPO and the MOA signatories. In considering any suggested mitigation proposed by the consulting archaeologist to mitigate impacts on historical resources or unique archaeological resources, a determination will be made whether avoidance is necessary and feasible in light of factors such as the nature of the find, project design, costs, and other similar considerations. All significant cultural materials recovered will be, as necessary and at the discretion of the consulting archaeologist, subject to scientific analysis, professional museum curation, and documentation according to current professional standards as determined in the project MOA. Unless the archaeologist determines that the archaeological resource is "unique" under CEQA or of greater interpretive use than research significance, then an archaeological data recovery program shall be implemented to address the resources in a manner that meets the requirements of Section VI(c)(1) of the Programmatic Agreement, and Section 21083.2 of CEQA

  See Section 3.17.6.1 of the EIR/EIS for additional details.

- **Arch-MM#3: Plan an Intentional Site Burial Preservation In-Place.** If project engineering concludes that avoidance is not feasible, a process to determine whether the site can be preserved through intentional site burial will be considered. When complete avoidance is not possible, preservation in-place is the preferred form of mitigation for an "historical resource of an archaeological nature" because it retains the relationships between artifact and context, and may avoid conflicts with groups associated with the site. If intentional site burial in place is necessary, the contracted archaeologist will, in addition to the formal delineation of the site boundaries, prepare and implement a design plan to dictate the conditions of the intentional site burial according to the requirements and recommendations of A Technique to Protect Against National or Mechanical Loss (Thorne 1991).See Section 3.17.6.1 of the EIR/EIS for additional details.

Significance Construction Impacts Cultural Resource (Archaeological)

The impacts with substantial intensity identified in Section 3.17.4.5 of the EIR/EIS and summarized above are considered significant because they have the potential to adversely affect a cultural resource, a term used in this NEPA impact subsection and based upon the definition in CEQ 1508.27.

Soil excavation or compaction demolition, degradation, or unearthing resulting from the use of heavy machinery on the construction site itself or in staging areas may affect the integrity of artifact-bearing deposits associated with known and as yet undiscovered archaeological sites. These impacts would be significant because an archaeological site that has lost its depositional integrity can no longer provide new information with which to formulate a better understanding of prehistory or history.

Creating the potential for archaeological deposits to be revealed, exposing them to potential looting, more traffic, and compaction would also be a significant impact because the loss of some or all of the artifacts from a site prevents us from a complete understanding of the human activities carried out at that site. The affected archaeological site can therefore no longer provide an accurate picture of the past, nor contribute to a better understanding of prehistory or history.

As discussed in Section 3.17.3.4 of the EIR/EIS, although actions determined to have an adverse impact under NEPA may be mitigated and have a lesser effect, for Section 106, the effect determination remains adverse even when mitigated.

Affected Environment (Architectural History and Historical Properties and Resources).

Forty-seven significant historic architectural resources have been identified within the APE. Of these resources, 20 within the APE were listed, have been determined eligible for listing, or appear to be eligible for listing in the NRHP, pending SHPO concurrence. These 20 historic properties are also considered to be historical resources for the purposes of CEQA. The remaining 27 historic architectural resources do not meet the NRHP criteria, but are considered historical resources for the purposes of CEQA. All of these resources are reported in the HPSR (Authority and FRA 2012a), as required in the PA. The 47 historic architectural resources that are either historic properties (Section 106) or historical resources (CEQA), or both, are shown in Table 3.17-6 of the EIR/EIS.

Construction Cultural Resources Impacts (Architectural History and Historical Properties and Resources)

The activities that cause impacts on historical properties and resources are typically associated with the construction of the project: disturbance of the ground, the material or physical alteration of the built environment, or the alteration of the visual setting. Construction activities may cause impacts on cultural resources and can include excavation, staging, heavy equipment usage and movement, drilling, demolition, or relocation, as well as increases in noise or vibration levels, or introduction of new visual elements.

One common potential adverse effect or change is construction noise and vibration; therefore, the project will develop avoidance mitigation to make sure that there would be no indirect adverse effects or indirect substantial adverse change to any historic properties (Section 106) from noise or vibration caused by construction activities for any of the Merced to Fresno Section alternatives. Vibration from impact pile-driving during construction could cause the physical destruction, damage, or alteration of historic properties if the pile-driving is within 25 to 50 feet of the building. The development of alternative construction methods at these locations would avoid adverse effects on historic properties (Section 106). Preconstruction surveys conducted at locations within 50 feet of piling would document existing condition of buildings in case there is an issue during or after construction.

Construction noise also has the potential to cause adverse effects or substantial adverse change to historic properties. Historic properties that are sensitive to noise include resources like residences, parks,

libraries, museums, and schools. These types of resources have an inherent quiet nature that is part of their identification as well as their significance. As a precaution, the project would develop avoidance mitigation to avoid adverse effect or substantial adverse change resulting from such construction noises such as impact pile-driving, jackhammering, and truck loading and operations. Avoidance mitigations would include alternative measures, such as low-noise emission equipment and noise-deadening for trucks.

The BNSF Alternative would cause *direct adverse effects* under Section 106, direct substantial adverse change under CEQA, and impacts with substantial intensity under NEPA on the following three historic properties:

- Robertson Blvd. Tree Row (#14) is in the direct path of both the Ave 24 and Ave 21 wyes for all three alternatives and would cross the HST alignment with either an overpass or an underpass. Construction would result in the physical demolition, destruction, damage, or substantial alteration of this linear resource between the two wyes. As a result, the proposed project would cause direct adverse effects under Section 106, direct substantial adverse change under CEQA, and impacts with substantial intensity under NEPA.

- Weber Avenue Overcrossing (#17) is in the direct path of these alternatives, which share a common alignment in this location. Construction would result in the physical demolition, destruction, damage, or substantial alteration of the resource. As a result, the proposed project would cause direct adverse effects under Section 106, direct substantial adverse change under CEQA, and impacts with substantial intensity under NEPA.

- Belmont Avenue Subway and Traffic Circle (#18) is in the direct path of these alternatives, which share a common alignment in this location. Construction would result in the physical demolition, destruction, damage, or substantial alteration of the resource. As a result, the proposed project would cause direct adverse effects under Section 106, direct substantial adverse change under CEQA, and impacts with substantial intensity under NEPA.

The BNSF Alternative and design options would cause an *indirect adverse effect* under Section 106, an indirect substantial adverse change under CEQA, and an impact with moderate intensity under NEPA on the following three historic properties/historical resources:

- Roeding Park: APN 450-020-08 (#16) is immediately adjacent to these alternatives, which share a common alignment in this location. Construction would introduce new visual elements that would diminish the integrity of the significant features of this property. As a result, the proposed project would cause an indirect adverse effect under Section 106, an indirect substantial adverse change under CEQA, and an impact with moderate intensity under NEPA. Mitigation options are addressed in further detail in Section 3.15, Parks, Recreation, and Open Space.

- Southern Pacific Railroad Depot: APN 467-030-31 (#31) is located immediately adjacent to these alternatives, which share a common alignment in this location. The project in this location includes construction of a Tulare Street overcrossing that would be adjacent to the southern side of the resource. Construction would introduce new visual elements that would diminish the integrity of the significant features of this property. As a result, the proposed project would cause an indirect adverse effect under Section 106, an indirect substantial adverse change under CEQA, and a, impact with moderate intensity under NEPA. The project in this location also includes an option for an undercrossing at Tulare Street and this option would have no adverse effect on this property.

- Bank of America: APN 467-074-01 (#35) is located adjacent to the Tulare Street overcrossing, which includes roadway changes associated with the project. The construction of roadway overpasses within 15 feet of the resource would introduce new visual elements that would diminish the integrity of the significant features of this property. As a result, the proposed project would cause an indirect adverse effect under Section 106, an indirect substantial adverse change under CEQA, and an impact

with moderate intensity under NEPA. The project in this location also includes an option for an undercrossing at Tulare Street and this option would have no adverse effect on this property.

Construction Cultural Resources Mitigation Measures (Architectural History and Historical Properties and Resources)

Protective measures, such as building stabilization, and recordation of historical resources would take place prior to construction; other protective measures such as vibration monitoring for built historical resources would occur during construction.

- **Hist-MM#1:** Avoid Adverse Construction Vibration Effects--The HST Project will develop construction methods to avoid indirect adverse effects or indirect substantial adverse change to any historical properties and resources under Section 106 and CEQA from vibration caused by construction activities. Vibration from impact pile-driving during construction could cause the physical destruction, damage, or alteration of historic properties or historical resources if the pile-driving is within 25 to 50 feet of the building. Because this impact pile-driving could cause adverse effects or substantial adverse changes, alternative construction methods causing less than 0.12 peak particle velocity of one inch per second (0.12 PPV in/sec) measured at the receptor would be developed for construction activities near historic properties or historical resources if they are determined to be extremely susceptible to vibration damage. If piling is more 50 feet from buildings, or if alternative methods such as push piling or auger piling can be used, damage from construction vibration should not be an issue. Preconstruction surveys conducted at locations within 50 feet of piling would document existing condition of buildings in case there is an issue during or after construction. All performance standards set forth in FRA's *High Speed Ground Transportation Noise and Vibration Impact Assessment* (2005) for noise and vibration impact evaluations, and set forth in the BETP for avoidance of adverse vibration effects on exiting historical properties and resources will be implemented to minimize and mitigate noise and vibration impacts. See Section 3.17.6.2 of the EIR/EIS for additional information.

- **Hist-MM#2:** Develop Protection and Stabilization Measures—Historical Properties and resources subject to this mitigation measure include any that are potentially physically affected, and/or relocated, and/or in close enough proximity to construction of BNSF Alternative improvements to require protection. This mitigation will be used to confirm that adverse effects on historical properties/historical resources will be either avoided entirely, or minimized to the extent possible. This mitigation will be developed in consultation with the landowner and land-owning agencies, as well as the SHPO and the MOA signatories, as required by and in accordance with the standards set forth in the PA. Such measures may include one or more of the following, but will not be limited to: vibration monitoring of construction in the vicinity of historical properties and resources; cordoning off of resources, such as traffic, equipment storage, and personnel, from construction activities; shielding of resources from dust or debris; and stabilization of buildings adjacent to construction. For buildings that are to be moved (see MM#3), such measures will include stabilization of buildings and structures before, during, and after relocation; protection of buildings and structures during temporary storage; and relocation at a new site and during subsequent rehabilitation. Moving buildings could result in minor impacts on air emissions from equipment and vehicles and minor effects on developed or undeveloped sites. See Section 3.17.6.2 of the EIR/EIS for additional information.

- **Hist-MM#3:** Minimize Adverse Effects through Relocation of Historic Structures--The BETP identifies historical properties/historical resources that will be relocated to help avoid destruction and minimize the direct adverse effect of their physical damage or alteration. The plan for relocation will be developed, and implementation of relocation will take place prior to construction. The relocation of the historical properties/historical resources will take into account the historical site and layout (i.e., the orientation of the buildings to the cardinal directions), as well as their potential re-use. All structures will be thoroughly recorded in a Historic Structure Report (HSR), and the relocation plan

will provide for stabilization of the structures before, during, and after the move. The relocation plan will be developed pursuant to and will implement all appropriate best practices applicable to the historical resource and/or property being relocated. See Section 3.17.6.2 of the EIR/EIS for additional information.

- **Hist-MM#5:** Prepare and Submit NRHP Nominations--Specific historic properties/historical resources identified for nomination to the NRHP Program of the National Park Service (NPS). Properties subject to this mitigation will be treated in consultation with the landowner, or land-owning agencies, and the lead agency. Current photographs of the property used in the nomination(s) will be taken prior to the start of project construction. The nomination document may also use other current and/or historic images prepared as part of other mitigation activities. See Section 3.17.6.2 of the EIR/EIS for additional information.

- **Hist-MM#6:** Prepare and Submit CRHR Nominations--Specific historical resources shall be identified for nomination to the CRHR Program at the California OHP consistent with best practices within the professional historic preservation community. Current photographs of the resource used in the nomination(s) will be made prior to the start of construction. The nomination document may also use current and/or historic images prepared as part of other mitigation activities. See Section 3.17.6.2 of the EIR/EIS for additional information. Nominated resources will be protected pursuant to the mitigation measures specified in this document for existing and already listed historical properties and resources.

- **Hist-MM#7:** Prepare and Submit Historic American Building Survey (HABS)/Historic American Engineering Record (HAER)/Historic American Landscape Survey (HALS) Documentation--Specific historical resources that would be physically altered, damaged, relocated, or destroyed by the project in compliance with the HABS/HAER/HALS programs. Consultation with the SHPO, NPS, and the consulting parties will be required if any of the resources must be documented to these standards. Prior to the start of construction, in consultation with the Western Regional Office of the NPS, Oakland, California, large-format (4-inch by 5-inch, or larger, negative-size) black and white photographs will be taken of these historic properties/historical resources showing them in context, as well as details of character-defining features. It is anticipated that the recordation of historic properties will be completed to Level II HABS written data standards, and will include archival and digital reproduction of historic images, plans, and drawings, if available. Copies of the documentation will be offered to the appropriate local governments, historical societies and agencies, and libraries. The documentation will also be offered in printed and electronic form to any repository or organization upon which SHPO, the Authority, and local agency with jurisdiction over the property, through consultation, may agree. See Section 3.17.6.2 of the EIR/EIS for additional information.

- **Hist-MM#8:** Prepare Historic Structure Reports--Historic properties/historical resources that would be physically altered, damaged, or relocated that would be subject to an HSR have been identified in the BETP. The HSR for these resources will be prepared prior to the start of construction. The HSR will follow the general guidelines for such reports as described in the California OHP publication, "Historic Structure Report Format" (OHP n.d.). The scope of each HSR will be developed in consultation with the land-owning agencies, the SHPO, and appropriate consulting parties. The HSR will include documentation of existing landscaping, if appropriate. The HSRs may be used in the ongoing planning process and re-use of the properties, and may be coordinated with the other mitigation documentation activities, such as HABS/HAER records. See Section 3.17.6.2 of the EIR/EIS for additional information.

- **Hist-MM#9:** Prepare Interpretive Exhibits--Some historic properties/historical resources may be identified for historic interpretation. Interpretive exhibits will provide information regarding the specific historic property or historical resource. The interpretive exhibits will utilize images, narrative history, drawings, or other material produced for the mitigation described above, including the HABS/HAER reports, NRHP and CRHR nominations, or other archival sources, and will be consistent

with Best Practices within the professional historic preservation community based on the type of historical resources addressed. The interpretive exhibits may be in the form of, but are not limited to, interpretive display panels and/or printed material for dissemination to the public. The interpretive exhibits may be installed at local libraries, historical societies, or public buildings.

All historic properties/historical resources demolished by the project will be the subject of informative permanent metal plaques that will be installed at the site of the demolished historic property, or at nearby public locations. The plaques will provide a brief history of the property, its engineering/architectural features and characteristics, and the reasons for and date of its demolition. See Section 3.17.6.2 of the EIR/EIS for additional details.

- **Hist-MM#10:** Plan Repair of Inadvertent Damage--The BETP provides a plan for the repair of inadvertent damage to historical properties/historical resources. The plan has been developed prior to construction, and states that damage resulting from the project to any of the historical properties/historical resources near construction activities will be repaired in accordance with the SOI's Standards for Rehabilitation. The HSR, and/or HABS/HAER, recordation will photographically document the condition of historic properties/historical resources prior to the start of construction to establish the baseline condition for assessing damage. A copy of this photographic documentation will be provided to the landowner or land-owning agencies. Prior to implementation, plans for any repairs to historic properties will be submitted for SHPO review and comment to verify conformance with the SOI's Standards for Rehabilitation. See Section 3.17.6.2 of the EIR/EIS for additional information.

Significance of Construction Cultural Resources Impacts (Architectural History; Historical Properties and Resources)

The impacts with substantial intensity identified in Section 3.17.4.5 of the EIR/EIS and summarized above are considered significant because they have the potential to adversely affect a cultural resource, a term used in this NEPA impact subsection and based upon the definition in CEQ 1508.27.

Physical impacts such as material or structural alteration, especially demolition of an NRHP-listed or eligible historic property, would be an impact with substantial intensity under NEPA. These direct impacts would be significant because the impacts could directly alter the physical integrity, use, or setting. As a result, the historic property may no longer be able to convey its significance through its physical characteristics and, therefore, may no longer be eligible for the NRHP.

Introduction of new visual elements or alteration of the visual setting when it is part of the property's integrity would result in an impact with moderate intensity under NEPA because the historic property may no longer be able to convey its significance and, therefore, may no longer be eligible for the NRHP.

Construction or operational noise that impacts historic properties that have an inherent quiet nature that is part of their identification as well as their significance would cause impacts with moderate intensity under NEPA because they would permanently degrade the elements that make the historic property eligible for the NRHP.

To the extent that visual effects and vibration could degrade the elements that make the resource eligible, these long-term effects would be adverse and of moderate intensity.

As discussed in Section 3.17.3.4 of the EIR/EIS, although actions determined to have an adverse impact under NEPA may be mitigated and have a lesser effect, for Section 106, the effect determination remains adverse even when mitigated. Table 6.3-10 contains the CEQA significance determinations before and after mitigation.

Project Period Archaeological Impacts

Archaeological sites would only be subject to adverse effects during construction activities for the BNSF Alternative, but not during operations. Increasing public access to archaeological sites during operations could lead to their intentional or unintentional disturbance or destruction by people who previously would not have been able to enter the property where the site is located. However, the HST alternatives, including the BNSF Alternative, would not create new access for any areas that contain archaeological resources. In remote areas, the guideway would be fenced; therefore, it would not provide access for persons to loot sites and would not expose sites to the adverse effects of compaction through pedestrian or vehicular traffic. Because the HST System for the BNSF Alternative would allow only maintenance persons or vehicles within the operating corridor, it is unlikely that operation of the HST would affect archaeological sites. The related roadway modifications would not cause more traffic near identified archaeological sites. There is a possibility for new sites to be discovered during construction of the BNSF Alternative, but these would be managed under supervision of a trained archaeologist in accordance with the Section XI of the PA, which details the procedures to be implemented in the event of an unanticipated discovery. The PA is included in Appendix 3.17-A of the EIR/EIS. Therefore, project operation would not result in effects on archaeological resources under NEPA or CEQA. The impact during operations would have negligible intensity under NEPA and be less than significant under CEQA.

Project Period Archaeological Mitigation Measures.

None needed.

Significance of Project Period Archaeological Impacts

Negligible intensity under NEPA and Section 106; Less than Significant under CEQA.

Project Period Architectural History Impacts

Adverse effects on historic architectural resources would largely occur during construction activities associated with all HST alternatives, including the BNSF Alternative. While there is potential for both vibration and noise impacts generated during operation, HST projects, including the BNSF Alterative, typically generate significantly fewer vibration impacts as compared with noise impacts.

There would be no vibration impacts for most locations along the Merced to Fresno Section under any of the HST alternatives, including the BNSF Alternative. This is because of the very inefficient propagation of vibration through the soils in the project vicinity, the low vehicle input force, and the presence of elevated structures, which provide significant attenuation of vibration levels in heavily populated areas where vibration-sensitive receptors are primarily located. In addition, any buildings and structures actually within the construction footprint were not included in the vibration analysis because it is anticipated that they would be destroyed. As a result, there would be no operational vibration effects on historical properties or resources under NEPA (see 3.17.5 and Section 3.4, Noise and Vibration of the EIR/EIS).

Operational noise has the potential to cause adverse effects or substantial adverse change to historical properties and historical resources. Historical properties and historical resources that are sensitive to noise include resources such as residences, parks, libraries, museums and schools. These types of resources have an inherent quiet nature that is part of their identification as well as their significance.

There are two historic properties within the APE that are considered potentially sensitive to increases in noise: Roeding Park and the residence at 24302 Road 15.

The BNSF Alternative would not have any *direct* adverse vibration or noise effects on any historic properties or historic resources as the result of operational activities.

The BNSF Alternative would cause an *indirect adverse effect* under Section 106 and CEQA on the following two historic properties as shown in Table 3.17-9 of the EIR/EIS as a result of operational activities:

- Roeding Park: APN 450-020-08 (#16) is located immediately adjacent to these alternatives, which share a common alignment in this location. According to FRA Noise Impact Criteria, the park would experience severe noise impacts. A substantial increase in the noise levels of the pastoral setting of the passive recreational portion of the park, particularly at those inherently quiet and contributing sites mentioned above, would not be consistent with the historic setting, feeling, and association and would diminish the historic integrity of Roeding Park. As described in Section 3.4 of the EIR/EIS, Noise and Vibration, noise impacts are anticipated to be severe without mitigation, which would be decided in consultation with the City of Fresno (See EIR/EIS Section 3.15, Parks, Recreation, and Open Space).
- Residence at 24302 Road 15: APN 026-233-011 (#13) is located immediately adjacent to the north side of a proposed overpass at Road 15 along the Ave 24 Wye. According to FRA Noise Impact Criteria, the residence would experience severe noise impacts during operation of the HST. As described in Section 3.4 of the EIR/EIS, Noise and Vibration, noise impacts are anticipated to be severe without mitigation.

Project Period Architectural Mitigation Measures

- **Hist-MM#4: Minimize Adverse Operational Noise Effects**. Properties subject to this mitigation will be treated in consultation with the landowner, or land-owning agencies, and the lead agency and noise impacts will generally be mitigated. Preliminary project design options have been developed to help reduce noise impacts and follow FRA methodologies and noise reduction performance standards for noise abatement. These options will be further developed during project design and will be implemented during construction. Historic properties/historical resources subject to this mitigation measure will be thoroughly recorded in the appropriate format of the Historic American Building Survey (HABS)/Historic American Engineering Record (HAER)/ Historic American Landscape Survey (HALS) programs prior to construction of the HST Project. See Section 3.17.6.2 of the EIR/EIS for additional details.

Significance of Project Period Impacts on Architectural Historical Properties and Resources

Construction or operational noise that impacts historic properties that have an inherent quiet nature that is part of their identification as well as their significance would cause impacts with moderate intensity under NEPA because they would permanently degrade the elements that make the historic property eligible for the NRHP.

To the extent that visual effects and vibration could degrade the elements that make the resource eligible, these long-term effects would be adverse and of moderate intensity.

As discussed in Section 3.17.3.4 of the EIR/EIS, although actions determined to have an adverse impact under NEPA may be mitigated and have a lesser effect, for Section 106, the effect determination remains adverse even when mitigated.

<u>Cumulative Construction Cultural Resource Impacts</u>

Prehistoric sites are common in riverbank and floodplain areas, and burial sites are sometimes encountered during ground-disturbing activities. It is likely that the BNSF Alternative would disturb known archaeological resources as described above, and unknown archaeological resources could also be disturbed, damaged or destroyed during project construction activities. Significant and unavoidable losses of unique archaeological resources or a historical resource could occur when excavations encounter archaeological deposits that cannot be removed or recovered (e.g., under levees) or where recovery

would not sufficiently prevent the loss of significant cultural resources. If such permanent losses occurred, cumulative construction impacts would have moderate intensity under NEPA and be significant under CEQA.

Further, under the No Project Alternative, three reasonably foreseeable projects could also adversely affect cultural resources. The Tesoro Viejo Specific Plan (for the area approximately 10 miles northeast of the project) would potentially affect a burial area. The Madera County Dairy Standards Programmatic Final EIR (Madera County 2008) states that this project has the potential to affect cultural resources. The cumulative cultural resource impacts of these projects would be significant *but by law mitigation will be required per regulatory standards so likely mitigated to a level that is less than significant*. The Roeding Regional Park Master Plan and Fresno Chaffee Zoo Facility Master Plans (City of Fresno 2011) would affect cultural resources in the Roeding Park Historic District, but these effects would be less than significant after mitigation.

Future growth under the No Project Alternative would result in the urbanization of land outside of existing urban areas but within urban spheres of influence. Historical architectural resources could also be damaged or require removal from areas in and around the study area. Furthermore, local projects and the secondary effects of redevelopment pressures around the HST stations would potentially result in the removal of historical buildings in Downtown Merced and Downtown Fresno. If these resources meet the definition of a historical resource or a historic resource (as defined in Section 106, 36 CFR 800), their modification or destruction would be significant. Implementation of mitigation measures would reduce the effects on significant cultural resources to a level of less than significant. This assumes future projects will mitigate to standards required by federal state and local regulations. There could be a loss of significant cultural artifacts, and due to this likelihood, cumulative impacts could have substantial intensity under NEPA.

As described in the 2005 Statewide Program EIR/EIS (Authority and FRA 2005) and the 2008 Bay Area to Central Valley Program EIR/EIS (Authority and FRA 2008), the HST System as a whole could have a significant impact on archaeological resources and historical structures, and therefore may contribute to a cumulatively considerable impact. Potential impacts would likely occur in areas that cross formations with paleontological sensitivity, such as the Colma Formation (San Francisco to San Jose Section), and in areas where the HST alternative alignments, including the BNSF Alternative, use existing rail corridors, as these corridors and potential stations in urban centers typically are surrounded by historical structures and districts.

Cumulative Cultural Resource Mitigation Measures

The BNSF Alternative will minimize cumulative impacts on cultural resources by implementing all the mitigation measures described above, and by adhering to federal, state, and local cultural resource protection regulations and providing guidance on the treatment of significant properties (as defined in Section 106 evaluation criteria). Implementation of Mitigation measures for cultural resources summarized above and discussed in Section 3.17.6 of the EIR/EIS and compliance with applicable federal, state and local cultural resources protection regulation will minimize and mitigate the project's contribution to cultural resources impacts to a level that is not cumulatively considerable, thereby reducing cumulative impacts. Although implementation of mitigation measures can reduce cumulative impacts, it cannot avoid them entirely.

Significance of Cumulative Cultural Resources Impacts

The cumulative construction and operations impacts of the project and other reasonably foreseeable projects on cultural resources would have moderate intensity under NEPA and be significant under CEQA, but would be minimized and mitigated to a level that is less than significant.

6.3.5.5 Parks-BNSF

Affected Environment

The study area for parks, recreation, and open space is defined as 1,000 feet on either side of the north-south alignments and the wyes and 0.5 mile around the station areas, HMFs, and support facilities. Please refer to the UPRR discussion for more information on the affected environment and Section 3.15 of the EIR/EIS.

There are six park and recreational resources within 1000 feet, 3 resources within 300 feet, and three resources within 100 feet of the BNSF alignment's construction footprint. Of the six resources within 1000 feet, one is a park in Merced and five are parks in Fresno.

The BNSF Alternative includes the same parks identified for the Downtown Merced Station and Downtown Fresno Station study areas under the UPRR/SR 99 Alternative. Most have easy vehicular and pedestrian access to attract users from the surrounding area.

The study areas for the Mission Ave and Mariposa Way design options include Le Grand Park in the unincorporated community of Le Grand in Merced County. The Mission Ave East of Le Grand and Mariposa Way East of Le Grand design options shift the alignment farther to the north (Figure 3.15-2 of the EIR/EIS); the study areas do not include Le Grand Park. With these two design options, seven parks lie within the BNSF Alternative study area.

Construction Period Impacts

The BNSF Alternative has the same alignment as the UPRR/SR99 Alternative in Merced Station area and from immediately north of the San Joaquin River through the Fresno Station. Therefore the BNSF Alternative Construction effects are the same as the UPRR/SR 99 Alternative for Bob Hart Square, Courthouse Square Park, Chukchansi Park Stadium, Camp Pashayan, San Joaquin River Parkway and Roeding Park (see the UPRR discussion and Figures 3.15-9 to 3.15-14 of the EIR/EIS). The only park unique to the BNSF is Le Grand Park.

Le Grand Park (City of Le Grand) – This park is more than 800 feet from the proposed HST alignment and is separated from the alignment by two blocks with numerous buildings (see Figure 3.15-16 of the EIR/EIS). Therefore, the BNSF Alternative would have no direct or indirect construction impacts.

Construction Period Mitigation Measures

Mitigation measures for construction impacts along the BNSF Alternative would be the same as those listed for the UPRR/SR99 Alternative.

Significance of Construction Period Impacts

Four park resources would incur impacts with substantial intensity due to park closures during construction: Sharon Avenue Linear Park, Riverside Park, County Road 27¾ Linear Park, and Camp Pashayan. After mitigation, the impacts on these parks would be considered of substantial intensity under NEPA because the temporary use would require the partial or full closure of the parks during construction a duration of up to 4 years. Construction impacts on the San Joaquin River Parkway and Roeding Park would have moderate intensity under NEPA. Impacts to Sharon Avenue Linear Park and County Road 27-2/3 Linear Park would be significant under CEQA. Impacts to Camp Pashayan would be considered less than significant.

Project Period Impacts

Project impacts from the BNSF Alternative are limited to Camp Pashayan and Roeding Park. In both cases, these impacts are the same as the UPRR/SR 99 Alternative.

Project Period Mitigation Measures

Mitigation measures for project impacts along the BNSF Alternative would be the same as those listed for the UPRR/SR99 Alternative.

Significance of Project Period Impacts

The BNSF Alternative would acquire land from Camp Pashayan and the impact would be considered of substantial intensity under NEPA and less than significant with mitigation under CEQA. Impacts would be of substantial intensity under NEPA to Roeding Park and less than significant under CEQA.

Cumulative Construction Period Impacts

Cumulative construction impacts along the BNSF Alternative would be the same as those listed for the UPRR Alternative. Roeding Park would experience cumulatively considerable impacts from construction from the HST, the Roeding Regional Park and the Fresno Chaffee Zoo Facility Master Plan renovations, and planned auxiliary lanes on SR 99 between Clinton Avenue and Fresno Street.

Cumulative Construction Period Mitigation

None required.

Significance of Cumulative Construction Period Impacts

Except for impacts at Roeding Park, construction of other past, present, and reasonably foreseeable infrastructure and development projects would not physically alter parks in the Merced to Fresno Section, and construction -related cumulative impacts on parks would, therefore be of negligible intensity under NEPA and less than significant under CEQA.

Cumulative Project Period Impacts

Cumulative project period impacts along the BNSF Alternative would be the same as those listed for the UPRR Alternative. The BNSF alternatives would have approximately 0.6 acres property acquisition of park lands.

The BNSF Alternative would have potential for cumulative impacts to parks because it would impact parks in Fresno, where there is already a low ratio of parks to residents.

Cumulative Project Period Mitigation

Mitigation will include providing financial compensation for purchase and development of replacement park property of at least equivalent value with the property acquired or, where appropriate, enhancement of the existing facility.

Significance of Cumulative Project Period Impacts

The cumulative project period impacts of the project and other reasonably foreseeable projects on parkland projects would be considered of negligible intensity under NEPA and less than significant under CEQA.

6.3.5.6 Section 4(f) BNSF Alternative

The BNSF Alternative would result in the use of four Section 4(f) resources. Camp Pashayan, Robertson Tree Row, Belmont Avenue Subway and Traffic Circle in Fresno, and the Weber Avenue Bridge. These uses and the measures to minimize harm for these uses are identical to those described for the UPRR/SR 99 Alternative in Section 6.2, above.

6.4 Sequenced Search for Less Environmentally Damaging Alternatives

Both the Council of Environmental Quality's (CEQ) NEPA Implementation Procedures (40 CFR 1502.14) and USACE NEPA Implementation Procedures (33 CFR 325, Appendix B) require consideration of a range of reasonable alternatives for a proposed action. The substantive criteria used by the USACE to evaluate a permit are the Section 404(b) (1) Guidelines (40 CFR 230) promulgated by the EPA. The 404(b) (1) Guidelines indicate that the analysis of alternatives for NEPA environmental documents will in most cases provide the information required to evaluate the alternatives under the guidelines (40 CFR 230.10 [a] [4]). As of July 2010, the guidelines require the evaluation of "practicable alternatives," and define an alternative as practicable "if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes" (40 CFR § 230.10(a)(2)). This review will follow:

6.4.1 HST Project-Level Alternatives Development Process: How the Initial Range of Alternatives were Developed

6.4.2 Alternatives Analysis Screening

How the initial range of alternatives were screened against the Purpose and Need (consistent with Checkpoint 1 concurrence) and if the alternatives impact were substantially greater on the physical, chemical, and biological components of the aquatic resources than other reasonable alternatives under consideration (Checkpoint B).

6.4.3 Alternatives Refinements

Other tests have been applied through the development of the Environmental Impact Statement:

1. compliance with certain federal laws concerning water quality, endangered species, and marine sanctuaries.
2. determine that the project does not cause or contribute to significant degradation to the waters of the United States.
3. determine that appropriate and practicable steps have been taken that would minimize potential adverse impacts of the discharge on the aquatic ecosystem.

Alternatives Analysis Reports Available for Public Review

The Alternatives Analysis, including the preliminary and supplemental reports, are available on-line at:

www.cahighspeedrail.ca.gov/lib_Merced_Fresno.aspx

6.4.4 HST Project-Level Alternatives Development Process

Following the Statewide and Bay Area Program EIR/EIS decisions, the Authority in cooperation with FRA began the project-specific environmental review process, which includes a Notice of Intent (published in 2008) and an agency and public scoping process. Public and agency comments received during the Merced to Fresno Project EIR/EIS scoping period and through interagency coordination meetings also informed the initial alternatives for the screening evaluation.

After analysts identified the initial project alternatives, they developed alignment plans, preliminary profile concepts, and cross sections. The Merced to Fresno Section design criteria dictate 220-mph designs throughout the system with few exceptions. The designers modified the alternatives in response to preliminary environmental findings for both sensitive habitat areas and community resources.

6.4.5 Alternatives Analysis Screening

The development of project-level alternatives followed the process described in *Alternatives Analysis Methods for Project EIR/EIS, Version 2* (Authority 2009c). The evaluation began with determining whether each alternative was consistent with the Project Purpose and Need for the Merced to Fresno Section. The basic components include:

- Capable of reaching 220-miles-per-hour operating speeds
- Connect Merced to Fresno stations
- Be a 'Practicable' alternative (as defined above). These were defined in a qualitative assessment of constructability, accessibility, operations, maintenance, right-of-way, public infrastructure impacts, railway infrastructure impacts, engineering assessment of project length, travel time, and configuration of key features of the alignment, such as the presence of existing infrastructure

Other driving project objectives included:

- Provide intercity travel capacity to supplement critically overused interstate high ways and commercial airports,
- Meet future intercity travel demand that will be unmet by present transportation system and increase capacity for intercity mobility
- Maximize the use of existing transportation corridors and rights-of-way, to the extent feasible.

Secondarily, measures of potential environmental effects were evaluated. The assessment of potential alternatives involved both qualitative and quantitative measures that address applicable policy and technical considerations. Screening included environmental criteria to measure the potential effects of the proposed alternatives on the natural and human environment. Some data included field inspections of corridors for field verification of certain data; and a GIS analysis of impacts to farmland, water resources, wetlands, threatened and endangered species, cultural resources, current urban development, and infrastructure.

The land use criteria measured the extent to which a station alternative supports transit use; is consistent with existing adopted local, regional, and state plans; and is supported by existing and future growth areas. Community impacts measured the extent of disruption to neighborhoods and communities, such as potential to minimize (1) right-of-way acquisitions, (2) dividing an established community, and (3) conflicts with community resources. Environmental resources and quality measured the extent to which an alternative minimizes impacts on natural resources.

6.4.6 Range of Potential Alternatives Considered and Findings

Figure 6.5-1 demonstrates the full range of potential route alternatives and corresponding locations of stations and HMFs that were considered during the alternatives development process. These included five primary north-south routes between Merced and Fresno, six station alternatives to the Merced Station, and another six alternatives for the Fresno station. The Alternatives Analysis also considered five options for the west connection from the San Jose to Merced Section, which influences the ultimate HST track design of the north-south route (see Figure 6.5-1).

The initial screening dismissed the Sierra Foothills (located 8 miles east of SR99) Alternative due to lack of connectivity with urban centers and high environmental impacts. This alternative was not consistent with the Merced to Fresno Section purpose and need.

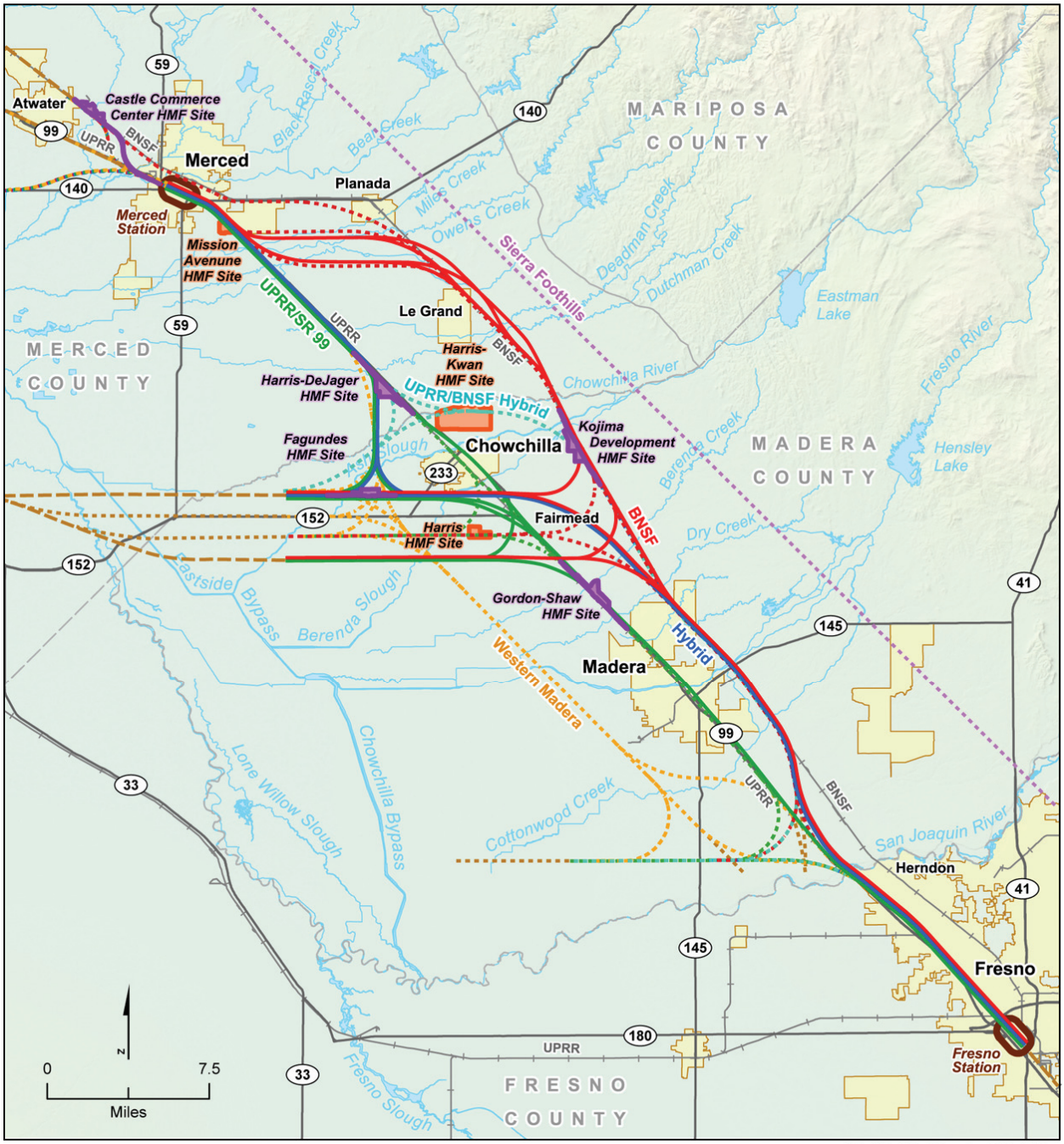


Figure 6.5-1
Range of Alternatives Considered

The alternative analysis process then evaluated design options within the individual alternatives in order to isolate concerns, screen, and refine the overall alternative to avoid key environmental issues or improve performance. The stations, the west connection options from San Jose, and the north-south alignment between Merced and Fresno were each evaluated separately first.

Of the eight alternative stations evaluated for the north station, the Downtown Merced Station best satisfied purpose and need. It best met the purpose and need objectives and was mutually supported by the City of Merced. It offers the best access to the regional highway and public transit system, and has the fewest residential impacts. The station is proposed adjacent to the UPRR right-of-way in Downtown Merced. In Fresno, the Downtown Fresno Station options remain on either the east or the west of UPRR located approximately between Fresno and Inyo Streets. This station would be in the business district and would connect with existing transit facilities, including the Greyhound station.

The east-west connection from the San Jose to Merced Section balanced ecological, agricultural, and community avoidance issues against travel time and longer track development. Of the five east-west routes, the two that remain are the routes following Avenue 24 and Avenue 21 (refined from the original Avenue 22 option for environmental avoidance purposes). These are referred to as the "Ave 24 Wye" and the "Ave 21 Wye" design options for the Merced to Fresno Section.

Once components were screened to lowest impacts and highest HST performance, the analysis compared the alternatives against each other. These data are a relative comparison for the available design conducted at the time of the alternatives analyses. The data are not current with refined engineering design, including additional facilities (power stations, roadway modifications) and the data for the Ave 22 Wye (South SR 152) has evolved to minimize impacts to become the current Ave 21 Wye design option.

While the Alternatives Analysis considered multiple criteria, the screening emphasized the project objective to maximize the use of existing transportation corridors and available rights-of-way, to the extent feasible. The alternatives being carried for further study follow the two existing freight corridors of the UPRR and the BNSF.

Those alternatives that were not carried forward had greater direct and indirect environmental impacts and the potential to cause undesirable growth patterns over those alternatives that closely follow existing transportation corridors. In the Preliminary Alternative Analysis, the Western Madera (A3) and UPRR/BNSF Crossover (A4) alternatives were removed from further consideration because they departed from existing transportation corridors, thereby causing new transportation corridors among highly productive agricultural lands. Doing so would have the potential to reduce the viability of surrounding farmlands, giving way to other uses such as other transportation and utility infrastructure that could result in unwanted and unplanned growth patterns. The original Alternatives Screening Memorandum (Checkpoint B package) was submitted on January 6, 2011, and revised on April 22, 2011. In the June 2011 correspondence, EPA and USACE concurred with all alternatives to be carried forward for further study, except neither EPA nor USACE was satisfied with information supporting elimination of the Western Madera (A3) Alternative.

On January 27, 2012, the Authority issued a memorandum that documented the Western Madera (A3) Alternative in more detail regarding the effects on the Water of the United States. A3 would directly impact more waters of the United States than the other alternatives under consideration. A3 would result in total (direct plus indirect) impacts on more waters of the United States than the Hybrid Alternative and the UPRR/SR99 Alternative with West Chowchilla and UPRR/SR99 Alternative with East Chowchilla design options. In addition, A3 would have greater effects on the comparative functions and services of the aquatic environment when compared to the BNSF, UPRR/SR99 and Hybrid alternatives. The results of the analysis indicate that construction of A3 would result in direct impacts to approximately 39 total acres of Waters of the United States. This is at least 13 acres greater than the direct impacts to waters of the United States associated with BNSF and UPRR/SR99, and approximately 15 acres greater than the Hybrid alternative. The USACE provided verbal concurrence in February 2012.

The UPRR/SR99 Alternative (A2) was found to optimize travel time and minimize environmental impacts at the cost of a more elevated profile and potentially more community impacts than the other alternatives. The BNSF Alternative did not perform as well as the UPRR/SR 99 Alternative in terms of travel time performance and resulted in higher impacts on the natural and residential environment. However, the BNSF Alternative does provide an alternative to the UPRR/SR 99 Alternative that meets the project purpose and need while also adhering to all the project objectives. This alternative's more distant location from several community centers allows the alternative to remain at-grade for most of its distance and to have a lower level of impact on commercial centers compared to the UPRR/SR 99 Alternative. The Hybrid Alternative also follows transportation corridors, minimizes community impacts.

6.4.7 Alternatives Refinements

Once the range of reasonable alternatives were identified, as series of meetings and outreach activities has led to further refinement of the alternatives. Examples of these include modifications to the UPRR/SR 99 Alternative; refinement of the West Chowchilla Design Option, realignments to avoid key industrial developments; and the roadway adjustments in the City of Madera. A change in the alignment on the leg of the wyes for the BNSF Alternative minimize effects on the Women's Correctional Facility. Changes to the Hybrid Alternative minimize effects in the Madera Acres community, avoiding wetlands areas and avoidance of an industrial business. Refinements to Merced Station are applied to all the Alternatives.

The EIS/EIR document, which is collected and summarized in this Checkpoint C package, will demonstrate:

a. Compliance with certain federal laws concerning water quality, endangered species, and marine sanctuaries.

b. Determination that the project does not cause or contribute to significant degradation to the waters of the United States.

c. Determination that appropriate and practicable steps have been taken that would minimize potential adverse impacts of the discharge on the aquatic ecosystem.

7.0 Factual Determinations Regarding Impacts of Proposed Project/Preferred Alternative (40 CFR Section 230.11 and Subparts C, D, E, and F)

7.1 Anticipated Changes Resulting from the Proposed Project to the Physical/Chemical Characteristics of the Aquatic Environment (40 CFR Section 230.11)

Pursuant to the 404(b)(1) Guidelines, the potential short-term or long-term effects of a proposed discharge of dredged or fill material (here, the Hybrid Alternative, which is the proposed project) on the physical, chemical, and biological components of the aquatic environment are evaluated below to make the findings of compliance or non-compliance with the restrictions on discharge in 40 CFR § 230.10. Each of the subsections below sets forth the nature and degree of effect that the proposed discharge will have, individually and cumulatively, on the physical characteristics of the aquatic environment.

7.1.1 Physical Substrate Determinations (40 CFR Sections 230.11(a); 230.20)

7.1.1.1 Construction and/or Fill Related Impacts, Mitigation Measures, Significance with Mitigation

To ensure all potential impacts to jurisdictional waters are evaluated, it has been conservatively assumed that for at-grade segments, there will be direct permanent impacts to all jurisdictional waters within a 100-foot wide footprint; for elevated segments, it is assumed that there will be direct permanent impacts to all jurisdictional waters within a 60-foot wide footprint, and temporary impacts within the 20 feet to either side of the footprint; indirect permanent impacts are assumed for all jurisdictional waters within 250 of the footprints for at-grade and elevated segments. Based on these conservative assumptions, the Preferred Alternative would permanently impact between 35 and 37 acres of Waters of the U.S. Of this total impact, the Preferred Alternative would affect between 5.26 acres and 5.61 acres of vernal pools and other seasonal wetlands. The remaining impacts are to coastal and valley freshwater marsh (0.00 to 0.04 acres), Fremont cottonwood forested wetlands (3.59 to 3.64 acres), natural watercourses (4.79 to 7.74 acres), and constructed watercourses and basins (16.65 to 19.12 acres). Substrate conditions at these impact areas are briefly described as follows (see Appendix B), Evaluation of Wetland Condition using the California Rapid Assessment Method, for additional details):

- Vernal pools are a type of seasonal wetland that respond markedly to winter precipitation and summer desiccation. Vernal pools are associated with certain types of soil formations; hardpan soil layers frequently form in the horizons of clay soils, leading to the formation of vernal pools with clay soils.
- Freshwater marsh habitats are semi-permanently flooded areas found on floodplains, backwater areas, and within the channels of rivers and sloughs.
- Fremont cottonwood forested wetlands occur on soils intermittently or seasonally flooded or saturated by freshwater systems. Frequently, these community types are found along riparian corridors, floodplains subject to high-intensity flooding, or on low-gradient depositions along rivers and streams.

- Natural watercourses include riverine areas of the study area, including the perennial San Joaquin River, Bear Creek, and several intermittent to ephemeral sloughs and creeks. Most historically natural watercourses have ephemeral hydrology either because of their small watershed size or because they have been impounded or diverted upstream into other watercourses for agricultural purposes. All are low-gradient systems with bottom substrates dominated by fine sediments (i.e., sand, silt, or clay).
- Constructed watercourses include linear water features such as canals and drains that have been constructed primarily for the conveyance of agricultural irrigation water.
- Constructed basins are highly disturbed and may be routinely managed through vegetation removal and dredging. Three categories of constructed basin wetland types are described below:
  - Stormwater retention basins are generally excavated earthen basins that have been constructed to hold urban stormwater runoff. Most of these basins are devoid of vegetation or support ruderal species that become established when the water levels are low or the basins are dry.
  - Reservoirs include variously sized basins that have been constructed to hold water for urban, industrial, or agricultural use. Water is generally either diverted or pumped into these areas and is held for use at a later time. Reservoirs are often lined to prevent or reduce water loss as a result of seepage into the soil and are generally devoid of vegetation.
  - Agricultural tail water ponds are generally small, relatively shallow basins that are excavated in the low corners or along the side of an agricultural field or orchard for the purpose of capturing excess irrigation water. Excess water is then either allowed to gradually seep into the soil or is pumped into a nearby canal feature.

Because the impacts would consist of the placement of structural fill or bridge piers, functional wetland values would be fully eliminated for resources small enough to be entirely or mostly impacted. For resources whose size is larger than that of the impact area (e.g. bridge piers in watercourses), functional wetland values would be diminished at the impact site but not entirely lost. Aquatic vegetation, where present, would be permanently removed. Benthic organisms in these areas would be displaced or destroyed. The permanent impacts to substrate conditions would be irreversible. Compensatory mitigation would be provided for all project impacts (see Bio-MM#57 and Bio-MM#58 in the EIR/EIS).

Indirect impacts to vernal pools and other wetlands would be as follows: 8.38 acres to 13.08 acres of vernal pools and other seasonal wetlands, 3.08 to 3.37 acres of Fremont cottonwood forested wetlands, 0.00 acres to 0.22 acres of coastal and valley freshwater marsh, 24.10 acres to 27.78 acres of natural watercourses, and 20.89 to 26.82 acres of constructed watercourses and basins. Indirect effects to these areas, such as runoff from new paved surfaces, are expected to be minimal because the project Stormwater Management Plan would be implemented to divert and filter all roadway runoff into the storm drain system. See additional discussion below under Section 7.1.3, Suspended Particulates or Turbidity.

The Preferred Alternative would temporarily impact no more than 1 acre of vernal pools and other seasonal wetlands over and above the total permanent impacts described above. Substrate conditions are the same as described permanent impacts. Because the impacts would consist of the placement of fill, functional wetland values would be eliminated during the construction period. Following construction, these temporarily affected areas would be restored (see Bio-MM#43 in the EIR/EIS). In addition, compensatory mitigation for total project impacts would be adjusted to account for the temporary loss of wetland values during construction (see Bio-MM#58 in the EIR/EIS).

Temporary indirect impacts to vernal pools and other wetlands (e.g., runoff from construction sites) are expected to be minimal because of stormwater quality protection measures to be implemented during construction (e.g., Stormwater Pollution Prevention Plan). See additional discussion in EIR/EIS Section 3.8.6 (Project Design Features) and below under Section 7.1.3, Suspended Particulates or Turbidity.

The Preferred Project would permanently impact between 35 and 37 acres of Waters of the U.S. All permanent direct impacts will be fully mitigated through creation, restoration, and enhancement at a minimum of 1:1 ratio. All permanent temporary impacts will be restored at a minimum of 1:1 ratio. Considering the mitigation measures, this impact is of moderate intensity under NEPA and significant under CEQA.

7.1.1.2 Secondary/Operational Impacts, Mitigation Measures, Significance with Mitigation

Based on the conservative assumptions set forth in Section 7.1.1.1, above, the Preferred Alternative would permanently impact between 35 and 37 acres of Waters of the U.S. Of this total impact, the Preferred Alternative would affect between 5.26 acres and 5.61 acres of vernal pools and other seasonal wetlands. The remaining impacts are to coastal and valley freshwater marsh (0.00 to 0.04 acres), Fremont cottonwood forested wetlands (3.59 to 3.64 acres), natural watercourses (4.79 to 7.74 acres), and constructed watercourses and basins (16.65 to 19.12 acres). Substrate conditions at these impact areas are briefly described as follows (see Appendix B), Evaluation of Wetland Condition using the California Rapid Assessment Method, for additional details):

- Vernal pools are a type of seasonal wetland that respond markedly to winter precipitation and summer desiccation. Vernal pools are associated with certain types of soil formations: hardpan soil layers frequently form in the horizons of clay soils, leading to the formation of vernal pools with clay soils.
- Freshwater marsh habitats are semi-permanently flooded areas found on floodplains, backwater areas, and within the channels of rivers and sloughs.
- Fremont cottonwood forested wetlands occur on soils intermittently or seasonally flooded or saturated by freshwater systems. Frequently, these community types are found along riparian corridors, floodplains subject to high-intensity flooding, or on low-gradient depositions along rivers and streams.
- Natural watercourses include riverine areas of the study area, including the perennial San Joaquin River, Bear Creek, and several intermittent to ephemeral sloughs and creeks. Most historically natural watercourses have ephemeral hydrology either because of their small watershed size or because they have been impounded or diverted upstream into other watercourses for agricultural purposes. All are low-gradient systems with bottom substrates dominated by fine sediments (i.e., sand, silt, or clay).
- Constructed watercourses include linear water features such as canals and drains that have been constructed primarily for the conveyance of agricultural irrigation water.
- Constructed basins are highly disturbed and may be routinely managed through vegetation removal and dredging. Three categories of constructed basin wetland types are described below:
  - Stormwater retention basins are generally excavated earthen basins that have been constructed to hold urban stormwater runoff. Most of these basins are devoid of vegetation or support ruderal species that become established when the water levels are low or the basins are dry.
  - Reservoirs include variously sized basins that have been constructed to hold water for urban, industrial, or agricultural use. Water is generally either diverted or pumped into these areas and is held for use at a later time. Reservoirs are often lined to prevent or reduce water loss as a result of seepage into the soil and are generally devoid of vegetation.
  - Agricultural tail water ponds are generally small, relatively shallow basins that are excavated in the low corners or along the side of an agricultural field or orchard for the purpose of capturing excess irrigation water. Excess water is then either allowed to gradually seep into the soil or is pumped into a nearby canal feature.

Because the impacts would consist of the placement of structural fill or bridge piers, functional wetland values would be fully eliminated for resources small enough to be entirely or mostly impacted. For resources whose size is larger than that of the impact area (e.g. bridge piers in watercourses), functional wetland values would be diminished at the impact site but not entirely lost. Aquatic vegetation, where present, would be permanently removed. Benthic organisms in these areas would be displaced or destroyed. The permanent impacts to substrate conditions would be irreversible. Compensatory mitigation would be provided for all project impacts (see Bio-MM#57 and Bio-MM#58 in the EIR/EIS).

Indirect impacts to vernal pools and other wetlands would be as follows: 8.38 acres to 13.08 acres of vernal pools and other seasonal wetlands, 3.08 to 3.37 acres of Fremont cottonwood forested wetlands, 0.00 acres to 0.22 acres of coastal and valley freshwater marsh, 24.10 acres to 27.78 acres of natural watercourses, and 20.89 to 26.82 acres of constructed watercourses and basins. Indirect effects to these areas, such as runoff from new paved surfaces, are expected to be minimal because the project Stormwater Management Plan would be implemented to divert and filter all roadway runoff into the storm drain system. See additional discussion below under Section 7.1.3, Suspended Particulates or Turbidity.

The Preferred Project would permanently impact between 35 and 37 acres of Waters of the U.S. All permanent direct impacts will be fully mitigated through creation, restoration, and enhancement at a minimum of 1:1 ratio. All permanent temporary impacts resulting from the operation of the project will be restored at a minimum of 1:1 ratio. Considering the mitigation measures, this impact is of moderate intensity under NEPA and significant under CEQA.

7.1.1.3 Cumulative Impacts, Mitigation Measures, Significance with Mitigation

The proposed project, in conjunction with reasonably foreseeable projects, could contribute to potential cumulative impacts on wetlands and other Waters of the United States and state (e.g., vernal pools and creeks with a riparian corridor). These impacts could include loss of wetlands and hydrological changes to wetlands. Potential wetland losses would be small relative to the quantity of existing wetland habitat in the study area but would contribute to the net loss of wetland habitat within the California Central Valley. Avoidance, minimization, and mitigation measures would minimize impacts on wetlands; however, cumulative impacts would likely be of moderate intensity under NEPA and significant under CEQA.

7.1.2 Current Patterns and Water Circulation, Fluctuation, and Salinity Determinations (40 CFR Sections 230.11(b); 230.23)

7.1.2.1 Construction and/or Fill Related Impacts, Mitigation Measures, Significance with Mitigation

The potential for adverse impacts to drainage patterns and hydrology as a result of project construction and post-development operation are addressed in Section 3.8 of the EIR/EIS. Potential changes to surface water runoff patterns are addressed below in Section 7.1.5, Flood Control Functions and Flood Fluctuations in Water Level. Stormwater design and impacts and management of stormwater are addressed in the Stormwater Management Plan.

Construction activities associated with the proposed project would involve handling, storing, hauling, and placing fill; possible pile driving; stations, parking lots, aerial structure and bridge construction; and concrete track bed construction. At-grade embankment construction will require excavating, leveling, and raising the ground surface; temporarily impeding overland flow where swales are crossed; and permanently rerouting overland flow toward new or existing ditches, culverts, or channels. This could result in obstructing, redirecting, and changing the local velocity of existing runoff over limited reaches at the HST alignment.

Permanent drainage patterns are largely unaltered by the project, except immediately adjacent to the HST embankment where overland flow is passed through the new embankment via new culverts. These culverts will generally be in line with existing culverts, but may also include additional culverts to improve cross-embankment conveyance compared to that at existing embankments, such as the UPRR embankment and SR 99 roadway embankment. Where the BNSF and Preferred Projects transition between the existing UPRR and BNSF transportation corridors, the construction of new embankment will require new culverts. Existing connectivity and design-flood capacity between channel tributaries and distributaries of the San Joaquin River and regional irrigation channels will be maintained. With design features for stormwater management and flood protection, impacts on surface water capacity, connectivity, quality and management would have negligible intensity under NEPA and be less than significant under CEQA.

7.1.2.2 Secondary/Operational Impacts, Mitigation Measures, Significance with Mitigation

The potential for adverse impacts to drainage patterns and hydrology as a result of post-development operation are addressed in Section 3.8 of the EIR/EIS. There will be onsite operational impacts to stormwater, which will be managed onsite and discharged to existing offsite stormwater conveyance facilities where approved; see the Stormwater Management Plan for details. Stormwater impacts would have negligible intensity under NEPA and be less than significant under CEQA.

7.1.2.3 Cumulative Impacts, Mitigation Measures, Significance with Mitigation

The new urbanization that would accommodate the population increase by 2035 would result in an estimated 93,000 acres of additional development and land use changes to accommodate housing, commercial, office, transportation, parks, and schools (see Chapter 2, Alternatives, of the EIR/EIS). The reasonably foreseeable projects would result in changes to existing onsite drainage patterns and could result in increased stormwater runoff from an increase in impervious surface area. Conversion of vacant undeveloped land to accommodate the population by 2035 is estimated at 93,000 acres, which would result in up to 33,000 acres of new impervious surface (assuming an average of 35% of new development is impervious). However, new developments would comply with stormwater control ordinances, thus mitigating the impact of the runoff. On a much smaller scale, similar impacts would result from operation of the project because of the increase in impervious surface area caused by structures and parking facilities at the HST stations and HMF. Guideway construction materials and soil compaction below the guideway would also inhibit infiltration.

Although cumulative hydrology and water resources impacts would be negligible in most cases, the HST Project will implement the measures for hydrology and water resources provided in EIR/EIS Section 3.8.6 to minimize impacts. These measures will contribute to limiting hydrology cumulative impacts to moderate intensity under NEPA and significant under CEQA.

7.1.3 Suspended Particulates or Turbidity (40 CFR Sections 230.11(c); 230.21)

7.1.3.1 Construction and/or Fill Related Impacts, Mitigation Measures, Significance with Mitigation

The potential for adverse impacts to surface waters from suspended particles as a result of project construction is addressed in the Water Quality portion of Section 3.8.5.3 of the EIR/EIS. The Hybrid Alternative would cross 23 to 29 natural water bodies. Stream crossings would be particularly vulnerable to degraded water quality because construction would occur in the stream channel and contaminants would have a direct path to surface water. Bridge supports in areas of high groundwater or in surface water would require excavation in the stream channel and dewatering of the work area. The proximity of flowing water to active construction could provide a direct path for sediments to reach surface water. In

some cases flowing streams may be temporarily re-routed around construction areas in the channel. This could temporarily reduce channel capacity and cause erosion or sedimentation, degrading water quality. To the extent construction in the stream channel occurs during wet weather, there could be an increase in sediment in the river during the event.

Construction of at-grade sections of the trackway would require excavating or leveling the ground surface. New frontage roads and road bridges would also result in excavations and exposed soils that would be susceptible to erosion during construction. The total amount of temporary disturbance resulting from the Hybrid Alternative would be approximately 2,700 acres.

The State's Construction Stormwater General Permit requires preparation and implementation of a SWPPP, which would provide BMPs to minimize potential short-term increases in sediment transport caused by construction, including erosion control requirements, stormwater management, and channel dewatering for affected stream crossings. Erosion Risk Level 1 sediment control measures would be carried out within most of the project area, as stipulated by the State's General Permit. Due to its sensitivity, somewhat more stringent Level 2 measures would be carried out at project sites near the San Joaquin River and also where construction activities are conducted within or immediately adjacent to sensitive environmental areas such as streams, wetlands, and vernal pools.

The SWPPP would identify pollutant sources that could affect water quality, and specify, implement, and maintain BMPs to reduce pollutant discharges, particularly sediment, from construction site runoff. The SWPPP would include measures to address the following:

- Practices to reduce erosion of exposed soil, including soil stabilization, watering for dust control, perimeter silt fences, placement of rice straw bales, and sediment basins.
- Practices to minimize sedimentation including silt fences, stabilized construction entrances, grass buffer strips, ponding areas, organic mulch layers, inlet protection, and Baker tanks and sediment traps.
- Use of diversion ditches to intercept offsite surface runoff.
- Where feasible, avoidance of areas that may have substantial erosion risk, including areas with erosive soils and steep slopes.
- Where feasible, limit construction to dry periods when flows in water bodies are low or absent. No construction would occur in stream or river channels during winter storm season.

With the implementation of these standard minimization and avoidance measures, effects from construction on suspended particles would be not be significant.

7.1.3.2 Secondary/Operational Impacts, Mitigation Measures, Significance with Mitigation

The potential for adverse impacts to suspended particles as a result of post-development operation is addressed in the Water Quality portion of Section 3.8.5.3 of the EIR/EIS. During project operations, pollutant generating project surfaces such as project roads and train stations could produce sediment that would reach water bodies and degrade water quality. In addition, the project bridges could become sources of long-term sedimentation to streams.

To avoid or minimize these possible impacts, new bridges would be designed to maintain the existing conveyance capacity and hydraulic conditions of the water body being crossed as described in EIR/EIS Section 3.8.6, Project Design Features. Therefore, no change in the stream sedimentation characteristics (e.g., sediment deposition or channel erosion) would result from these crossings. As detailed below in Section 7.1.4, Water Quality: Temperature, Salinity Patterns, and Receiving Water Quality Standards for

Contaminants of Concern, stormwater treatment would be provided for pollutant and sediment generating areas resulting from the project. As a result, no increases in sediment or turbidity would occur.

The project would avoid increasing existing peak stormwater flows from the project site as described in EIR/EIS Section 3.8.6, Project Design Features and in the Stormwater Management Plan. This would be accomplished by emphasizing onsite retention of stormwater runoff using measures such as flow dispersion, infiltration, and evaporation, supplemented by detention, where required. Additional flow control measures could be implemented where local regulations or drainage requirements dictate. With the implementation of these project design features, effects on suspended particle levels in waters of the U.S. would be not be significant.

7.1.3.3 Cumulative Impacts, Mitigation Measures, Significance with Mitigation

Construction of the HST alternatives, in conjunction with construction activities associated with other past, present, and reasonably foreseeable projects, could alter existing drainage patterns and redirect stormwater runoff, resulting in increased sedimentation and turbidity. The HST alternatives and other future projects would be subject to regulations and permits required by the Central Valley Regional Water Quality Control Board to mitigate construction impacts on water quality. Therefore, potential cumulative construction impacts would be reduced, and cumulative construction impacts on water quality would be negligible.

The new urbanization that would accommodate the population increase by 2035 would result in an estimated 93,000 acres of additional development and land use changes to accommodate housing, commercial, office, transportation, parks, and schools (see Chapter 2, Alternatives of the EIR/EIS).

Some of the foreseeable projects identified for the study area (e.g., dairy expansion, new urban development, and mining operations) would potentially create new sources of runoff pollution that would contribute to the cumulative condition with any of the HST alternatives. Preservation of water quality is anticipated to be a greater challenge by 2035 under the cumulative condition of the No Project Alternative.

Similar to the proposed project, other projects would be subject to regulations and permits required by the Central Valley Regional Water Quality Control Board to mitigate impacts on water quality. Therefore, potential cumulative impacts would be reduced. These regulations are in place to make sure that new developments and infrastructure projects do not result in water quality standard violations, and the cumulative impact on water quality is not expected to be negative as all new projects would be required to meet water quality standards.

Although cumulative water quality impacts would be negligible in most cases, the HST Project will implement the measures for water quality provided in EIR/EIS Section 3.8.6 to minimize impacts. These measures will contribute to keeping water quality cumulative impacts moderate.

7.1.4 Water Quality: Temperature, Salinity Patterns, and Receiving Water Quality Standards for Contaminants of Concern (40 CFR Sections 230.11(d)); 230.22; 230.25)

7.1.4.1 Construction and/or Fill Related Impacts, Mitigation Measures, Significance with Mitigation

The potential for adverse impacts to water quality as a result of project construction is addressed in the Water Quality portion of Section 3.8.5.3 of the EIR/EIS. Construction activities associated with the proposed project would involve handling, storing, hauling, and placing fill; possible pile driving; two train stations, parking lots, aerial structure, and bridge construction; and concrete track bed construction. With

respect to direct impacts, the fill and construction of the project may introduce the following pollutants to receiving waters: floating material, detergents, oil and greases, sediment, settable material and petrochemical fuels. Salinity is not expected to be an issue associated with this project. Stream crossings would be particularly vulnerable to degraded water quality because construction would occur in the stream channel and contaminants would have a direct path to surface water. Bridge supports in areas of high groundwater or in surface water would require excavation in the stream channel and dewatering of the work area, potentially resulting in harmful discharges to surface waters.

The following waters appear on the State's 303d List of water quality impaired waters: San Joaquin River (exotic species) and Bear Creek (mercury). A number of additional streams are proposed for listing due to high levels of several agricultural chemicals (chlopyrifos and diuron) and the bacteria *E. coli*. The project would not add to or substantially affect the levels of these contaminants. The risk of polluted runoff would be minimized through implementation of various control and design measures that are summarized in Section 3.8.6 of the EIR/EIS and that would be detailed in the SWPPP prepared prior to and implemented during project construction. These procedures identify pollutant sources that could affect water quality, and identify, implement, and maintain BMPs to reduce pollutants and non-stormwater discharges in construction site runoff. The Construction SWPPP will include measures to address the following:

- Practices to minimize the contact of construction materials, equipment, and maintenance supplies with stormwater.
- Limiting fueling and other activities using hazardous materials to areas distant from surface water, providing drip pans under equipment, and daily checks for vehicle condition.
- Practices to capture and provide proper offsite disposal of concrete washwater, including isolation of runoff from fresh concrete during curing to prevent it from reaching the local drainage system, and possible treatment with dry ice or other acceptable means to reduce the alkaline character of the runoff (high pH) that typically results from new concrete.
- Development of a spill prevention and emergency response plan to handle potential fuel or other spills.

With the implementation of these standard minimization and avoidance measures, effects from construction on surface water quality would have negligible intensity under NEPA and be less than significant under CEQA.

7.1.4.2 Secondary/Operational Impacts, Mitigation Measures, Significance with Mitigation

The technology proposed for the HST System does not require large amounts of lubricants or hazardous materials for operation. The electric trains would use a regenerative braking technology, resulting in reduced physical braking and associated wear. The at-grade tracks and the elevated guideways are therefore assumed to be less than significant pollutant-generating surfaces. However, the stations, the new frontage roads, and the new road overpasses would create new sources of potentially contaminated runoff during HST operation.

The project would relocate 2 miles of SR 99 and reconstruct several interchanges in the Fresno area. The project would also construct new grade-separated roads at a number of project rail crossings elsewhere in the project area. These new sources of road runoff from the new crossings, relocated highways, or frontage roads could negatively affect water quality. However, water quality design measures would be implemented to reduce the potential for adverse impacts as described in EIR/EIS Section 3.8.6, Project Design Features and in the Stormwater Management Plan. To protect water quality, the project would design and construct onsite stormwater management facilities to capture runoff and provide treatment prior to discharge for pollutant-generating surfaces, including station parking areas, access roads, new

road over- and underpasses, reconstructed interchanges, and new or relocated roads and highways. Low-impact development (LID) techniques would be employed to retain runoff onsite and to reduce offsite runoff, to the extent practicable. Stormwater treatment would be accomplished through the use of biofiltration and bioretention systems, wet ponds, constructed wetland systems, organic mulch layers, planting soil beds, and vegetated systems (biofilters) such as vegetated swales and grass filter strips. With these design features for stormwater management and treatment, water quality impacts during operation would have negligible intensity under NEPA and be less than significant under CEQA.

7.1.4.3 Cumulative Impacts, Mitigation Measures, Significance with Mitigation

Construction of the HST alternatives, in conjunction with construction activities associated with other past, present, and reasonably foreseeable projects, could alter existing drainage patterns and redirect stormwater runoff, potentially resulting in increased discharge of pollutants of concern. The HST alternatives and other future projects would be subject to regulations and permits required by the Central Valley Regional Water Quality Control Board to mitigate construction impacts on water quality. Therefore, potential cumulative construction impacts would be reduced, and cumulative construction impacts on water quality would be negligible.

The new urbanization that would accommodate the population increase by 2035 would result in an estimated 93,000 acres of additional development and land use changes to accommodate housing, commercial, office, transportation, parks, and schools (see Chapter 2, Alternatives, of the EIR/EIS). Some of the foreseeable projects identified for the study area (e.g., dairy expansion, new urban development, and mining operations) would potentially create new sources of runoff pollution that would contribute to the cumulative condition with any of the HST alternatives. Preservation of water quality is anticipated to be a greater challenge by 2035 under the cumulative condition of the No Project Alternative.

Similar to the proposed project, other projects would be subject to regulations and permits required by the Central Valley Regional Water Quality Control Board to mitigate impacts on water quality. Therefore, potential cumulative impacts would be reduced. These regulations are in place to make sure that new developments and infrastructure projects do not result in water quality standard violations, and the cumulative impact on water quality is not expected to be negative as all new projects would be required to meet water quality standards. Although cumulative hydrology and water resources impacts would have negligible intensity in most cases, the HST Project will implement the measures for hydrology and water resources provided in EIR/EIS Section 3.8.6 to minimize impacts. These measures will contribute to limiting water quality cumulative impacts to moderate intensity under NEPA and significant under CEQA.

7.1.5 Flood Control Functions and Flood Fluctuations in Water Level (40 CFR Section 230.24)

7.1.5.1 Construction and/or Fill Related Impacts, Mitigation Measures, Significance with Mitigation

The potential for adverse impacts to flood control as a result of project construction are addressed in Section 3.8 of the EIR/EIS. Construction of the HST alternatives would result in temporary impacts on existing runoff pathways, natural watercourses, and irrigation distribution systems. Overland flow could be temporarily impeded by staging and construction materials, and most natural and larger manmade crossings would require in-water work for the construction of supporting bridge piers. Impacts on design flooding can be largely avoided by maintain existing hydraulic capacity at water crossings and connectivity across the floodplain via spaced culverts. Measures for avoiding these impacts are described below under Secondary/Operational Impacts.

7.1.5.2 Secondary/Operational Impacts, Mitigation Measures, Significance with Mitigation

The potential for adverse impacts to flood control as a result of post-development operation are addressed in Section 3.8 of the EIR/EIS. Flood-related features include natural water bodies, such as rivers, streams, and sloughs; manmade water bodies, such as canals and ditches; and floodplains. Stream flow consists of natural flows, irrigation runoff, and other point- and nonpoint-source discharges. Natural flows depend on precipitation, snowmelt runoff; regulated releases from reservoirs, diversions, stormwater facilities and canals; and the slow discharge of groundwater. Much of the region is in floodplains that have relatively flat gradients toward the west or southwest. When channels overflow, most of the floodplain is characterized by shallow, 1- to 3-foot-deep overland flooding. This flooding can pond against linear obstacles such as canal levees and road and railroad embankments lying perpendicular to the land gradient. If these facilities lack sufficient culverts or other means of cross drainage, the overland flows can be diverted for long distances before finally overflowing the linear obstacles and continuing west.

The natural water bodies are listed in Table 3.8-4 and shown on Figures 3.8-1 to 3.8-5 of the EIR/EIS. Floodplains are shown on Figure 3.8-7 of the EIR/EIS. The total numbers of natural and manmade water body crossings are summarized in Table 7.1-1, and the total acres of floodplain impacted or crossed are summarized by SFHA in Table 7.1-2.

Table 7.1-1
HST Hybrid Alternative Water Body Crossings

Design Option	Natural Water Bodies	Canals and Ditches	Total
North-South Alignment with Ave 24 Wye	29	85	113
North-South Alignment with Ave 21 Wye	23	78	101
Range of Impact	**23 to 29**	**78 to 85**	**101 to 113**

Table 7.1-2
HST Hybrid Alternative Area in the Special Flood Hazard Area (acres)

Design Option	FEMA Zone[a]			
	A	AE	AH	AO
North-South Alignment with Ave 24 Wye	65	16	1	343
North-South Alignment with Ave 21 Wye	175	13	1	322
Range of Impact	**65 to 175**	**13 to 16**	**1**	**322 to 343**

Impacts on design flooding can be largely avoided by maintain existing hydraulic capacity at water crossings and connectivity across the floodplain via spaced culverts. Most stream crossings would require bridges and the placement of piers in the floodplain, or in the case of the San Joaquin River, a FEMA-designated floodway. See Section 3.8.6 of the EIR/EIS for project design features. Design of these bridge crossings would include measures to compensate for any effects of placing piers in the floodplains and floodways. In all cases, the design would maintain the crossing's existing flow conveyance capacity. Hydrologic modeling would be necessary to demonstrate that proposed project design features, such as minor enlargement of the channel cross section, would maintain existing channel capacity within regulatory thresholds (zero rise with in the FEMA floodway, 0.1 foot rise within USACE and CVFPB

regulated flood control projects, and up to 1.0 foot within other FEMA floodplains outside of floodways). Permanent impacts on surface water capacity and connectivity would be negligible. Project facilities could redirect shallow flooding and result in some changes to existing drainage patterns or routes, as well as increase runoff from project impervious surfaces. These impacts are not readily distinguishable by alternative. With design features for stormwater management and flood protection (see EIR/EIS Section 3.8.6 and the Hydrology and Floodplains Technical Report), impacts on existing drainage patterns would be negligible.

7.1.5.3 Cumulative Impacts, Mitigation Measures, Significance with Mitigation

The new urbanization that would accommodate the population increase by 2035 would result in an estimated 93,000 acres of additional development and land use changes to accommodate housing, commercial, office, transportation, parks, and schools (see Chapter 2, Alternatives, of the EIR/EIS). These changes would affect surface water hydrology. Reasonably foreseeable projects would result in impacts on flooding if the projects are within a Special Flood Hazard Area (SFHA), such as the Buena Vista Project. Similar impacts would result from operation of the project where the alignment would cross SFHAs. However, potential cumulative impacts would be reduced because all projects in SFHAs are subject to project-level environmental analysis, standards, and permits (prepared by project proponents). Project-level analyses would identify and analyze, and avoid, minimize, or mitigate potential impacts on floodplains, to the extent feasible; therefore, impacts on floodplains would be negligible. Although cumulative hydrology and water resources impacts would be negligible in most cases, the HST Project will implement the measures for hydrology and water resources provided in EIR/EIS Section 3.8.6 to minimize impacts. These measures will contribute to keeping floodplain cumulative impacts moderate.

7.1.6 Hydrology, Hydromodification, and Erosion and Accretion Patterns (40 CFR Section 230.23(b))

7.1.6.1 Construction and/or Fill Related Impacts, Mitigation Measures, Significance with Mitigation

The potential for adverse impacts to water quality as a result of project construction is addressed in the Water Quality portion of Section 3.8.5.3 of the EIR/EIS. The Preferred Project would cross 23 to 29 stream or rivers. This could result in hydrologic and hydraulic effects to these water bodies due to changes in existing local drainage and stormwater runoff resulting from channel disturbance associated with construction of piers and bridge abutments.

Construction activities such as grading and establishing construction staging areas could alter existing drainage patterns and redirect stormwater runoff. In addition, the amount of stormwater runoff would increase if construction resulted in the removal of natural vegetation or other barriers to runoff. Temporary diversion of stream flow may be necessary during the installation of support piers and bridge abutments in stream channels. This could temporarily reduce channel capacity and cause erosion or sedimentation, degrading water quality. The Construction SWPPP will include measures to address the following:

- Use of diversion ditches to intercept offsite surface runoff.
- Where feasible, avoidance of areas that may have substantial erosion risk, including areas with erosive soils and steep slopes.
- Where feasible, limit construction to dry periods when flows in water bodies are low or absent. Unless otherwise allowed by USACE, CDFG, the SWQCB, and fisheries agencies as appropriate, no construction activities would occur in stream or river channels during winter storm season, which is generally defined as October through March, but based on year to year hydrologic conditions.

With the implementation of these measures, effects from construction on hydrology would be have negligible intensity under NEPA and be less than significant under CEQA.

7.1.6.2 Secondary/Operational Impacts, Mitigation Measures, Significance with Mitigation

The potential for adverse impacts to water quality as a result of post-development operation is addressed in the Water Quality portion of Section 3.8.5.3 of the EIR/EIS. Impacts on surface water from operation of the project would include changes to the hydrology and connectivity of natural water bodies in the study area. As stated above, the Preferred Project would cross 23 to 29 natural water bodies each of which could require bridge abutments on banks and support piers in the water channel. These bridge components could permanently obstruct the ability of the water body to convey peak flows by reducing its channel capacity and possibly raising flood elevations locally. Elevated crossings could require support piers in the water channel. At-grade crossings of stream channels would require bridge abutments on banks and support piers in the water channel, or in some cases the alignment would cross the smaller natural water bodies using box culverts.

The CVFPB regulates specific river, creek, and slough crossings for flood protection. These crossings must meet the provisions of Title 23 of the CCR. Title 23 requires that new crossings maintain hydraulic capacity through such measures as in-line piers, adequate streambank height (freeboard), and measures to protect against streambank and channel erosion. Section 208.10 requires that crossings, be constructed in a manner that does not reduce the channel's capacity or functionality. Therefore, new bridges would be designed to maintain the existing conveyance capacity and hydraulic conditions of the water body being crossed. Final design would minimize the number of piers on banks and in channels to the extent possible. As a result, no change in the stream sedimentation characteristics (e.g., sediment deposition or channel erosion) would occur at these crossings. Culverts would be designed to at a minimum maintain the hydraulic conveyance capacity of the existing canal, ditch, or adjacent culvert.

Drainage systems would collect and discharge project stormwater to the local stormwater system in urban areas or to the local drainage system via swales in rural areas. Increased stormwater runoff from the project could exceed the capacity of a receiving water body, causing or exacerbating drainage problems. Substantial alteration of the existing drainage pattern would increase the rate or amount of surface runoff in a manner that could cause flooding, erosion, or sedimentation.

The project would seek to minimize increases in existing peak stormwater flows from the project site. This would be accomplished by emphasizing onsite retention of stormwater runoff using measures such as low impact development (LID; refer to Section 7.1.4, Water Quality: Temperature, Salinity Patterns, and Receiving Water Quality Standards for Contaminants of Concern), flow dispersion, infiltration, and evaporation, supplemented by detention, where required. During the detailed design phase, evaluate each receiving stormwater system's capacity to accommodate project runoff. As necessary, design onsite stormwater management measures, such as detention or selected upgrades to the receiving system, to provide adequate capacity.

With the implementation of the project features discussed above, the project would have impacts on hydrology or sedimentation during operations of negligible intensity under NEPA and would be less than significant under CEQA.

7.1.6.3 Cumulative Impacts, Mitigation Measures, Significance with Mitigation

The new urbanization that would accommodate the population increase by 2035 would result in an estimated 93,000 acres of additional development and land use changes to accommodate housing, commercial, office, transportation, parks, and schools (see EIR/EIS Chapter 2, Alternatives). The reasonably foreseeable projects would result in changes to existing onsite drainage patterns and could result in increased stormwater runoff from an increase in impervious surface area. Conversion of vacant undeveloped land to accommodate the population by 2035 is estimated at 93,000 acres, which would

result in up to 33,000 acres of new impervious surface (assuming an average of 35% of new development is impervious). However, new developments would comply with stormwater control ordinances, thus mitigating the impact of the runoff. On a much smaller scale, similar impacts would result from operation of the project because of the increase in impervious surface area caused by structures and parking facilities at the HST stations and HMF. Guideway construction materials and soil compaction below the guideway would also inhibit infiltration. Although cumulative hydrology and water resources impacts would be negligible in most cases, the HST Project will implement the measures for hydrology and water resources provided in EIR/EIS Section 3.8.6 to minimize impacts. These measures will contribute to limiting hydrology cumulative impacts to moderate intensity under NEPA and significant under CEQA.

7.1.7 Assessment of Proposed Disposal Site

Not applicable.

7.2 Anticipated Changes Resulting from the Proposed Project to the Aquatic Ecosystem (40 CFR Section 230.11(e))

7.2.1 Special Aquatic Sites: Wetlands, Mudflats, Coral Reefs, Pool and Riffle Areas, Vegetated Shallows, Sanctuaries, and Refuges (40 CFR 230.40-45)

7.2.1.1 Wetlands

The Preferred Project has two design option combinations: East Chowchilla Ave 21 and West Chowchilla Ave 24. There are approximately 138 acres of waters and wetlands within the East Chowchilla design option combination and approximately 147 acres with West Chowchilla design option combination based on the conservative assumption that for at-grade segments, there will be direct permanent impacts to all jurisdictional waters within a 100-foot wide footprint; for elevated segments, there will be direct permanent impacts to all jurisdictional waters within a 60-foot wide footprint, and temporary impacts within the 20 feet to either side of the footprint; and indirect permanent impacts to all jurisdictional waters within 250 of the footprints for at-grade and elevated segments. Based on these conservative assumptions, implementing the East Chowchilla design option combination would result in approximately 126 acres of permanent impacts (approximately 39 acres of direct and 87 acres of indirect) on waters and wetlands, while implementing West Chowchilla design option combination would result in approximately 136 acres of permanent impact (approximately 41 acres of direct and 95 acres of indirect) on waters and wetlands. Direct temporary impact acreage is almost equal under the two design option combinations. Tables 7.2-1, 7.2-2, and 7.2-3 below illustrate that of the total impact types listed for each design alternative, only a fraction are impacts to natural aquatic resources, and in turn, even a smaller amount of impacts are to wetlands.

The implementation of the Preferred Project will directly impact between 10.40 and 10.44 acres of wetlands, consisting of vernal pools, seasonal wetlands, freshwater marsh, and palustrine forested wetlands. Construction-related indirect impacts on these habitats would include: erosion, siltation, and runoff into natural and constructed watercourses; soil and water contamination from construction equipment leaks; construction-related dust reducing photosynthetic capability (especially during flowering periods); and an increased risk of fire (e.g., construction equipment use and smoking by construction workers) in adjacent open spaces. Wildlife use of adjacent habitats would also be subjected to noise, dust, and motion and startle disturbances. During the project period, these wetland areas are anticipated to be directly disturbed after construction for maintenance and the introduction of other hardscape,

fencing and landscape features. The resource values that exist would be permanently removed during site preparation and continue to be during the life of the Project.

Table 7.2-1
Direct Permanent Impacts

Type of Impact (acres)	East Chowchilla Ave 21	West Chowchilla Ave 24
Impacts to wetlands	9.24	8.90
Impacts to other waters	6.54	9.43
Impacts to constructed waters	23.19	23.11
TOTAL impacts to all waters and wetlands	38.97	41.44

Table 7.2-2
Direct Temporary Impacts

Type of Impact (in acres)	East Chowchilla Ave 21	West Chowchilla Ave 24
Impacts to wetlands	1.64	1.50
Impacts to other waters	6.02	6.00
Impacts to constructed waters	4.33	4.04
TOTAL impacts to all waters and wetlands	11.99	11.54

Table 7.2-3
Indirect Permanent Impacts

Type of Impact (in acres)	East Chowchilla Ave 21	West Chowchilla Ave 24
Impacts to wetlands	16.38	11.75
Impacts to other waters	27.96	31.19
Impacts to constructed waters	42.86	51.60
TOTAL impacts to all waters and wetlands	87.20	94.54

Mitigation for impacts to wetlands will be accomplished by one or more of the following:

- Purchase of credits from an agency-approved mitigation bank.
- Fee-title-acquisition of natural resource agency-related property.
- Purchase or establishment of a conservation easement with an endowment for long-term management of the property-specific conservation values.
- In-lieu fee contribution determined through negotiation and consultation with the various natural resource regulatory agencies.
- Base compensation for permanent impacts on the following ratios (acres of mitigation to acres of impact), pending agency confirmation:
- Vernal pools and other seasonal wetlands: 2:1 Preservation and 1:1 Creation.
- Coastal and Valley Freshwater Marsh: 1:1.

- Other wetlands: Between 1.1:1 and 1.5:1 (1:1 onsite and 0.1 to 0.5:1 offsite), based on function and values temporarily lost.

After considering mitigation for the impact of approximately ten and one-half acres, this effect is considered an impact with moderate intensity under NEPA and significant under CEQA.

7.2.1.2 Mudflats

There are no mudflats affected by implementation of either of the Preferred Project's design options. No impact.

7.2.1.3 Coral Reefs

There are no coral reefs affected by implementation of either of the Preferred Project's design options. No impact.

7.2.1.4 Pool and Riffle Areas

It is unknown at this time if the Preferred Project will impact pool and riffle areas. The Preferred Project will directly impact between approximately 11 and 14 acres of natural watercourses, some of which may contain riffle pool complexes. Where possible, the project will span natural waterways. Where spans are not possible crossings will entail either culverts or piers. Culverts could have the following impacts on riffle pool complexes:

- Elimination of riffle and pool areas by displacement, hydrologic modification, or sedimentation;
- Reduction of aeration and filtration capabilities at the discharge site and downstream, which may reduce stream habitat diversity, and may retard repopulation of the disposal site and downstream waters through sedimentation and the creation of unsuitable habitat;
- Alteration of stream hydrology which may cause scouring or sedimentation of riffles and pools;
- Sedimentation induced through hydrological modification or as a direct result of the deposition of unconsolidated dredged or fill material may clog riffle and pool areas, destroy habitats, and create anaerobic conditions;
- Elimination of pools and meanders by the discharge of dredged or fill material which could lead to reduction of water holding capacity of streams and cause rapid runoff from a watershed which in turn could lead to delivery of large quantities of flood water in a short time to downstream areas resulting in the destruction of natural habitat, high property loss, and the need for further hydraulic modification.

Piers could have similar impacts, though to a much lesser degree. Due to the uncertainty of this impact, it is considered an impact with moderate intensity under NEPA and significant under CEQA.

7.2.1.5 Vegetated Shallows

There are no vegetated shallows affected by implementation of either of the Preferred Project's design options. No impact.

7.2.1.6 Sanctuaries and Refuges

There are no sanctuaries within any of the Preferred Project alignments. One refuge, Camp Pashayan, is within and adjacent to the construction footprint of the Preferred Project. Camp Pashayan, which is within the San Joaquin River Ecological Reserve, is a CDFG-administered mitigation property that is part of a

regional planning process for conservation. Construction of the Preferred Project would result in direct and indirect impacts to Camp Pashayan which could result in the following:

- The disruption of breeding, spawning, migratory movements or other critical life requirements of
- resident or transient fish and wildlife resources;
- The creation of unplanned, easy and incompatible human access to remote aquatic areas;
- The creation of the need for frequent maintenance activity;
- The establishment of undesirable competitive species of plants and animals; or
- A change in the balance of water and land areas needed to provide cover, food, and other fish and wildlife habitat requirements in a way that modifies sanctuary or refuge management practices.

Mitigation measures that will minimize construction period impacts include the following:

- Reduce fugitive dust by watering;
- Reduce fugitive dust from material hauling;
- Prepare and implement a worker environmental awareness program;
- Prepare and implement a biological resources management plan;
- Delineate environmentally sensitive areas and environmentally restricted areas (on plans and in-field);
- Use equipment staging areas; and
- Control vehicle traffic.[1]

With implementation of mitigation measures, this is an impact with moderate intensity under NEPA and significant under CEQA.

7.2.2 Habitat For Fish and Other Aquatic Wildlife and Organisms (40 CFR Sections 230.31; 230.75)

This section deals with impacts associated with aquatic wildlife and organisms within open water environments. Impacts to and appropriate mitigation for aquatic wildlife and organisms (Conservancy fairy shrimp, vernal pool fairy shrimp, vernal tadpole fairy shrimp California tiger salamander) whose habitat is terrestrial wetlands (vernal pools, seasonal wetlands, marshes) would be the same impacts and mitigation measures as are discussed in Section 7.2.1, Special Aquatic Sites: Wetlands, Mudflats, Coral Reefs, Pool and Riffle Areas, Vegetated Shallows, Sanctuaries, and Refuges and in Section 7.2.3, Endangered and Threatened Species.

7.2.2.1 Fish, Crustaceans, Mollusks, and Other Aquatic Organisms in the Food Web

The Preferred Project contains aquatic habitats (primarily along the San Joaquin River) known to support Kern brook lamprey, Central Valley steelhead, Central Valley spring-run Chinook salmon, hardhead, and San Joaquin roach. Essential fish habitat is currently being restored within the San Joaquin River from the Friant Dam to the Merced River confluence. Potential project impacts (i.e., indirect from runoff/water-quality related) could hinder re-establishment of special-status fish along the San Joaquin River; as such, essential fish habitat is regulated by NMFS, CDFG, and USFWS. Two design options are being considered for the San Joaquin River crossing. The first design option for the San Joaquin River crossing utilizes a continuation of the spacing of the columns of the elevated structure as it approaches the river crossing within the inundated river channel. The proposed configuration or span arrangement utilizes piers/foundations at a spacing of 110 feet and results in the placement of 3 piers within the wetted perimeter of the typical low flow channel of the river.

[1] These mitigation measures are discussed in detail in the EIR/EIS, and summarized elsewhere in the Checkpoint C Summary Report.

A second design option utilizes a combination of the typical precast segmental construction up to the north bank of the river with a two span (320- to 160-foot) steel truss superstructure spanning the main portion of the low flow channel. This second design minimizes the need to enter the wetted perimeter of the low-flow river channel. The second design option is considered the primary option at this point and is the option currently being considered by NMFS in their preparation of a biological opinion for the project. Additional hydrologic studies would be required for the adoption of the first design option which would result in 3 piers being placed in the wetted channel.

Regardless or the design option, the HST crossing will be designed with due consideration for the anticipated increases in river flows resulting from the implementation of the SJRRP and to minimize any appreciable changes in scour, sediment transport and deposition, or changes in geomorphic processes that could alter habitat conditions in a manner that will impede the reestablishment of these species. The Authority, in partnership with the Design-Build Team, will design and conduct a hydraulics/hydrology analysis with appropriate modeling tools and incorporate site-specific data, including the needed geotechnical investigations, to ensure that the design, sizing, location, and construction techniques are compatible with habitat conditions that support salmonoid utilization of the San Joaquin River within the area impacted by the proposed HST crossing.

Construction period and project period impacts to these and other aquatic organisms could include the following:

- An effect on the populations of fish, crustaceans, mollusks and other food web organisms through the release of contaminants which adversely affect adults, juveniles, larvae, or eggs, or result in the establishment or proliferation of an undesirable competitive species of plant or animal at the expense of the desired resident species;
- Suspended particulates settling on attached or buried eggs, resulting in smothering the eggs by limiting or sealing off their exposure to oxygenated water;
- The debilitation or death of sedentary organisms by smothering, exposure to chemical contaminants in dissolved or suspended form, exposure to high levels of suspended particulates, reduction in food supply, or alteration of the substrate upon which they are dependent.
- Modification (redirection, delay, or cessation) of the reproductive and feeding movements of some species of fish and crustacea, thus preventing their aggregation in accustomed places such as spawning or nursery grounds and potentially leading to reduced populations;
- Reduction of detrital feeding species or other representatives of lower trophic levels resulting in impairment of the flow of energy from primary consumers to higher trophic levels. This in turn could lead to the reduction or potential elimination of food chain organism populations, decreasing the overall productivity and nutrient export capability of the ecosystem.

Mitigation measures designed to address these potential impacts include the following:

- Prepare and implement an aquatic weed control plan;
- Compensate for permanent riparian impacts;
- Conduct delineation of jurisdictional waters and state streambeds;
- Prepare and implement a habitat mitigation and monitoring plan;
- Compensate for permanent impacts on jurisdictional waters;
- Prepare and implement a worker environmental awareness program;
- Prepare and implement a biological resources management plan;
- Delineate environmentally sensitive areas and environmentally restricted areas (on plans and in-field);
- Designate equipment staging areas;
- Control vehicle traffic;

- Prepare post-construction compliance reports;
- Prepare and implement a construction stormwater pollution prevention plan; and
- Implement Central Valley Regional Water Quality Board, Order No. 5-00-175, Waste Discharge Requirements General Order for Dewatering and Other Low Threat Discharges to Surface Waters.

After considering mitigation, this is an impact with moderate intensity under NEPA and significant under CEQA.

7.2.2.2 Other Wildlife, Including Resident and Transient Mammals, Birds, Reptiles, and Amphibians

Construction period and project period impacts to mammals, birds, reptiles, and amphibians could include the following:

- The loss or change of breeding and nesting areas, escape cover, travel corridors, and preferred food sources for resident and transient wildlife species associated with the aquatic ecosystem resulting from changes in water levels, water flow and circulation, salinity, chemical content, and substrate characteristics and elevation;

- Increased water turbidity which can adversely affect wildlife species which rely upon sight to feed, and which can disrupt the respiration and feeding of certain aquatic wildlife and food chain organisms;

- The availability of contaminants from the discharge of dredged or fill material may lead to the bioaccumulation of such contaminants in wildlife;

- Changes in physical and chemical factors of the environment may favor the introduction of undesirable plant and animal species at the expense of resident species and communities;

- The lowering of plant and animal species diversity which may disrupt the normal functions of the ecosystem and lead to reductions in overall biological productivity.

Mitigation measures designed to address these potential construction period impacts include the following:

- Conduct pre-construction surveys and monitoring for raptors;
- Conduct pre-construction surveys and delineate active nest exclusion areas for other breeding birds;
- Provide for raptor protection on power lines;
- Reduce fugitive dust by watering;
- Reduce fugitive dust from material hauling;
- Prepare and implement a worker environmental awareness program;
- Prepare and implement a biological resources management plan;
- Delineate environmentally sensitive areas and environmentally restricted areas (on plans and in-field);
- Designate equipment staging areas;
- Control vehicle traffic;
- Implement work stoppage;
- Conduct 'take' notification and reporting; and
- Prepare post-construction compliance reports

After considering mitigation, this is an impact with moderate intensity under NEPA and significant under CEQA.

7.2.3 Endangered or Threatened Species (40 CFR 230.30)

All impact calculations are based on suitable habitats for federally and state-listed species. The extent of suitable habitat for listed species that is actually occupied has not been determined. By mitigating for all suitable habitat for T&E species, the project will accomplish full mitigation for all listed species because actual effects from the project are likely to be less than those estimated by using habitat-based impact estimations.

7.2.3.1 Special-Status Plants

Special-Status Plant Impacts

It is assumed that any special-status plant species and their habitat present within the construction footprint of the hybrid alternative would be permanently removed with project implementation. Potential indirect impacts on special-status plant species include erosion, siltation, and runoff into natural and constructed watercourses; soil and water contamination from construction equipment leaks; construction-related dust affecting plants by reducing their photosynthetic capability (especially during flowering periods); and an increased risk of fire (e.g., construction equipment use and smoking by construction workers) in adjacent open spaces. In areas where special-status plant surveys were not conducted to determine presence or absence, it is assumed that suitable habitats for special-status plants within the project footprint and 100-foot buffer area are occupied by populations of special-status plants. A total of 36 special-status plant species were identified as having potential to occur in the alternatives study areas. Implementing any of the alignment alternatives has the potential to result in the loss of or damage to all 36 special-status plant species and their habitats.

Of the 36 potentially occurring special-status plant species, five are federally listed species and are associated with vernal pool habitats (Colusa grass, San Joaquin Valley Orcutt grass, hairy Orcutt grass, Greene's tuctoria, and succulent owl's clover). Table 7.2-4 summarizes estimated direct and indirect impacts that would result from implementation of the hybrid alternative. Impact acreages in Table 7.2-4 are based solely on impacts on habitats deemed suitable for the plant species in question. No special-status plant species have been detected in any project alternative to date.

Cumulative Impacts

Special-status plant species may occur in northern claypan vernal pools in the area of potential effect for the Hybrid Alternative and other foreseeable projects include succulent owl's-clover, Boggs Lake hedge-hyssop, Colusa grass, San Joaquin Valley Orcutt grass, hairy Orcutt grass, vernal pool smallscale, and Wright's trichocoronis. Effects on northern claypan vernal pools may result in take of individual plants associated with this habitat type. With the implementation of avoidance, minimization, and mitigation measures, the project and other foreseeable projects would affect a small proportion of suitable habitat within the reported range of these species. The loss of habitat is not anticipated to result in the loss of any sustainable populations associated with this habitat type. Therefore, cumulative impacts would be moderate under NEPA.

Special-Status Plant Mitigation Measures

Mitigation measures for special-status plants include dust control, weed control measures, and avoidance of adjacent habitat that could potentially support special-status plants. A detailed description of mitigation measures for potential project-related impacts to special-status plants is provided in the final EIR/EIS for the Merced to Fresno Section.

AQ-MM#1: Reduce Fugitive Dust by Watering. Reduce potential dust impacts to remaining special-status plants by implementing dust control during project construction. Dust control would occur during all project construction that would have the potential to generate fugitive dust.

AQ-MM#3: Reduce Fugitive Dust from Material Hauling. Measures will be implemented to minimize fugitive dust from material hauling during construction. These measures would occur during all material hauling that would have the potential to general fugitive dust.

Table 7.2-4
Summary of Special-Status Plant Habitat Impacts for the Hybrid Alternative

North-South Alignment Isolated and with Wye Design Option	Hybrid Alternative	
	East Chowchilla Design Option (Ave 21)	West Chowchilla Design Option (Ave 24)
Colusa grass		
Direct Permanent Effect (acres)		
North-South Alignment	0.14	0.14
Ave 24 Wye	NA	0.00
Ave 21 Wye	0.00	NA
Total Direct Permanent Effect (acres)	**0.14**	**0.14**
Indirect Permanent Effect (acres)		
North-South Alignment	0.07	0.07
Ave 24 Wye	NA	0.00
Ave 21 Wye	0.00	NA
Total Indirect Permanent Effect (acres)	**0.07**	**0.07**
San Joaquin Valley Orcutt grass		
Direct Permanent Effect (acres)		
North-South Alignment	5.40	4.69
Ave 24 Wye	NA	0.00
Ave 21 Wye	0.07	NA
Total Direct Permanent Effect (acres)	**5.47**	**4.69**
Indirect Permanent Effect (acres)		
North-South Alignment	5.53	4.67
Ave 24 Wye	NA	0.00
Ave 21 Wye	0.00	NA
Total Indirect Permanent Effect (acres)	**5.53**	**4.67**
Hairy Orcutt Grass		
Direct Permanent Effect (acres)		
North-South Alignment	5.61	5.47
Ave 24 Wye	NA	0.00

North-South Alignment Isolated and with Wye Design Option	Hybrid Alternative	
	East Chowchilla Design Option (Ave 21)	West Chowchilla Design Option (Ave 24)
Ave 21 Wye	0.00	NA
Total Direct Permanent Effect (acres)	**5.61**	**5.47**
Indirect Permanent Effects (acres)		
North-South Alignment	4.85	4.15
Ave 24 Wye	NA	0.00
Ave 21 Wye	0.00	NA
Total Indirect Permanent Effect (acres)	**4.85**	**4.15**
Greene's tuctoria		
Direct Permanent Effect (acres)		
North-South Alignment	3.94	3.47
Ave 24 Wye	NA	0.00
Ave 21 Wye	0.00	NA
Total Direct Permanent Effect (acres)	**3.94**	**3.47**
Indirect Permanent Effects (acres)		
North-South Alignment	3.12	2.58
Ave 24 Wye	NA	0.00
Ave 21 Wye	0.00	NA
Total Indirect Permanent Effect (acres)	**3.12**	**2.58**
Succulent owl's clover		
Direct Permanent Effect (acres)		
North-South Alignment	2.62	2.05
Ave 24 Wye	NA	0.00
Ave 21 Wye	0.07	NA
Total Direct Permanent Effect (acres)	**2.69**	**2.05**
Indirect Permanent Effects (acres)		
North-South Alignment	2.82	2.68
Ave 24 Wye	NA	0.00
Ave 21 Wye	0.00	NA
Total Indirect Permanent Effect (acres)	**2.82**	**2.68**

Bio-MM#3: Workers Environmental Awareness Plan. Prior to ground-disturbing activities, the Mitigation Manager or designee will prepare and implement a WEAP for construction crews. WEAP training materials will include the following: discussion of the federal ESA, CESA, BGEPA, and the MBTA; consequences and penalties for violation or 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; hazardous substance spill prevention and containment measures; the contact person in the event of the discovery of a dead or injured wildlife species; and review of mitigation measures. This program would improve awareness of potentially sensitive biological resources in the vicinity of the construction area and minimize the potential for inadvertent impacts to special-status species including plants.

Bio-MM#4: Prepare and Implement a Weed Control Plan. Prior to ground-disturbing activities, the contractor will prepare and implement a Weed Control Plan to minimize or avoid the spread of weeds during ground-disturbing activities.

Bio-MM#5: Prepare and Implement a Biological Resources Management Plan. See previous summary of this mitigation measure.[2]

Bio-MM#6: **Prepare and Implement a Restoration and Revegetation Plan.** See previous summary of this mitigation measure.

Bio-MM#7: Delineate Environmentally Sensitive Areas and Environmentally Restricted Areas (on plans and in-field). See previous summary of this mitigation measure.

Bio-MM#8: **Equipment Staging Areas.** See previous summary of this mitigation measure.

Bio-MM#10: Vehicle Traffic Control. See previous summary of this mitigation measure.

Bio-MM#14: Post-Construction Compliance Reports. After each construction period is completed, the Project Biologist will submit post-construction compliance reports consistent with the appropriate agency (e.g., UFSWS, NMFS and CDFG) protocols, including compliance with resource agency permits (i.e., Section 7 of FESA, Section 2081 of CESA and Section 401 and 404 of FCWA and 1600 of Fish and Game Code). The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance. The frequency of the memorandum compilation and submission will be consistent with regulatory compliance permits.

Bio-MM#17: Conduct Pre-Construction Surveys for Special-Status Plant Species. The Project Biologist will conduct pre-construction surveys for special-status plant species in suitable habitat areas, subject to ground-disturbing activities. The surveys will be conducted in the appropriate season prior to ground-disturbing activities for salvage and relocation activities. The Project Biologist will use the results of the Special-Status Plants Survey Report (prepared as part of the Biological Resources Technical Report), including mapping of locations of special-status plant species, to determine focused locations for the pre-construction surveys, as appropriate. The Project Biologist will work with the Contractor's Biologist to mark and avoid locations of all special-status plant species observed where feasible or incorporate the species into the relocation/compensation program defined in Bio-MM#49: Compensate for Impacts on Special-Status Plant Species.

Bio-MM#18: Prepare and Implement Plan for Salvage, Relocation and/or Propagation of Special-Status Plant Species. The Contractor's Biologist will prepare a plan prior to ground-disturbing activities to address monitoring, salvage, relocation, and propagation of special-status plant species. The plan will be submitted to the Project Biologist for concurrence. The relocation or propagation of plants and seed will be performed at a suitable mitigation site, as appropriate per species. Documentation will

2 Summaries of cross-referenced mitigation measures appear in Section 6, above.

include provisions that address the techniques, location, and procedures required for successful establishment of the plant populations.

WR-MM#1: Construction Stormwater Pollution Prevention Plan. A Stormwater Pollution Prevention Plan would be prepared prior to the initiation of construction. This would protect the water quality of remaining wetland features that could potentially support special-status plant species.

Bio-MM#43: Restore Temporary Impacts on Jurisdictional Waters. See previous summary of this mitigation measure.

Bio-MM#44: Monitor Construction Activities within Jurisdictional Waters. See previous summary of this mitigation measure.

Bio-MM#50: Compensate for Impacts on Special-Status Plant Species. Prior to Final Design and during the permitting process, the Authority will comply with CESA and the federal ESA by implementing the following measures:

- Purchase credits from an existing mitigation bank or conduct a special-status plant re-establishment program within the same watershed or in proximity to the impact area at a 1:1 ratio.
- Mitigate the impacts on special-status plants in accordance with the USFWS Biological Opinion and/or CDFG 2081(b).

Bio-MM#56: Conduct Delineation of Jurisdictional Waters and State Streambeds. See previous summary of this mitigation measure.

Bio-MM#57: Prepare and Implement a Habitat Mitigation and Monitoring Plan. See previous summary of this mitigation measure.

Bio-MM#58: Compensate for Permanent Impacts on Jurisdictional Waters. See previous summary of this mitigation measure.

Bio-MM#59: Offsite Habitat Restoration, Enhancement and Preservation. See previous summary of this mitigation measure.

Conclusion for Construction Special-Status Plant Impacts

Although actions determined to have an adverse impact under NEPA may be mitigated and have a lesser effect, for special-status plants, the effect determination remains potentially adverse even when mitigated if special-status plants are found inside or within 100 feet of the project footprint. The effect determination will vary depending on the results of focused special-status plant surveys.

7.2.3.2 Special-Status wildlife

Federally listed wildlife species that are considered potentially affected by the Hybrid Alternative include Conservancy fairy shrimp, vernal pool fairy shrimp, vernal pool tadpole shrimp, valley elderberry longhorn beetle, California tiger salamander, and San Joaquin kit fox. Table 7.2-5 summarizes the estimated direct and indirect impacts on potential species' habitat by the Hybrid Alternative.

Special-Status Wildlife Impacts

Impacts on suitable habitats for these species were calculated according to the following methodology. It is assumed that any suitable habitat for special-status wildlife species within the project footprint would be directly and permanently impacted. Outside the project footprint, species habitat would be considered to be permanently and directly or indirectly impacted depending on the species in question. Suitable habitat for valley elderberry longhorn beetle within 100 feet of the project footprint would be considered

indirectly impacted. The full acreage of any aquatic feature that provides potentially suitable wetland habitat for species typically associated with vernal pools, such as vernal pool fairy shrimp and California tiger salamander, is considered directly and permanently lost if any portion of the wetland feature lies within the footprint boundary. Therefore, the direct habitat impact acreage for vernal pool-associated species in Table 7.2-5 is greater than the vernal pool impact acreage discussed previously under impacts on jurisdictional waters. Suitable habitat for fairy shrimp species and California tiger salamander (upland habitat) within 250 feet of the project footprint would be considered indirectly impacted. Suitable habitat for San Joaquin kit fox within 1,000 feet of the project footprint would be considered indirectly impacted.

Table 7.2-5
Summary of Special-status Wildlife Habitat Impacts with Hybrid Alternative

Hybrid Alternative		
	Design Option	
	East Chowchilla Design Option (Ave 21)	West Chowchilla Design Option (Ave 24)
Conservancy Fairy Shrimp		
Direct Permanent Effect (acres)		
North-South Alignment	22.78	16.15
Ave 24 Wye	NA	0.00
Ave 21 Wye	0.00	NA
Total Direct Permanent Effect (acres)	**22.78**	**16.15**
Indirect Permanent Effects (acres)		
North-South Alignment	5.61	5.34
Ave 24 Wye	NA	0.00
Ave 21 Wye	0.00	NA
Total Indirect Permanent Effect (acres)	**5.61**	**5.34**
Vernal Pool Fairy Shrimp		
Direct Permanent Effect (acres)		
North-South Alignment	25.75	18.59
Ave 24 Wye	NA	0.41
Ave 21 Wye	0.44	NA
Total Direct Permanent Effect (acres)	**26.20**	**18.99**
Indirect Permanent Effect (acres)		
North-South Alignment	10.47	8.71
Ave 24 Wye	NA	0.04
Ave 21 Wye	0.68	NA
Total Indirect Permanent Effect (acres)	**11.14**	**8.75**

Hybrid Alternative		
	Design Option	
	East Chowchilla Design Option (Ave 21)	West Chowchilla Design Option (Ave 24)
Vernal Pool Tadpole Shrimp		
Direct Permanent Effect (acres)		
North-South Alignment	20.00	13.36
Ave 24 Wye	NA	0.00
Ave 21 Wye	0.00	NA
Total Direct Permanent Effect (acres)	**20.00**	**13.36**
Indirect Permanent Effect (acres)		
North-South Alignment	2.25	1.98
Ave 24 Wye	NA	0.00
Ave 21 Wye	0.00	NA
Total Indirect Permanent Effect (acres)	**2.25**	**1.98**
Valley Elderberry Longhorn Beetle		
Direct Permanent Effect (acres)		
North-South Alignment	1.22	1.31
Ave 24 Wye	NA	3.95
Ave 21 Wye	0.42	NA
Total Direct Permanent Effect (acres)	**1.63**	**5.26**
Indirect Permanent Effect (acres)		
North-South Alignment	1.15	2.39
Ave 24 Wye	NA	5.12
Ave 21 Wye	0.97	NA
Total Indirect Permanent Effect (acres)	**2.12**	**7.51**
California Tiger Salamander		
Direct Permanent Effect (acres)		
North-South Alignment	82.12	72.19
Ave 24 Wye	NA	0.41
Ave 21 Wye	1.93	NA
Total Direct Permanent Effect (acres)	**84.05**	**72.60**
Indirect Permanent Effect (acres)		

Hybrid Alternative		
	Design Option	
	East Chowchilla Design Option (Ave 21)	West Chowchilla Design Option (Ave 24)
North-South Alignment	167.67	128.41
Ave 24 Wye	NA	0.04
Ave 21 Wye	2.72	NA
Total Indirect Permanent Effect (acres)	**170.38**	**128.45**
San Joaquin Kit Fox		
Direct Permanent Effect (acres)		
North-South Alignment	113.22	111.48
Ave 24 Wye	NA	2.92
Ave 21 Wye	13.56	NA
Total Direct Permanent Effect (acres)	**126.79**	**114.40**
Indirect Permanent Effect (acres)		
North-South Alignment	1109.16	1052.36
Ave 24 Wye	NA	9.61
Ave 21 Wye	30.91	NA
Total Indirect Permanent Effect (acres)	**1,140.07**	**1,061.97**

All impacts on special-status wildlife species were determined using a habitat-based approach, where species presence is assumed in areas that contain suitable habitat for the species in question.

Special-Status Wildlife Cumulative Impacts

Special-status wildlife species could potentially occur in vernal pools and adjacent California annual grasslands including California tiger salamander, and western spadefoot toad. Vernal pool and adjacent California annual grassland habitat within the known range of these special-status species would be affected by the project and other foreseeable projects. However, the loss of habitat is not anticipated to result in the loss of sustainable populations associated with this habitat type if avoidance, minimization, and mitigation measures are implemented. Therefore, cumulative impacts would be moderate under NEPA.

The project and other foreseeable projects within the range of the valley elderberry longhorn beetle may result in the loss of elderberry shrubs that provide suitable habitat. Suitable habitat and reported occurrences of valley elderberry longhorn beetle are located throughout the study area. These projects would not result in the loss of local populations of this species. Therefore, cumulative impacts would be moderate under NEPA.

Special-status wildlife species may occur in California annual grasslands including San Joaquin kit fox, burrowing owl, and American badger. The loss of California annual grassland habitat and take of associated individual special-status animals could occur. The project and other foreseeable projects are

not expected to result in the loss of a substantial proportion of California annual grasslands and would not result in the loss of populations that are dependent on California annual grassland habitat. Therefore, cumulative impacts would be moderate under NEPA. San Joaquin kit fox dispersal habitat may be affected by the project and other foreseeable projects within the study area. Disruption to linkages and movement corridors may result in isolated populations that are at greater risk of extirpation. Therefore, cumulative impacts would be moderate under NEPA.

Golden eagle, Swainson's hawk, western snowy plover, white-tailed kite, American peregrine falcon, greater sandhill crane, bald eagle, Belding's savannah sparrow, and other migratory bird utilize the Central Valley for foraging and nesting habitat. The project and other foreseeable projects may affect nesting and foraging habitat associated with individual special-status birds. Nesting and foraging habitat for these species is variable; however, the projects are not expected to result in the loss of sustainable populations of sensitive bird species. Therefore, cumulative impacts would be moderate under NEPA.

Operational Special-Status Wildlife Impacts

Operational impacts to special-status wildlife species could occur from collisions with high-speed trains. These encounters would be expected to be minimal because the right-of-way would be fenced to prevent entry onto the tracks. Most impacts to special-status wildlife would be expected to occur during construction.

Special-Status Wildlife Mitigation Measures

AQ-MM#1: Reduce Fugitive Dust by Watering. See previous summary of this mitigation measure.

AQ-MM#3: Reduce Fugitive Dust from Material Hauling. See previous summary of this mitigation measure.

Bio-MM#3: Prepare and Implement a Worker Environmental Awareness Program. See previous summary of this mitigation measure.

Bio-MM#4: Prepare and Implement a Weed Control Plan. See previous summary of this mitigation measure.

Bio-MM#5: Prepare and Implement a Biological Resources Management Plan. See previous summary of this mitigation measure.

Bio-MM#6: Prepare and Implement a Restoration and Revegetation Plan. See previous summary of this mitigation measure.

Bio-MM#7: Delineate Environmentally Sensitive Areas and Environmentally Restricted Areas (on plans and in-field). See previous summary of this mitigation measure.

Bio-MM#8: Equipment Staging Areas. See previous summary of this mitigation measure.

Bio-MM#9: Mono-Filament Netting. During ground-disturbing activities, the Project Biologist will verify that plastic mono-filament netting (erosion-control matting) or similar material is not used in erosion control materials; substitutes include coconut hair matting or tackified hydroseeding compounds. The Project Biologist will submit memoranda to the Mitigation Manager documenting compliance monthly, or as appropriate, through the life of the project construction.

Bio-MM#10: Vehicle Traffic Control. See previous summary of this mitigation measure.

Bio-MM#11: Entrapment Prevention. The Contractor's biologist will cover all excavated, steep-sided holes or trenches, more than 8 inches deep, at the close of each working day with plywood or similar materials, or provide a minimum of one escape ramp per 10 feet of trenching constructed of earth fill.

The Contractor's Biologist will thoroughly inspect such holes or trenches for trapped animals before leaving the construction site each day.

Bio-MM#12: Work Stoppage. During ground-disturbing activities, the Project Biologist or Biological Monitor will halt work in the event that a special-status wildlife species gains access to the construction footprint. This work stoppage will be coordinated with the resident engineer and/or the Authority or its designee. At this direction the Contractor will suspend ground-disturbing activities in the immediate construction area that could reasonably result in a "take" of special-status wildlife species. The Contractor will continue the suspension until the individual leaves voluntarily, is relocated to a release area using USFWS- and/or CDFG-approved handling techniques and relocation methods, or as required by USFWS or CDFG.

Bio-MM#13: 'Take' Notification and Reporting. The Contractor's Biologist in coordination with the Project Biologist and Mitigation Manager will notify the USFWS and/or CDFG immediately in the case of an accidental death or injury to a federal or state listed species during project-related activities. The Authority or its designee will be notified prior to the notification to the agencies. The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance.

Bio-MM#14: Post-Construction Compliance Reports. After each construction period is completed, the Project Biologist will submit post-construction compliance reports consistent with the appropriate agency (e.g., UFSWS, NMFS and CDFG) protocols, including compliance with resource agency permits (i.e., Section 7 of FESA, Section 2081 of CESA and Section 401 and 404 of FCWA and 1600 of Fish and Game Code). The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance. The frequency of the memorandum compilation and submission will be consistent with regulatory compliance permits.

Bio-MM#15: Restore Temporary Riparian Impacts. During post-construction, the Contractor's Biologist will revegetate all disturbed riparian areas using appropriate plants and seed mixes. The Project Biologist will monitor restoration activities consistent with provisions in the Habitat Mitigation and Monitoring Plan (HMMP) as described in Bio-MM#56. The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance and other reporting requirements in the 1600 Streambed Alteration Agreement.

Bio-MM#16: Mitigation and Monitoring of Protected Trees. Prior to, during, and post-construction, the Contractor's Biologist will implement the following methods to preserve and/or mitigate impacts on protected trees:

1. The Contractor will conduct pre-construction surveys to evaluate the condition of all ornamental and native trees found within urban areas directly and indirectly affected by the proposed project;

2. The Contractor will transplant all directly affected trees that are in good condition to a suitable site outside the construction footprint;

3. The Contractor will fence trees which may be indirectly affected by construction activities 5 feet from their driplines to form exclusion zones; and

The Contractor will prepare a monitoring and maintenance program to monitor transplanted trees for re-establishment of root systems.

Bio-MM#19: Conduct Pre-Construction Sampling and Assessment for Vernal Pool Fauna. Prior to ground-disturbing activities, the Project Biologist will conduct pre-construction, non-protocol surveys in seasonally inundated habitats (seasonal wetland, noninundated wetlands) within the construction footprint. The Project Biologist will conduct general aquatic surveys at a suitable interval after the first significant storm event of the rainy season (October 15 to June 1), as feasible prior to ground-disturbing

activities. The sampling is an assessment of the hydrological, biological and ecological conditions of each seasonal wetland and inundated nonwetland. This assessment will determine the quality and suitability of seasonal wetlands for special-status species (e.g., vernal pool branchiopods, western spadefoot toads, and California tiger salamanders).

Bio-MM#20: Seasonal Vernal Pool Work Restriction. For seasonal avoidance of special-status vernal pool branchiopods and vernal pool-dependent species (e.g., California tiger salamander), the Contractor will not work within 250 feet of aquatic habitats suitable for these species (e.g., vernal pools and other seasonal wetlands) from October 15 to June 1 (corresponding to the rainy season), or as determined through informal or formal consultation with the USFWS or USACE. Ground-disturbing activities may begin once the habitat is no longer inundated for the season. If any work remains to be completed after October 15, exclusion fencing and erosion control measures will be placed at the vernal pools and other seasonal wetlands by the Contractor's Biologist. The fencing will act as a buffer between ground-disturbing activities and the vernal pools and other seasonal wetlands as determined through consultations with USFWS/USACE.

Bio-MM#21: Implement and Monitor Vernal Pool Protection. For temporary impacts on vernal pools and other seasonal wetlands that cannot be avoided, the Contractor's Biologist will apply geotextile fabric and a layer of gravel over the affected vernal pool(s) prior to ground-disturbing activities to protect the contours. The Contractor will implement this measure within temporary impact areas adjacent to or within the construction footprint.

Bio-MM#22: Implement Conservation Guidelines During the Construction Period for Valley Elderberry Longhorn Beetle. Prior to and during ground-disturbing activities, the Contractor will implement the avoidance and minimization measures detailed in the Conservation Guidelines for the Valley Elderberry Longhorn Beatle (USFWS 1999a). These measures include establishing and maintaining appropriate buffer areas around elderberry plants, surveying for beetle boreholes in affected shrubs, restricting the use of chemicals that might harm beetles, and mowing. After ground-disturbing activities are completed, restore any damage to buffer areas containing elderberry shrubs according to specifications within the Conservation Guidelines for the Valley Elderberry Longhorn Beetle (USFWS 1999a).

Bio-MM#23: Translocation of California Tiger Salamanders. Prior to ground-disturbing activities, the Project Biologist or designee will conduct a pre-construction survey and relocate any California tiger salamanders from within the construction footprint in accordance with the Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander (USFWS 2003).

Bio-MM#24: Erect Amphibian Exclusion Fencing. The Contractor's Biologist will install exclusion barriers (i.e. silt fences) to influence the movement of California tiger salamander, including other amphibian species, within impacted areas. They can be used to both exclude California tiger salamander, including other amphibian species, from ground-disturbing areas as well as to guide breeding adults toward pre-identified mitigation ponds. Exclusion fencing will be maintained by the Contractor throughout the California tiger salamander's entire active period (November to April) or until all ground-disturbing activities are completed, whichever occurs first.

Bio-MM#25: Conduct Western Pond Turtle Pre-Construction Surveys and Relocation. Prior to ground-disturbing activities, conduct pre-construction surveys for western pond turtles to determine the presence or absence of western pond turtles within the construction footprint. If western pond turtles are found within the construction footprint, conduct daily clearance surveys prior to the initiation of any construction activities.

Bio-MM#26: Conduct Western Pond Turtle Monitoring. During ground-disturbing activities, the Project Biologist will observe all construction activities immediately adjacent to, or within, habitat that

supports populations of western pond turtles. If environmentally sensitive areas (ESAs) are deemed necessary, the Project Biologist will conduct a clearance survey for western pond turtles prior to the time the fence is installed. If necessary, conduct daily clearance surveys prior to construction.

Bio-MM#27: Implement Western Pond Turtle Avoidance and Relocation. Prior to ground-disturbing activities, if a western pond turtle nesting area is present and will be affected by ground-disturbing activities as determined by the Project Biologist, the Contractor will avoid western pond turtles nesting areas, where feasible. If not feasible, the Project Biologist will coordinate with CDFG to identify where to relocate western pond turtles. The Project Biologist will coordinate specific trapping and relocation protocols with CDFG for adults, hatchlings, and eggs prior to ground-disturbing activities.

Bio-MM#28: Conduct Pre-Construction Surveys and Monitoring for Raptors. Prior to ground-disturbing activities, the Project Biologist or designee will conduct pre-construction surveys for nesting raptors if construction and habitat removal activities are scheduled to occur during the breeding season (February 1 to August 15). The Project Biologist or designee will conduct surveys in areas within 300 feet of the construction footprint. Modify the required survey dates based on local conditions. If breeding raptors with active nests are found, establish a 300-foot buffer around the nest and phase construction activities within the buffer(s) until the young have fledged from the nest or the nest is abandoned.

Bio-MM#29: Conduct Pre-Construction Surveys and Delineate Active Nest Exclusion Areas For Other Breeding Birds. In the event active bird nests are encountered during the pre-construction survey, the Project Biologist or designee will determine the nest avoidance buffer zones as appropriate. The Project Biologist or designee will coordinate with the Contractor's Biologist to establish the suitable buffers consistent with the intent of the MBTA and as determined by the Project Biologist. The Project Biologist or designee will delineate nest avoidance buffers established for ground nesting birds in a manner that does not create predatory bird perch points in close proximity (150 feet) to the active nest site. The Project Biological Monitor will monitor weekly active bird nests or more frequently pending status of nest and status of fledgling development. The Contractor's Biologist will maintain the nest avoidance buffer zone until nestlings have fledged or the nest is abandoned.

Bio-MM#30: Raptor Protection on Power Lines. During final design, the Contractor will verify that the catenary system and masts are designed to be raptor-safe, in accordance with the Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006 (Avian Power Line Interaction Committee 2006). The Project Biologist will check the final design drawings and submit a memorandum to the Mitigation Manager documenting compliance.

Bio-MM#31: Conduct Pre-Construction Surveys for Swainson's Hawks. The Project Biologist or designee will conduct pre-construction surveys for Swainson's hawks during the nesting season (March 1 through September 15) within the construction footprint and within a 0.5-mile buffer. The Project Biologist or designee will conduct the pre-construction nest surveys at least 30 days prior to ground-disturbing activities and phase with project construction. The pre-construction surveys will determine the status (i.e. active, inactive) of the nest.

Bio-MM#32: Swainson's Hawk Nest Avoidance. If active Swainson's hawk nests (defined as a nest used one or more times in the last 5 years) are found within 0.5 mile of the construction footprint during the nesting season (March 1 to September 15), the Contractor's Biologist will implement buffers restricting construction activities, following CDFG's Staff Report Regarding Mitigation for Impacts to Swainson's Hawks (Buteo swainsoni) in the Central Valley of California (CDFG 1994). Adjustments to the buffer(s) will require prior approval by CDFG as coordinated by the Project Biologist.

Bio-MM#41: Conduct Pre-Construction Surveys for San Joaquin Kit Fox. The USFWS' Standardized Recommendations for Protection of the San Joaquin Kit Fox Prior to or During Ground Disturbance (USFWS 1999c) will be implemented as follows for construction related impacts. Prior to the start of ground-disturbing activities, the Project Biologist or designee will conduct pre-construction

surveys in accordance with the USFWS' San Joaquin Kit Fox Survey Protocol for the Northern Range (USFWS 1999b). The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance.

Bio-MM#42: Minimize Impacts on San Joaquin Kit Fox. The Contractor's Biologist will Implement USFWS' Standard Measures for Protection of the San Joaquin Kit Fox Prior to or During Ground Disturbance (USFWS 1999c) to minimize ground disturbance-related impacts to this species. The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance.

Bio-MM#43: Restore Temporary Impacts on Jurisdictional Waters. See previous summary of this mitigation measure.

Bio-MM#44: Monitor Construction Activities within Jurisdictional Waters. See previous summary of this mitigation measure.

Bio-MM#45: Wildlife Corridor Undercrossing (Planning/Refinement). In response to the California Department of Fish and Game (Department) letter (October 13, 2011 RE: SCH No. 2009091125 Final EIR/EIS comment letter) regarding wildlife movement the Authority and its regional consultant met with the Department on January 11, 2012 to discuss the Wildlife Permeability Approach (WPA). The Authority presented the original overall approach for mitigating potential landscape permeability and wildlife movement impacts for the Merced to Fresno Section. The Department identified that other opportunities may exist for wildlife movement and provided some direction to the Authority.

Bio-MM#46: Wildlife Corridor Undercrossing (Implementation). During ground-disturbing activities, the Contractor will install wildlife corridor undercrossing(s) at the designated locations shown on the construction drawings. To the extent feasible, water crossing structures (those serving either constructed or natural watercourses) should be designed to also accommodate wildlife passage.

Bio-MM#47: Install Wildlife Fencing. Prior to operation of the HST, the Contractor's Biologist will install free-ranging mammal-proof fencing along portions of the proposed project that are adjacent to wildlife movement corridors consistent with final design. The Project Biologist will verify that the installation is consistent with the designated terms and conditions in the applicable permits. The Project Biologist will prepare and submit a memorandum to the Mitigation Manager documenting compliance.

Bio-MM#48: Construction in Wildlife Movement Corridors. Before ground-disturbing activities, the Contractor's Biologist will submit a construction avoidance and minimization plan for the Eastman Lake-Bear Creek ECA to the Project Biologist for concurrence. During ground-disturbing activities, the Contractor will keep the Eastman Lake-Bear Creek ECA riparian corridors (including Deadman and Dutchman Creeks) free of all equipment, storage materials, construction materials, and any significant potential impediments. The Contractor will minimize ground-disturbing activities within the Eastman Lake-Bear Creek ECA riparian corridors (Deadman and Dutchman Creeks) during nighttime hours to the extent practicable. In addition, keep nighttime illumination (e.g., for security) from spilling into the ECA or shield nighttime lighting to avoid illumination spilling into the ECA. Inspections will verify compliance and the Project Biologist will report through an appropriate memorandum to the Mitigation Manager.

Bio-MM#49: Compensate for Permanent Riparian Impacts. See previous summary of this mitigation measure.

Bio-MM#51: Implement Conservation Guidelines During the Project Period for Valley Elderberry Longhorn Beetle. The Authority or its designee will conduct compensatory mitigation for the valley elderberry longhorn beetle, including transplantation and replacement of elderberry shrubs, and maintenance for replacement shrubs, following the USFWS' Conservation Guidelines for the Valley Elderberry Longhorn Beetle (USFWS 1999a). The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance.

Bio-MM#52: Compensate for Impacts on California Tiger Salamander. The Authority or its designee will determine compensatory mitigation for the temporary and permanent loss of suitable upland and aquatic breeding habitat through agency consultation with the USFWS and CDFG.

Bio-MM#53: Compensate for Loss of Swainson's Hawk Foraging Habitat. To compensate for the loss of Swainson's hawk foraging habitat, the Authority or its designee will provide compensatory mitigation that follows the ratios recommended by CDFG's (1994) Staff Report Regarding Mitigation for Impacts to Swainson's hawks in the Central Valley.

Bio-MM#54: Compensate for Loss of Burrowing Owl Foraging and Breeding Habitat. The Authority or its designee will provide base compensatory mitigation for the temporary and permanent loss of foraging and breeding habitat on the number of western burrowing owl pairs or individuals affected. Compensation will be at a 6.5:1 ratio (acres of habitat: number of pairs or individuals). Mitigate each occupied burrow destroyed by enlarging or enhancing existing unsuitable burrows at a 2:1 ratio based on CDFG's (1995) Staff Report on Burrowing Owl Mitigation. The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance.

Bio-MM#55: Compensate for Destruction of Natal Dens. The Authority or its designee will mitigate the destruction of kit fox natal dens by the purchase of suitable, approved habitat (USFWS and CDFG). Replace habitat at a minimum of 1:1 acre of habitat in order to provide additional protection and habitat in a location consistent with the recovery of the species. Mitigate the impacts on San Joaquin kit fox in accordance with the USFWS Biological Opinion and/or CDFG 2081(b). The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance.

Bio-MM#56: Conduct Delineation of Jurisdictional Waters and State Streambeds. See previous summary of this mitigation measure.

Bio-MM#57: Prepare and Implement a Habitat Mitigation and Monitoring Plan. See previous summary of this mitigation measure.

Bio-MM#58: Compensate for Permanent Impacts on Jurisdictional Waters. See previous summary of this mitigation measure.

Bio-MM#60: Wildlife Corridor Artificial Dens. To prevent predation by larger predators (e.g., coyotes, bobcats, red foxes, and dogs) at wildlife undercrossings, the Contractor's Biologist will install artificial dens at each dedicated wildlife crossing structure to provide escape cover for wildlife (e.g., San Joaquin kit foxes). The Project Biologist will submit a memorandum to the Mitigation Manager documenting compliance.

Bio-MM#61: Monitoring and Reporting of Wildlife Corridor Undercrossings. Prior to final design, the Authority or its designee will prepare the Wildlife Corridor Monitoring Program which will document wildlife usage of the undercrossing(s). The Authority or its designee will monitor and report the wildlife usage of the designated undercrossings during operation of the project consistent with the methods identified in the Wildlife Corridor Monitoring Program.

Bio-MM#62: Compensate for Impacts to Protected Trees. The Contractor will compensate for impacts, including removal or trimming of native protected trees and landscape or ornamental trees, according to the various city and county policies, ordinances, and regulations through one of the following:

- The Contractor will transplant all directly affected protected trees that are judged by the arborist to be in good condition to a suitable site outside the zone of impact.
- The Contractor will replace all directly affected protected trees at onsite or offsite locations, based on the number of protected trees removed, at a ratio to be determined through consultation with the

various city and county governmental agencies, but not to exceed 3:1 for native trees or 1:1 for landscape or ornamental trees.

The Authority will contribute to a city or county tree-planting fund within the jurisdiction of a regulatory agency.

Conclusion for Construction Special-Status Wildlife Impacts

Although actions determined to have an adverse impact under NEPA may be mitigated and have a lesser effect, for special-status wildlife, the effect determination remains potentially adverse if mitigated if special-status wildlife are found inside or within the area of indirect effect of the project footprint. The effect determination will vary depending on the results of focused special-status wildlife surveys.

The Authority and FRA have prepared a Compensatory Mitigation Plan (CMP) as part of the Checkpoint C package (Appendix D) that summarizes potential avenues for mitigation. The Authority and FRA have also prepared a draft Mitigation Strategy and Mitigation Plan (MSIP) that proposes a specific mitigation plan to mitigate for impacts from construction and operation of the Hybrid Alternative to sensitive habitats (jurisdictional wetlands) and habitats suitable for use by federally and state-listed plant and wildlife species (a partial draft of the MSIP is provided in Appendix D of this Checkpoint C Summary Report). The proposed mitigation plan in the MSIP will be subject to review and approval by the permitting agencies prior to permit issuance. The Authority will also be responsible for presenting financial assurances to the agencies to ensure that all required mitigation will be implemented. Consult the CMP and the MSIP for a detailed discussion of proposed mitigation and monitoring for construction and operation of the Hybrid Alternative.

7.2.4 Municipal and Private Water Supplies, Including Aquifer Recharge (40 CFR Section 230.50; 230.76)

7.2.4.1 Construction- and/or Fill-Related Impacts, Mitigation Measures, Significance with Mitigation

Construction activities would use water to prepare concrete, to increase the water content of soil to optimize compaction, to control dust, and to re-seed disturbed areas. The difference in water demand between the alternatives is a function of the total guideway length and type. The BNSF Alternative with the Ave 24 Wye would consume the most water during construction (approximately 644 acre-feet annually); the Hybrid Alternative with the Ave 24 Wye would consume the least (approximately 513 acre-feet annually). A variety of sources would provide water, depending on the alternative constructed. Existing annual water use that would be displaced/terminated by the project (e.g., irrigated farmland that would convert to track alignment) is estimated between 4,892 acre-feet for the UPRR/SR 99 Alternative and 6,703 acre-feet for the BNSF Alternative. Therefore, average annual water use over the construction period would be less than existing demand and could be supplied from existing sources. For this reason, HST construction would require neither construction nor expansion of a water treatment facility and would also not require new or expanded entitlements. Impacts resulting from water demand would be negligible.

7.2.4.2 Secondary/Operational Impacts, Mitigation Measures, Significance with Mitigation

The HST alignment alternatives would not use substantial quantities of water in their operations. As described in EIR/EIS Section 3.6 (Public Utilities and Energy), current water use on the alignment footprint ranges from 4,892 acre-feet per year (UPRR/SR 99 Alternative) to 6,703 acre-feet per year (BNSF Alternative). Water use would decline to zero along the alignment footprint, and therefore all HST alternatives would have a beneficial impact on groundwater quality under both NEPA and CEQA.

Operational water supply at HST stations would be required for a variety of uses, including drinking fountains and restrooms in HST stations, irrigation for landscaping, and wash water for HSTs and facility maintenance. HST station water use estimates are based on a daily consumption factor of 5 gallons per passenger and 30 gallons per employee. Landscaping developed in conjunction with local communities would use native and drought tolerant plants (i.e., xeriscape) and would consist of a narrow (approximately 3 feet wide) strip along sidewalks and roadways. The Downtown Merced and Fresno HST stations would continue to be supplied with treated water from their respective municipal water supplier: the City of Merced, Division of Water Supply, and the City of Fresno, Water Division. The projected water demand at the Downtown Merced HST station (15 acre-feet per year) would be less than the current demand. Water demand at the Fresno HST station (47 acre-feet per year) would increase, because of the largely undeveloped nature of the land and the high rate of passenger boarding expected at the station. All alternatives use the same stations, and therefore there is no different among the alternatives in terms of station water use.

Overall annual operational water requirements are anticipated to be approximately 1.5% of the existing water usage in the entire study area that would be replaced by HST facilities. The project is not expected to require or result in the construction of new water treatment facilities or expansion of existing facilities, nor require new or expanded entitlements to supply water to the project; therefore, the project impact on water supplies would be negligible.

7.2.4.3 Cumulative Impacts, Mitigation Measures, Significance with Mitigation

The addition of 352,000 households under the cumulative condition of the No Project Alternative would require 4.48 billion gallons of potable water per year, assuming 127,400 gallons per household annually (American Water Works Association 2010). Commercial and industrial development would also generate increased water demand which would be projected by water providers and approved through a permitting process. As with many communities throughout California, more conservation measures would be required to reduce water demand during multiple years of drought.

In comparison, operation of the HST alternative alignments would result in an annual water requirement of approximately 1.5% of existing water usage in the construction footprint, and demand for the station alternatives would be less than 0.01% of the total projected water demands of the municipalities that would serve the sites. There would be insignificant increases in the use of potable and nonpotable water from the proposed HST stations and HMF. The additional demand because of the project in conjunction with the No Project Alternative and other reasonably foreseeable projects would not contribute to substantial or cumulatively considerable water resource impacts.

As described in the 2005 Statewide Program EIR/EIS and the 2008 Bay Area to Central Valley Program EIR/EIS, the extension of facilities and provision of water services for the entire HST System as a whole would have less than significant impacts and would not contribute to a substantial or cumulatively considerable impact from water demand, or a substantial or cumulatively considerable impact related to provision of water infrastructure.

7.2.5 Recreational Or Commercial Fisheries (40 CFR Section 230.51)

No commercial fisheries exist within or near the areas where the proposed project would cross the waters identified in Table 7.2-6, below. While there may be some informal recreational fishing that takes place within these waters, no formalized recreational fishing facilities exist within the proposed project area[3]. The nearest formal fishing facilities are located at Lake Yosemite (upstream and outside of the project limits approximately 8 miles northeast of Merced), at Eastman Lake (located upstream and outside the

[3] Sources: California Department of Fish and Game at http://www.dfg.ca.gov/fish/Fishing/ accessed February 11, 2012; Take Me Fishing at http://www.takemefishing.org/fishing/select-a-state/places/state/CA. Accessed February 11, 2012.

project limits 20 miles northeast of Chowchilla) at Hensley Lake (located upstream and outside of the project limits approximately 17 miles northeast of Madera), and Hidden Lake Recreation Area (upstream and outside of the project limits at Friant Dam approximately 10 miles outside of Fresno east of Highway 41). The San Joaquin River area near the Hidden Lake Recreation Area is the only water body within the project limits that is planted with fish by the California Department of Fish and Game (CDFG). See Figure 7.2-1.

Table 7.2-6
Natural Water Body Crossings

Natural Water Body Name	Alternative/Project Component								
	UPRR/SR 99			BNSF			Hybrid		
	North-South Alignment	Ave 24 Wye	Ave 21 Wye	North-South Alignment	Ave 24 Wye	Ave 21 Wye	North-South Alignment	Ave 24 Wye	Ave 21 Wye
Miles Creek	X			X			X		
Owens Creek	X			X			X		
Duck Slough	X			X[a]			X		
Mariposa Creek				X[b]					
Deadman Creek	X			X			X		
Dutchman Creek	X	X		X			X		
Chowchilla River	X	X		X			X		
Ash Slough	X	X			X		X	X	
Berenda Slough	X	X	X	X	X	X	X	X	X
Berenda Creek	X		X	X	X	X	X		X
Dry Creek	X			X	X	X	X		
Schmidt Creek	X			X			X		
Fresno River	X			X			X		
Cottonwood Creek	X			X			X		
San Joaquin River	X			X			X		

[a] Mariposa Way design option only. At the Mission Ave design option, this water body is called Mariposa Creek.

[b] Mariposa Way and Mariposa Way East of Le Grand design options only.

The closest CDFG fish hatcheries are similarly located well outside and upstream of the proposed project. The Merced River Hatchery is located on Highway 59, 19 miles northeast of Merced. The San Joaquin Hatchery is located on Highway 41 at Friant, 12 miles north east of Fresno. While there are "fishing lakes" at Roeding Park near the junction of SR-99/SR-180 in Fresno, these waterbodies are features created during construction of the park and are not Waters of the U.S. They will also not be directly or indirectly impacted by the proposed project. Therefore, the proposed project would not cause any direct impacts to recreational or commercial fisheries. In addition, because the proposed project is located substantially downstream from the above-identified hatcheries and location of fish planting, the proposed project also would not have any indirect effects to recreational or commercial fisheries and would not contribute to any cumulative impacts related to fisheries.

Figure 7.2-1
Project Limits Commercial Fishing Areas

Accessed at: www.takemefishing.org
Date: February 11, 2011

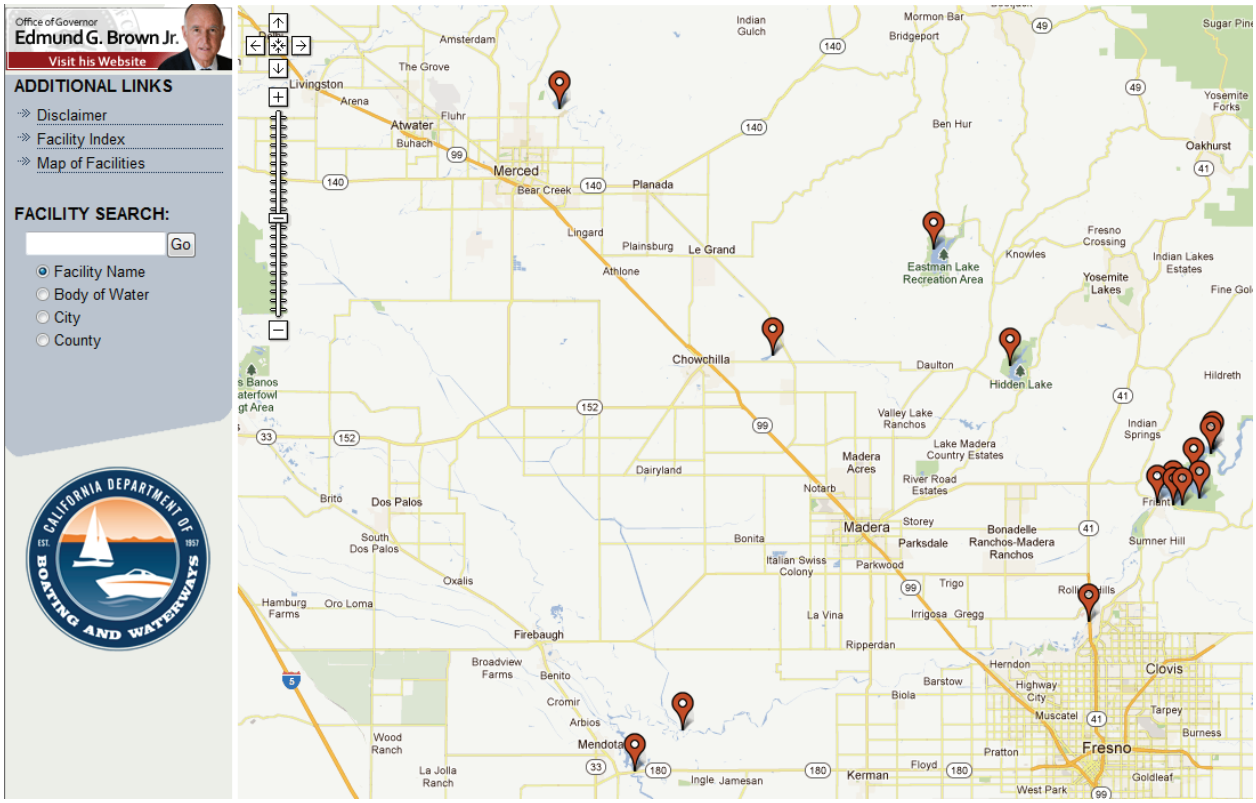
7.2.6 Other Water-Related Recreation (40 CFR Section 230.52)

There are no formalized recreation facilities at the locations where the proposed project crosses the waters listed in Table 7.2-6.[4] As discussed above, some formalized recreational facilities, such as fishing facilities, exist at Lake Yosemite, Eastman Lake, Hensley Lake, Hidden Lake Recreation Area, which are located well outside the proposed project area. Roeding Park has water-related recreational activities but the waterbodies are not Waters of the U.S. and park would not be directly or indirectly impacted by the proposed project. Berenda Reservoir which is located four miles east of Chowchilla on Avenue 26 is a seasonal water feature situated on six acres offering opportunities for summer recreational activities. The

[4] Ibid. Also California Department of Boating and Waterways at http://www.dbw.ca.gov/maps/inlinemap.asp accesse February 11, 2012.

site includes a Rotary Club BBQ shelter, Scout Island, a boat launch, beach swimming areas, and restrooms. It is only open during the summer months and is controlled by USACE and the Chowchilla Water District. The reservoir would not be directly impacted by the proposed project. The Hybrid Alternative with Ave 21 wye crosses about 2.7 miles downstream (on viaduct). The Hybrid Alternative with Avenue 24 wye crosses about 4.75 miles downstream (on bridge). Because the proposed project would cross downstream and well away from the reservoir, there would be no direct, indirect or cumulative impacts to this recreational resource. Please see January 7, 2010 Memorandum on Berenda Reservoir prepared by CH2M HILL for additional information. A search of the California Department of Boating and Waterways, did not yield any additional boating facilities within the proposed project limits. See Figure 7.2-2. Therefore, the proposed project would not cause any direct, indirect or cumulative impacts to other water related recreation.

Figure 7.2-2
Project Limits Boating Facilities



Source: California Department of Boating and Waterways at http://www.dbw.ca.gov/maps/inlinemap.asp Accessed February 11, 2012

7.2.7 Aesthetics of the Aquatic Ecosystem (40 CFR Section 230.53)

7.2.7.1 Construction and/or Fill Related Aesthetic Impacts, Mitigation Measures, and Significance with Mitigation

<u>Construction Aesthetic Impacts</u>

Construction activities would cease after completion. Therefore, aesthetic impacts from these activities for the Hybrid Alternative are considered temporary and impacts with negligible intensity under NEPA and less than significant under CEQA. Chapter 2, Alternatives, of the EIR/EIS describes the duration of temporary construction activities, which would include pile driving, partial or total road and lane closures,

detours (vehicular and pedestrian), partial/limited vehicle access on nearby roads, materials and equipment deliveries, and potentially establishing one or more concrete batch plants, where concrete would be prepared for use in nearby project construction. Construction of large roadway overcrossings and changes to SR 99 may be shorter in duration. Most of the staging sites would be located in right-of-way adjacent to the proposed HST alignment in areas that are generally rural or industrial in nature. Equipment and earthmoving activities are not visually intrusive in these types of settings. In urban areas, staging areas would be largest at the HST stations. Both HST stations would be adjacent to the UPRR right-of-way, where adjacent land uses are accustomed to freight and industrial movements.

The Hybrid Alternative will require the crossing of aesthetic streams and aquatic ecosystems, which generally have high aesthetic value. The Hybrid Alternative would have the fewest number of stream crossings when including the Ave 24 wye design option; otherwise, the north-south alignments of the alternatives have an equal number of stream crossings. Dredge and fill activities, if necessary, in those areas could involve bridge piles and would be located well away from the stream bank as feasible.

According to Section 3.9, Geology, Soils, and Seismicity, of the EIR/EIS, operation of the project alternatives on soft or loose soils could result in onsite or offsite slumps and small slope failures at stream crossings, instability of cut-and-fill slopes required for the track, or collapse of retaining structures associated with retained cuts or retained fills. The aesthetic and geotechnical effects of which are impacts with negligible intensity under NEPA and less than significant under CEQA with standard engineering design measures.

The following temporary aesthetic impacts would be common during the construction period for the Hybrid Alternative alternatives and would result in adverse effects near residences, parks, and areas where people congregate, specifically where viewers are assumed to have high visual sensitivity:

- The project would create new sources of light and glare that may temporarily affect day and nighttime views. Construction lighting would result in temporary impacts on areas surrounding construction activities. Lighting associated with nighttime construction would affect aesthetics and visual resources through an increase in ambient light, which may adversely affect nighttime views. This may be an annoyance not only in urban areas, such as Merced and Fresno, but also in residential areas along the alignment.

- Construction activities could create visual nuisance in some urban areas, particularly in areas adjacent to residential and historical resources. Construction equipment, earthmoving, constructing structures, and concrete plant operations may degrade the visual aesthetics for adjacent viewers. Construction can cause dust, and material stockpiles can create an untidy appearance, collectively degrading the visual unity and intactness of the surroundings.

Visual degradation from construction would last longer and be more noticeable in urban areas adjacent to residences and parkways. The Hybrid Alternative would substantially but temporarily affect the Merced and Fresno downtown areas during construction. The Hybrid Alternative would affect only the Merced and Fresno downtown areas and Madera Acres; whereas the UPRR/SR 99 Alternative would also affect Downtown Madera, and the BNSF Alternative would affect Le Grand and Madera Acres.

Construction Aesthetic Mitigation Measures

The two construction mitigation measures listed below for aesthetics and visual resources are consistent with mitigation measures for similar scale transportation projects, and have proven to be effective in minimizing the construction impacts noted above. For the Hybrid Alternative, mitigation measures for construction would be as follows:

- **Minimize Visual Disruption During Construction and from Construction Activities.** Adhere to local jurisdiction construction requirements (if applicable) regarding construction-related

visual/aesthetic disruption. In order to minimize visual disruption, construction will employ the following activities:

- Minimize pre-construction clearing to that necessary for construction.
- Limit the removal of buildings to those that would obstruct project components.
- When possible, preserve existing vegetation, particularly vegetation along the edge of construction areas that may help screen views.
- After construction, regrade areas disturbed by construction, staging, and storage to original contours and revegetate with plant material similar (in replacement numbers and types) to that which was removed upon completion of construction based upon local jurisdictional requirements. If there are no local jurisdictional requirements, replace removed vegetation at a 1:1 replacement ratio for shrubs and small trees, and 2:1 replacement ratio for mature trees. For example, if 10 mature trees in an area are removed, replant 20 younger trees that would provide similar cover prior to construction, and which may be thinned as they mature.
- To the extent feasible, do not locate construction staging sites within immediate foreground distance (0 to 500 feet) of existing residential, recreational, or other high-sensitivity receptors. Where such siting is unavoidable, screen staging sites from sensitive receptors using appropriate solid screening materials such as temporary fencing and walls. Any graffiti or visual defacement of temporary fencing and walls will be painted over or removed within 5 business days.

- **Minimize Light Disturbance During Construction.** Where construction lighting will be required during nighttime construction, shield such lighting and direct it downward in such a manner that the light source is not visible offsite, and so that the light does not fall outside the boundaries of the project site to avoid light spillage offsite.

Conclusion

Construction aesthetic impacts for the Hybrid Alternative would be temporary and impacts with negligible intensity under NEPA and less than significant under CEQA. See Section 3.16.5.3 of the EIR/EIS for additional information regarding construction aesthetic impacts.

7.2.7.2 Secondary/Operational Aesthetic Impacts, Mitigation Measures, Significance with Mitigation

Operational Aesthetic Impacts

The HST alternatives have common components that operationally can have direct aesthetic impacts by changing the character of the landscape and lowering existing visual quality. Because no officially designated state scenic highways exist near the Hybrid Alternative, no common impacts on such resources exist, and they are not discussed further. Similarly, impacts related to new light and glare sources are not discussed further, as project design features would avoid and minimize impacts. The proposed HST stations in Merced and Fresno that would serve the Hybrid Alternative would be designed to direct lighting downward, and there would be no overhead lights on the HST guideway. Train lights would be directed toward the guideway. Shadows manifest from tall and planar components of the HST, particularly piers, retaining walls, and sound barriers. However, the duration and size of shadows vary throughout the day and so does their effect, which would be an impact with negligible intensity under NEPA and less than significant under CEQA.

Sound barriers are required to mitigate impacts from noise (see Section 3.4, Noise and Vibration, of the EIR/EIS). Sound barriers, as well as retaining walls, can be visual barriers and can contribute to visual degradation, especially when installed at-grade and in proximity to moderately to highly sensitive viewers. Their impact will vary depending upon their design, height, and location. However, sound barriers at ground level are typically installed in urban areas containing features in the landscape such as

buildings, trees, signs, vehicles, overpasses, etc., that already block or intrude on scenic views (which, when present, are often distant views). Existing features also can block views of the ground-level sound barriers. The final locations, materials, and physical appearance of the sound barriers have not yet been determined, but could be colored and textured to be sensitive to context.

The HST stations in Merced and Fresno would create a beneficial change in visual character when viewed from adjacent downtown locations. The indirect effects of the project would be most noticeable at the HST stations and are expected to result in an overall increase in visual quality. The HST Project would also increase the potential for economic incentives through new development and redevelopment in areas near the HST stations. This is because the HST Project would create a new destination attraction and energize areas near it as a result of people either using HST or being drawn to the HST station areas. This would likely influence development patterns near the stations and could result in new projects and urban design improvements that would increase the appeal of these areas over time. In residential, railroad, highway, and industrial areas, no indirect effects are anticipated.

Each of the HST alternatives would create aesthetic impacts in at least one of the 14 landscape units analyzed for the project. The aesthetic impacts to landscape units were determined from the analysis of key viewpoints in each landscape unit, and the key viewpoints' level of impact and representation of the landscape character. In accordance with FTA and FRA aesthetic protocols, aesthetic impacts were categorized as no impact, impact with moderate intensity (change in visual quality but not large enough nor level of viewer sensitivity for an impact with substantial intensity), or severe impact (large change in visual quality and moderate or high level of viewer sensitivity). Detailed information regarding aesthetic impacts can be found in Section 3.16.5.3 of the EIR/EIS.

The north-south alignment of the Hybrid Alternative would result in the lowest overall number of landscape units traversed (7) and determined to have substantial and significant impacts (1) to aesthetics and visual resources, as shown in Table 7.2-7. Each alternative would have impacts to one more landscape unit (West of SR 99) as a result of the wye options (HMF landscape units not included). EIR/EIS Sections 3.12 (Socioeconomics, Communities, and Environmental Justice), 3.15 (Parks, Recreation, and Open Space), and 3.17 (Cultural Resources) also identify operational impacts to aesthetics of those resources at particular locations for the Hybrid Alternative.

Operational Aesthetic Mitigation Measures

Mitigation measures for operational impacts of the Hybrid Alternative to aesthetics and visual resources are consistent with those approaches discussed in FHWA Chapter 7 (1988) visual impacts guidance manual, which discusses various landscapes and elements of the built and natural environments associated with similar scale transportation projects to the HST. The manual indicates (page 101) that highway agencies must coordinate environmental assessment activities with subsequent project design, construction, and maintenance phases to ensure the full realization of any mitigation actions. The mitigation measures have proven to be effective in minimizing the operational impacts noted above.

Incorporate Design Criteria for Elevated and Station Elements That Can Adapt to Local Context. The Authority's Urban Design Guidelines for the California High-Speed Train Project briefly discusses the principles of context-sensitive solutions to guide the design of stations. This approach is equally applicable to elevated guideways of the Hybrid Alternative and will be employed to mitigate visual impacts through context-sensitive design. Aesthetic Guidelines for Non-Station Structures (TM 200-06) will also guide design of the HST components.

Table 7.2-7
Aesthetic Impacts That Differentiate Among North-South HST Alternatives and Design Options

North-South Alignment Isolated and with Wye Design Option	HST Alternatives and Design Options							
	UPRR/SR 99 Alternative		Hybrid Alternative		BNSF Alternative			
					Mariposa Way Design Options		Mission Ave Design Options	
	East Chowchilla Design Option	West Chowchilla Design Option	East Chowchilla Design Option	West Chowchilla Design Option	Le Grand	East of Le Grand	Le Grand	East of Le Grand
AESTHETICS AND VISUAL RESOURCES								
Construction-Period Impacts – No differentiating significant construction-period impacts between alternatives								
Project Impacts								
Number of landscape units with substantial and significant impacts to aesthetics and visual resources.								
North-South Alignment	2	2	1	1	4	4	4	4
With Ave 24 Wye	3	3	NA	2	5	5	5	5
With Ave 21 Wye	3	NA	2	NA	5	5	5	5

During final design of elevated guideways and the Merced and Fresno stations, the Authority will coordinate with local jurisdictions on the design of these facilities so that they are designed appropriately to fit in with the visual context of the areas near them. This will include the following activities:

- **For stations:** establish two station design working groups, one with the City of Merced and the other with the City of Fresno, during the station design process to identify and integrate local design features into the station design through a collaborative context-sensitive solutions approach. The working groups will meet on a regular basis to develop a consensus on the urban design elements to be incorporated into the stations' designs. During this process, the working groups will host joint workshops in their respective station areas to solicit community input. This effort will be coordinated with the station area planning process that will be undertaken by those cities under their station area planning grants.

- **For elevated guideways in cities or unincorporated communities:** establish a guideway design working group with the city or county with jurisdiction over the land along the elevated guideway during the process of advancing the final design through a collaborative context-sensitive solutions approach. The working groups will meet on a regular basis to develop a consensus on the urban design elements to be incorporated into the final guideway designs. During this process, the working groups will host joint workshops in the affected neighborhoods to solicit community input.

Actions taken to help achieve integration with the local design context during the context-sensitive solutions process will include the following:

- Design HST stations and associated structures such as elevators, escalators, and walkways to be attractive architectural elements or features that add visual interest to the streetscapes near them.
- Design HST station parking structures and adjacent areas to integrate visually into the areas where they would be located. Where the city has adopted applicable downtown design guidelines, the parking structures and adjacent areas will be designed to be compatible with the policies and principles of those guidelines.
- For the elevated guideways and columns, incorporate architectural elements, such as graceful curved or tapered sculptural forms and decorative surfaces, to provide visual interest. Include decorative texture treatments on large-scale concrete surfaces such as parapets and other portions of elevated guideways. Include a variety of texture, shadow lines, and other surface articulation to add visual and thematic interest. Closely coordinate the design of guideway columns and parapets with station and platform architecture to promote unity and coherence where guideways lie adjacent to stations. The designs within cities and unincorporated communities will reflect the results of the context-sensitive solutions design process.
- Integrate trees and landscaping into the station streetscape and plaza plans where possible to soften and buffer the appearance of guideways, columns, and elevated stations. This will be consistent with the principles of crime prevention through environmental design.
- For the stations, structures, and related open spaces: incorporate design features that provide interest and reflect the local design context. These features could include landscaping, lighting, and public art.

During the context-sensitive solutions design process, the HST Project's obligations and constraints related to planning, mitigation, engineering, performance, funding, and operational requirements will be taken into consideration.

Integrate the Elevated Guideways with Affected City Parks, Trails, and Urban Core Design Guidelines. During development of the final design, the Authority will work with the affected cities and counties to develop a project site and landscape design plan for the areas disturbed by the project. These plans will implement the design features as a result of other mitigation above. Where park properties will be acquired for the HST Project, the Authority will provide financial compensation to the city or county within which the park property is located for the purchase and development of equivalent park property within the city or unincorporated area. Where appropriate, and as consistent with the design features, the Authority will work with the applicable city or county to develop pedestrian trails or paths under the elevated guideways.

In urbanized areas, the Authority will establish a land use working group with the affected cities and counties (for unincorporated communities) to determine the appropriate and allowable development or use of areas within the HST right-of-way under the guideways. The city or county will be responsible for amending its zoning ordinance, if necessary, to provide for these uses. This zoning would include provisions to implement the design features developed under other mitigation above.

Screen Elevated Guideways Adjacent to Residential Areas. Consistent with the design features developed for other mitigation above, the Authority will plant trees along the edges of the rights-of-way in locations adjacent to residential areas. This will help reduce the visual contrast between the elevated guideway and the residential area. The species of trees to be installed will be selected on the basis of their mature size and shape, growth rate, hardiness, and drought tolerance. No species that is listed on the Invasive Species Council of California's list of invasive species will be planted. The crowns of trees used should ultimately be tall enough so that upon maturity they will partially, or fully, block or screen views of the elevated guideway from adjacent at-grade areas. Trees should allow ground-level views under the crowns (with pruning if necessary) while not interfering with the 15-foot clearance requirement

for the guideway. The trees will be continuously maintained and appropriate irrigation systems will be installed within the tree planting areas.

Replant Unused Portions of Lands Acquired for the HST. After construction is complete, the Authority will plant vegetation within lands acquired for the project (e.g., shifting roadways) that are not used for the HST or related supporting infrastructure. Plantings will allow adequate space between the vegetation and the HST alignment and catenary lines. All street trees and other visually important vegetation removed in these areas during construction will be replaced with similar vegetation that, upon maturity, will be similar in size and character to the removed vegetation. The vegetation will be continuously maintained and appropriate irrigation systems will be installed within the planting areas. No species that is listed on the Invasive Species Council of California's list of invasive species will be planted. The landscaped areas will be continuously maintained and appropriate irrigation systems will be installed.

Provide Landscape Treatments along the HST Project Overcrossings and Retained Fill Elements of the HST. Upon the completion of construction, the Authority will plant the surface of the ground supporting the overpasses (slope-fill overpasses) and retained fill elements with vegetation consistent with the surrounding landscape in terms of vegetative type, color, texture, and form. During final design, the Authority will consult with the affected cities and counties regarding the landscaping program for planting the slopes of the overcrossings and retained fill. Plant species will be selected on the basis of their mature size and shape, growth rate, and drought tolerance. No species that is listed on the Invasive Species Council of California's list of invasive species will be planted. The landscaping will be continuously maintained and appropriate irrigation systems will be installed, if needed. Where wall structures supporting the overpasses or retained fill are proposed, the structure will employ architectural details and low-maintenance trees and other vegetation to minimize graffiti and reduce the effects of large walls. Apply surface coatings on wood and concrete to facilitate cleaning and the removal of graffiti. Any graffiti or visual defacement or damage of fencing and walls will be painted over or repaired within 5 business days.

Provide Sound Barrier Treatments. The Authority will design a range of sound barrier treatments for visually sensitive areas, such as areas where residential views of open landscaped areas would change or in urban areas where sound barriers would adversely affect the existing character and setting. The Authority will develop the treatments during final design and integrate them into the final project design. The treatments will include, but are not limited to, the following:

- Sound barriers along elevated guideways may incorporate transparent materials, where sensitive views would be adversely affected by solid sound barriers.
- Sound barriers will use non-reflective materials and will be of a neutral color.
- Surface design enhancements and vegetation appropriate to the visual context of the area will be installed with the sound barriers. Vegetation will be installed consistent with the provisions of other mitigation above. Surface enhancements will be consistent with the design features developed under other mitigation above, and will include architectural elements (i.e. stamped pattern, surface articulation, and decorative texture treatment as determined acceptable to the local jurisdiction. Surface coatings will be used on wood and concrete sound barriers to facilitate cleaning and the removal of graffiti.

Screen Traction Power Distribution Stations and HMF. Upon completion of station or HMF construction, the Authority will screen the traction power substations (which are located at approximately 30-mile intervals along any of the HST alternatives) and HMF from public view through the use of landscaping or solid walls/fences. This will consist of context-appropriate landscaping of a type and scale that does not draw attention to the station. Plant species will be selected on the basis of their mature size and shape, growth rate, hardiness, and drought tolerance. No species that is listed on the Invasive Species Council of California's list of invasive species will be planted. The landscaping will be continuously

maintained and appropriate irrigation systems will be installed within the landscaped areas. Walls will be constructed of cinder-block or similar material and will be painted a neutral color to blend in with the surrounding context. If a chain-link or cyclone fence is used, it will include wood slats in the fencing. Any graffiti or visual defacement or damage of fencing and walls will be painted over or repaired within a reasonable period as agreed between the Authority and local jurisdiction.

None of the mitigation measure options are anticipated to result in secondary effects. The mitigation measures are typical of those elements of visual treatments applied on linear transportation facilities and they have been defined to be specific and implementable according to context in coordination with local jurisdictions.

Conclusion

Operational aesthetic impacts for the Hybrid Alternative would be impacts with substantial intensity under NEPA and significant under CEQA. With full implementation of the mitigation measures, there would still be significant aesthetic impacts in some landscape units and at specific key viewpoints. See Section 3.16.5.3 of the EIR/EIS for additional information regarding operational aesthetic impacts.

7.2.7.3 Cumulative Aesthetic Impacts, Mitigation Measures, and Significance with Mitigation

Potential Cumulative Aesthetic Impacts

As described in the 2005 Statewide Program EIR/EIS (Authority and FRA 2005) and the 2008 Bay Area to Central Valley Program EIR/EIS (Authority and FRA 2008) and Section 3.16 of the Merced to Fresno EIR/EIS, the HST System would create construction-related short-term aesthetic impacts. The HST System would also create long-term aesthetic impacts from the introduction of a new transportation system.

Construction

Construction activities would create temporary visual changes from demolition, vegetation removal, construction staging areas, construction lighting, and general construction activities. Construction can have an impact with moderate intensity but temporary cumulative visual impact where multiple projects are under construction in the same area. Thus, construction visual impacts in areas such as HST station areas and along SR 99, where multiple infrastructure and development projects would be under construction for multiple years, would be an impact with moderate intensity under NEPA and cumulatively considerable under CEQA (see Section 3.19, Cumulative Impacts, of the EIR/EIS).

Operation

Section 3.19, Cumulative Impacts, of the EIR/EIS identifies a number of proposed projects that would influence the future visual character of the study area. These projects would also increase sources of evening light and glare that could degrade nighttime views. It is assumed that these developments will be suburban in character and given existing design guidelines, will likely have at least moderate visual quality. Such developments tend to offer relatively high degrees of internal unity and intactness. In some locations, views toward open spaces, agricultural fields, and the Sierra Nevada Mountains may be reduced or blocked entirely by new structures associated with the new developments. In addition to new greenfield development (which occurs on undeveloped or agricultural lands, thus changing the area's character), redevelopment activities may result in the alteration of historical structures. Such features add interest and contribute a unique character to the urban fabric of parts of the study area (see Section 3.17, Cultural and Paleontological Resources, of the EIR/EIS) and could change these viewed landscapes.

Cumulative operations visual impacts in areas surrounding HST stations would be beneficial, resulting from visually iconic stations and new development. Operations visual impacts in other areas, away from

stations and particularly along SR 99, would be impacts with moderate intensity under NEPA and not cumulatively considerable under NEPA, because visual changes would occur in viewsheds with moderate to low visual quality and lower viewer sensitivity.

Cumulative Mitigation Measures

Several city and county plans, including general plans, downtown master plans, community plans, and specific plans address aesthetic and visual resources. Policies and regulations include design guidelines, designating scenic corridors/routes and identifying areas of particular scenic value. Local community design guidelines will be addressed during the subsequent phase of detailed architectural design and system engineering for the Hybrid Alternative. The Authority will coordinate and collaborate with local jurisdictions, citizens, and community leaders in regard to the appropriate mitigation measures and local design guidelines that are most context-appropriate for the locale's built and natural environment. The HST Project will implement mitigation measures for visual resources provided in Section 3.16.6 of the EIR/EIS to minimize impacts, thereby reducing cumulative impacts. Even with the implementation of mitigation measures for the HST Project, construction visual impacts will remain impacts with moderate intensity under NEPA and cumulatively considerable under CEQA (see Section 3.19, Cumulative Impacts, of the EIR/EIS).

Conclusion

Cumulative visual impacts of constructing the Hybrid Alternative would be impacts with moderate intensity under NEPA and cumulatively considerable under CEQA. Cumulative impacts from operation of the Hybrid Alternative would be beneficial around the HST stations; in areas away from the HST stations, impacts would be impacts with moderate intensity under NEPA and not cumulatively considerable under CEQA. Cumulative aesthetic impacts would be influenced by the policies, ordinances, and aesthetic guidelines of the local jurisdictions.

7.3 Anticipated Changes Resulting from the Proposed Project to Other Resources

7.3.1 Parks, National And Historic Monuments, National Seashores, Wild And Scenic Rivers, Wilderness Areas, Research Sites (40 CFR Section 230.54)

7.3.1.1 Affected Environment

The study area for parks, recreation, and open space is defined as 1,000 feet on either side of the north-south alignments and the wyes and 0.5 mile around the station areas, HMFs, and support facilities. Please refer to the UPRR discussion for more information on the affected environment and Section 3.15 of the EIR/EIS.

There are five to six park and recreational resources within 1,000 feet, three to four resources within 300 feet, and three resources within 100 feet of the Hybrid Alternative alignment's construction footprint. Of the six resources within 1,000 feet, one is a park in Madera County and five are parks in Fresno. Table 3.15-2 of the EIR/EIS describes the six parks within 1,000 feet of the Hybrid Alternative as follows:

- One park in Madera County: Fairmead Toddler Park with Wye 24
- Five parks in Fresno

The Hybrid Alternative includes the same parks identified for the Downtown Merced Station and Downtown Fresno Station study area under the UPRR/SR 99 Alternative.

7.3.1.2 Construction Period Impacts

The Hybrid Alternative would have the same effects on parks as those previously described under the UPRR/SR 99 and BNSF alternatives for the north-south alignment immediately north of the San Joaquin River to Fresno and within the Downtown Merced and Downtown Fresno station areas. However, in contrast with the UPRR/SR 99 Alternative, the Hybrid Alternative avoids Rotary Park, Sharon Avenue Linear Park, Riverside Park, Courthouse Park, or County Road 27¾ Linear Park. The Hybrid Alternative also avoids Le Grand and would have no construction effects on Le Grand Park.

7.3.1.3 Construction Period Mitigation

There are no temporary construction uses of the park identified, therefore, mitigation is not required.

7.3.1.4 Significance of Construction Period Impacts

Under NEPA, construction impacts would be impacts with negligible intensity under NEPA and are less than significant under CEQA.

7.3.1.5 Project Period Impacts

The Hybrid Alternative north-south alignment would have the same property acquisition impacts on Camp Pashayan as the UPRR/SR 99 Alternative, resulting in a total impact of 0.6 acre as shown in Table 3.15-6 of the EIR/EIS. The Hybrid Alternative's operational impacts along its north-south alignment would be the same as those for the UPRR/SR 99 and BNSF alternatives from north of the San Joaquin River to Fresno. Operational impacts on parks in the Downtown Merced Station study area and the Downtown Fresno Station study area would also be the same. The Hybrid Alternative with the Ave 24 Wye would result in the same impacts on Fairmead Toddler Park as the UPRR/SR 99 Alternative. In contrast with the UPRR/SR 99 Alternative, but similar to the BNSF Alternative, the Hybrid Alternative would avoid Rotary Park, Sharon Avenue Linear Park, Riverside Park, Courthouse Park, and County Road 27¾ Park. The Hybrid Alternative would also avoid Le Grand Park.

7.3.1.6 Project Period Mitigation

Mitigation measures for project impacts would be the same as those listed for the UPRR/SR99 Alternative.

7.3.1.7 Significance of Project Period Impacts

The impacts would be impacts with substantial intensity under NEPA and significant under CEQA.

7.3.1.8 Cumulative Construction Period Impacts

Cumulative construction impacts along the Hybrid Alternative would be the same as those listed for the UPRR/SR 99 Alternative. Roeding Park would experience cumulatively considerable impacts from construction from the HST, the Roeding Regional Park and the Fresno Chaffee Zoo Facility Master Plan renovations, and planned auxiliary lanes on SR 99 between Clinton Avenue and Fresno Street.

7.3.1.9 Cumulative Construction Period Mitigation

None required.

7.3.1.10 Significance of Cumulative Construction Period Impacts

Except for impacts at Roeding Park, construction of other past, present, and reasonably foreseeable infrastructure and development projects would not physically alter parks in the Merced to Fresno Section,

and construction-related cumulative impacts on parks would, therefore, be impacts with negligible intensity under NEPA and less than significant under CEQA.

7.3.1.11 Cumulative Project Period Impacts

Cumulative project period impacts along the Hybrid Alternative would be the same as those listed for the UPRR/SR 99 Alternative. The Hybrid alternative would have approximately 0.6 acres property acquisition of park lands. The Hybrid Alternative would have potential for cumulative impacts to parks because it would impact parks in Fresno, where there is already a low ratio of parks to residents.

7.3.1.12 Cumulative Project Period Mitigation

Mitigation will include providing financial compensation for purchase and development of replacement park property of at least equivalent value with the property acquired or, where appropriate, enhancement of the existing facility.

7.3.1.13 Significance of Cumulative Project Period Impacts

The cumulative project period impacts of the project and other reasonably foreseeable projects on parkland projects would be considered impacts with negligible intensity under NEPA and less than significant under CEQA.

Section 4(f) uses are discussed in Subsection 7.12, below.

7.3.2 National Natural Landmarks Program (40 CFR Section 230.54)

Not applicable

7.4 Other Environmental Impacts Resulting from the Proposed Project

7.4.1 Traffic/Transportation Patterns

7.4.1.1 Construction and/or Fill Related Traffic Impacts, Mitigation Measures, Significance with Mitigation

Construction Transportation Impacts

In urban areas, including Merced, Chowchilla, Le Grand, Fairmead, Madera, Madera Acres, and Fresno, project-related construction traffic could contribute to interference with pedestrians, bicyclists, and transit. Also, construction traffic may create an operational hazard or loss of access to community facilities, although emergency access would be maintained. This includes heavy truck traffic, as materials are brought to the project site and demolished or excavated materials are hauled out. Construction activities could require temporary lane or road closures and underground utility work. Construction activities could also lead to both temporary disruption of transportation system operations and possible damage to elements of the roadway system such as pavement and bridges. Most of the HMFs would be located in less urban areas. Because project construction traffic would be temporary, any associated traffic effects would not be considered as impacts.

All truck traffic, either for excavation or for transporting construction materials to the site, would use the designated truck routes within each city. A detailed Construction Transportation Plan would be developed for the project prior to beginning any construction activities. The Construction Transportation Plan would be reviewed by the cities. Trips for construction workers would generally occur outside of the peak hours for freeway and street traffic. The proposed project may involve building remote parking areas for these workers, with shuttles to bring them to and from the construction area if the remote parking areas are

distant from the project site. Early construction of the remote parking lots as the first phase of construction would make them available for construction workers to use for the remainder of the project. The movement of heavy construction equipment such as cranes, bulldozers, and dump trucks to and from the site would generally occur during off-peak hours on designated truck routes. Once onsite, heavy construction equipment would remain there until its use for that job was completed; such equipment would not be moved repeatedly to and from the construction site over public streets.

The construction of the HST stations, platforms, and track alignment would require temporary construction easements (TCEs). The TCE may require the temporary closure of parking areas, roadway travel lanes, pedestrian facilities, bicycle lanes, and paths. Any closure or removal of parking areas, roadways, pedestrian facilities, bicycle lanes, and paths during construction would be temporary and every attempt would be made to minimize their removal or shorten the length of time that these facilities are inoperable. Upon completion of construction, all parking areas, roadway lanes, pedestrian facilities, and bicycle lanes would be restored. For TCEs that cross railroad property, the Authority would attempt to avoid affecting railroad operations, to the extent possible. Permission for temporary access on railroad property may be necessary during construction. In order to avoid affecting railroad operations during construction, the contractor would be responsible for reaching agreement on the timing and duration of activities prior to implementing a TCE on railroad property. However, because construction conditions may vary, there is a possibility for disruption to or temporary delay of railroad operations. Because the timing and duration of activities would be predetermined in agreement with the railroad, the railroad would be able to adapt their operations during construction activities, and the potential for disruption to railroad operations would be an impact with moderate intensity under NEPA and less than significant under CEQA.

Downtown Merced Station Construction Impacts on Circulation. Approximately 225 daily peak-hour trips would be added to the Merced street system during construction of the proposed project. While the actual construction schedule is not currently known and cannot be known until closer to the beginning of construction, an analysis was conducted to assess impacts. The analysis focused on the impacts of construction-related trips (material hauling, worker trips, etc.) on City of Merced intersections. Based on this analysis, the addition of construction traffic from the proposed project is projected to be noticeable at the following six intersections:

- 16th Street at SR 59
- 16th Street at V Street
- SR 99 Southbound Ramps at Martin Luther King Jr. Way
- SR 99 Northbound Ramps at Martin Luther King Jr. Way
- 14th Street at Martin Luther King Jr. Way
- SR 99 Southbound On-Ramp at SR 140

Depending on the specifics of the construction activities, other intersections could experience increased traffic. However, any delays to other intersections would be short term and temporary, so are not considered impacts. Moreover, any delays from this additional traffic at the intersections identified above are expected to be short term and temporary. These construction impacts would not substantially increase hazards, safety risks, or incompatible uses or result in inadequate emergency access. Because additional trips resulting from construction of the project would be short term and temporary, and would not substantially increase hazards, safety risks, or incompatible uses, the impacts on the above intersections would be impacts with moderate intensity under NEPA and less than significant under CEQA.

Downtown Fresno Station Construction Impacts on Circulation. Approximately 170 daily peak-hour trips would be added to the Fresno roadway system during construction of the proposed project. While the actual construction schedule is not currently known and cannot be known until closer to the beginning of construction, an analysis was conducted to assess impacts. The analysis focused on the impacts of construction-related trips (material hauling, worker trips, etc.) on City of Fresno intersections. Based on this analysis, the addition of construction traffic from the proposed project is projected to be

noticeable at N Blackstone Avenue at SR 180 westbound ramps. Depending on the specifics of the construction activities, other intersections could notice increased traffic. These construction impacts are based on a worst-case assessment, however, that would likely be reduced through avoidance and minimization measures, and any impacts are expected to be short term and temporary. Moreover, these impacts would not substantially increase hazards or incompatible uses or result in inadequate emergency access. Because additional trips resulting from construction of the project would be short term and temporary, and would not substantially increase hazards, safety risks, or incompatible uses, the impacts would be impacts with moderate intensity under NEPA and less than significant under CEQA.

Construction Adjacent to Freeways Construction Impacts on Circulation. Impacts to existing freeways adjacent to the HST mainline would be temporary and would typically affect roadway operations. Such construction could result in temporary closure of traffic lanes, reduction of lane widths, reduced speed limits, temporary on- and off-ramp closures, detours, and temporary closure of the freeway for placement of structural elements of installation or removal of falsework. The duration of these impacts could range from several hours in the case of a freeway closure to months in the case of lane-width reductions. Standard construction procedures related to traffic management would be used, including development of a detailed traffic control plan for each affected location prior to beginning any construction activities. These plans would identify when and where temporary closures and detours would occur, with the requirement of maintaining traffic flow during peak travel periods. Impacts due to temporary roadway closures associated with construction would not substantially increase hazards or incompatible uses or result in inadequate emergency access (also see Section 3.11, Safety and Security, of the EIR/EIS). Because standard construction practices would be used to manage traffic during construction, hazards and incompatible uses would not increase and inadequate emergency access would not occur, the impacts would be impacts with moderate intensity under NEPA and less than significant under CEQA.

Construction Related to the Realignment of SR 99. The realignment of SR 99 would result in short-term increases in trips associated with construction activity. The number of trips would vary but are expected to be no more than 100 workers per day. Most of those trips would occur before the AM and PM peak hours, coinciding with construction worker shifts. Up to 100 construction worker trips would increase traffic at the intersections of Dakota Avenue and Brawley Avenue and Ashlan Avenue and SR 99 southbound ramps. Depending on the specifics of the construction activities, other intersections could notice increased traffic. However, any delays from this increased traffic would be short term and temporary, so are not considered impacts. Moreover, these impacts would not substantially increase hazards, safety risks, or incompatible uses or result in inadequate emergency access. Because delays from increased traffic caused by construction would be temporary, hazards and incompatible uses would not increase and inadequate emergency access would not occur, the impacts would be impacts with moderate intensity under NEPA and less than significant under CEQA.

Traffic Flow and Circulation Impacts during SR 99 Realignment. Reconstruction of a similar size and scale to the proposed modifications to the SR 99 alignment is typically performed in multiple stages. This is done to accommodate the existing traffic flows through the project and provide adequate space for safe and cost effective construction operations. The number of stages needed would be determined by how restrictive the highway corridor is and the amount of traffic being accommodated on alternate routes or through the construction zones. The Conceptual Staging Plans (summarized below) provide more details on the staged construction approach. Several stages of activities are anticipated for the overall construction effort: utility and local street modifications required to clear the right of way for the relocated highway facility, partial street and structure construction to accommodate staged access of traffic across highway and rail right-of-way, and partial highway construction to accommodate staged traffic through the mainline construction areas.

Construction Transportation Mitigation Measures

The Authority and FRA have incorporated avoidance measures into the project that have been developed/refined from the mitigation strategies listed in the Program EIR/EIS. During project design and construction, the Authority would implement measures to reduce impacts on transportation, including the following:

- Off-Street Parking for Construction-Related Vehicles
- Maintenance of Pedestrian Access
- Maintenance of Bicycle Access
- Restriction on Construction Hours
- Construction Truck Routes
- Protection of Public Roadways during Construction
- Maintenance of Public Transit Access and Routes
- Construction Transportation Plan.
- Construction during Special Events.

Construction Transportation Significance Conclusion

Incorporation of the mitigation measures listed above would cause construction impacts to be moderate and not significant under NEPA and less than significant under CEQA. See Section 3.2.5 of the EIR/EIS for additional information regarding transportation impacts during construction.

7.4.1.2 Project Period Traffic Impacts, Mitigation Measures, Significance with Mitigation

Project Period Transportation Impacts

The Hybrid alternative would provide benefits to the regional transportation system by reducing vehicle trips on the freeways through the diversion of intercity trips from road trips to high-speed rail. This reduction in future vehicle trips would improve the future LOS of the regional roadway system (and reduce overall VMT) compared to the No Project Alternative. As compared to existing conditions, the HST alternatives also would divert trips from regional road facilities, thereby improving regional roadway LOS. Likewise, interstate commercial air trips would be diverted to HST. The Hybrid Alternative would also have the potential to affect local commercial airport traffic, the existing commuter and local transit system, freight traffic, parking facilities, and pedestrian and bicycle facilities, particularly around stations. The connectivity that all project alternatives would provide between local and regional transit and the statewide HST system would result in beneficial impacts for commuters and local residents.

Some localized effects would result from implementation/operation of the Hybrid Alternative, including closure of between 30 and 36 local roads. Limited traffic (LOS) impacts are expected as a result of the closures and diversion of traffic. There may be potential impacts associated with property access as a result of these closures depending on the availability of alternative access routes. Because of potential property access issues, the road closure impacts are considered to be moderate and significant under NEPA and significant under CEQA. The Hybrid Alternative would shift SR 99 in a 2-mile-long portion of the corridor in Fresno. The freeway shift would improve safety and provide for needed improvements in this area of SR 99. Analysis of the realignment of SR 99 indicates an impact south of the existing southbound parkway on-ramp that would be substantial and significant impact under NEPA and significant under CEQA. Intersection and roadway impacts, defined as an unacceptable LOS decrease or increase in the volume to capacity ratio, resulting from implementation of the Hybrid Alternative identify impacts in the region between Herndon and Shaw and in the Merced and Fresno HST station areas that would be substantial and significant under NEPA and significant under CEQA.

Project transportation impacts are described in detail in Section 3.2.5.3 of the EIR/EIS.

Project Period Mitigation

The following mitigation measures are designed to reduce significant transportation system impacts to intersections and roadways to less-than-significant levels. For information about mitigation measures recommended for each intersection, see Section 3.2.7.2 of the EIR/EIS.

Mitigation Measures for Potential Road Closures

TR MM#1: Access Maintenance for Property Owners. Maintain access for owners to property within the construction area. If a proposed road closure restricts current access to a property, provide alternative access via connections to existing roadways. If adjacent road access is not available, prepare new road connections, if feasible. If alternative road access is not feasible, the property will be considered for acquisition.

Mitigation Measures for SR 99 Realignment Freeway Impacts

TR MM#2: Add Southbound Auxiliary Lane to SR 99. Add southbound auxiliary lane south of the Clinton Avenue on-ramp to Olive Avenue.

Mitigation Measures for HST Intersection and Roadway Impacts

TR MM#3: Modify Signal Phasing. Modify traffic signal phasing sequence to improve operations at a signalized intersection.

TR MM#4: Add Signal to Intersection to Improve LOS/Operation. Add traffic signals to affected unsignalized intersections in order to improve LOS and intersection operation. Intersections proposed for signalization must meet traffic signal warrants in order to be considered as impacted. This condition occurs in 2035 for the identified intersections, but the warrant criteria may not be met at earlier dates, such as the completion of construction. Therefore, the signalization mitigation will only be required at such time as the warrant is met. The mitigation summary indicates any locations where this mitigation will be justified after 2020. These intersections will have to be monitored once a year to determine if/when the warrant is met. Unless otherwise noted in the mitigation summary, this mitigation is justified before 2020.

TR MM#5: Restripe Intersections. Restripe specific intersections surrounding proposed HST station locations in order to improve LOS and intersection operations.

TR MM#6: Modify Signal Timing. Modify signal timing (to optimize cycle length and/or splits) at specific intersections surrounding proposed HST station locations in order to improve LOS and intersection operations.

TR MM#7: Widen Approaches to Intersections. Widen approaches in order to improve LOS and intersection operation.

TR MM#8: Add Exclusive Turn Lanes to Intersections. Add exclusive turn lanes at specific intersections in order to improve LOS and intersection operations.

TR MM#9: Convert Two-Way Stop to Four-Way Stop. Convert two-way stop controlled intersection to an all-way stop controlled intersection.

TR MM#10: Grade Separate Through Movements. Modify the intersection to provide an overpass for through movements to improve LOS and intersection operations.

TR MM#11: Add Lanes to the Segment. Add travel lanes to the roadway segment in order to increase capacity and improve roadway operations.

Project Period Significance

With implementation of the mitigation measures listed above, project transportation impacts would be reduced to moderate under NEPA and less than significant under CEQA.

7.4.1.3 Cumulative Traffic Impacts, Mitigation Measures, Significance with Mitigation

Cumulative Construction Transportation Impacts

Construction effects may compound if SR 99 expansion projects occur at the same time as the HST Project and may contribute to incrementally more delays in traffic and detours for travel within the region. Coordination and, to some degree, construction phasing would minimize these temporary effects, resulting in cumulative impacts that are negligible under NEPA and not cumulatively considerable under CEQA.

Cumulative Project Transportation Impacts

Because the transportation analysis is regional, the cumulative transportation impacts already include the cumulative impacts presented in Section 3.2, Transportation, of the EIR/EIS and the existing conditions represent the cumulative condition. In Merced and Madera, roadways in the vicinity of the proposed HST alignment operate at level of service (LOS) D or better under existing conditions. In Fresno, major roadways such as Golden State Boulevard, Shaw Avenue, and McKinley Avenue in the vicinity of the proposed HST alignment generally operate at LOS D or better under existing conditions. More information on the LOS calculation is provided in the Merced to Fresno Section Transportation Technical Report (Authority and FRA 2011a). The current vehicle miles traveled (VMT) in the study area is approximately 35 million.

The No Project Alternative would result in approximately 50 million VMT daily in the study area by 2035. Implementation of any of the three HST alternatives is expected to result in a combined reduction in VMT of 7.0% for Merced, Madera, and Fresno counties. Highway improvements planned in the study area would not reduce daily VMT but would help to reduce future congestion in some areas. Cumulatively, the HST alternatives and highway improvements would reduce congestion, reduce travel delays, and stimulate economic growth as a result of improvements in mobility for the study area population. Offering a broad range of transportation modes improves accessibility to the state's urban centers in the Central Valley beyond what would occur by only widening freeways, because HSTs offer a more reliable and safe mode of travel. Locally, the project would contribute to traffic in the HST station areas; however, only slight changes would be experienced with mitigation. As a result of reduced congestion and delay, and improved mobility and access, cumulative transportation impacts would be beneficial.

As described in the 2005 Statewide Program EIR/EIS (Authority and FRA 2005) and the 2008 Bay Area to Central Valley Program EIR/EIS (Authority and FRA 2008), implementation of the HST System as a whole could benefit intercity highways. The HST System could also have a significant impact on local traffic conditions near some HST stations, such as the Transbay Transit Center (San Francisco to San Jose Section) and Buena Vista Station Area (Palmdale to Los Angeles Section), resulting in decreases in level of service.

Cumulative Transportation Mitigation Measures

The HST Project would implement transportation mitigation measures provided in Section 3.2.7 of the EIR/EIS and summarized above.

Cumulative Transportation Impact Significance

Cumulative construction impacts on the transportation network would be impacts with negligible intensity under NEPA and not cumulatively considerable under CEQA because coordination and phasing with other projects would minimize temporary effects to traffic. The cumulative operations impact of the project and other reasonably foreseeable projects on the transportation network would be beneficial because of the reduced congestion and delay, and improved mobility and access in the region. Cumulative impacts on transportation are discussed in more detail in Section 3.19.3.2 of the EIR/EIS.

7.4.2 Global Climate Change and Greenhouse Gas Emissions -

7.4.2.1 Construction and/or Fill Related GHG Impacts, Mitigation Measures, Significance with Mitigation

GHG Construction Impacts

GHG emissions generated from construction of the project would be temporary. GHG emissions from the construction phase were quantified per the CEQ guidelines (CEQ 2010), because total emissions would be greater than the 25,000 metric tons of CO_2e. The GHG construction emissions would be less than 0.02% of the total statewide GHG emissions. To conservatively estimate the amortized GHG emissions, the HST Project life is assumed to be only 25 years (although the actual project life will be much longer) (Barber 2010). The estimated amortized GHG construction emissions for the Hybrid Alternative would be less than 3,900 metric tons CO_2e per year as shown in Table 3.3-10 of the EIR/EIS. The increase in GHG emissions generated during construction would be offset by the net GHG reductions in operation (because of car and plane trips removed) in a little over 1 year.

GHG Construction Mitigation Measures

Temporary, short-term, emission increases associated with construction activities could be reduced with mitigation strategies and design practices. The following mitigation measures could be applied to the project construction:

AQ-MM#1: Reduce Criteria Exhaust Emissions from Construction Equipment. This mitigation measure could be applied to heavy-duty construction equipment used during the construction phase. All off-road construction diesel equipment greater than 50 horsepower (hp) could be required to have to meet at least Tier 4 California Emission Standards unless such engines are not available for a particular piece of equipment. In the event that Tier 4 engines are not available for any off-road engine larger than 50 hp, then the engine could have tailpipe retrofit controls that reduce exhaust emissions of NO_x and PM to Tier 4 emission levels. A copy of each unit's certified tier specification and any CARB or SJVAPCD operating permit could be made available at the time of mobilization of each piece of equipment. Tier 3 engines could be allowed on a case-by-case basis only when the contractor has documented that no Tier 4 equipment or emissions equivalent retrofit equipment is available for a particular equipment type. Documentation could be provided in such instances by the contractors and at least two construction equipment rental companies.

AQ-MM#2: Reduce Criteria Exhaust Emissions from On-Road Construction Equipment. This mitigation measure could be applied to on-road trucks used to haul construction materials, including fill, ballast, rail ties, and steel. Material hauling trucks could consist of an average fleet mix of equipment model year 2010 or newer.

AQ-MM#3: Reduce the Potential Impact of Concrete Batch Plants. This mitigation measure will apply to the location of concrete batch plants. Concrete batch plants will be at least 1,000 feet from sensitive receptors, including daycare centers, senior care facilities, residences, parks, and other areas where children may congregate. Construction phase emissions were estimated with these three mitigation measures and the result is that the mitigated emissions would still be greater than the GC

significant impact thresholds. As such, construction phase emissions would be offset by implementing the following mitigation measures:

AQ-MM#4: Offset Project Construction Emissions through a SJVAPCD Voluntary Emission Reduction Agreement (VERA). The Authority and SJVAPCD will enter into a contractual agreement to mitigate the project's emissions by providing funds for the district's Emission Reduction Incentive Program to fund grants for projects that achieve emission reductions, thus offsetting project-related impacts on air quality. The project will commit to reduce construction emissions entirely through the VERA program.

AQ-MM#5: Purchase Offsets and Offsite Emission Mitigation for Emissions Associated with Hauling Ballast Material in Certain Air Districts. This mitigation measure will apply to scenarios where the ballast and sub-ballast material is hauled from quarries located outside the SJVAB. NO_x offsets will be purchased from the South Coast AQMD, and the Mojave Desert AQMD if offsets are available. The Bay Area AQMD does not have a direct offset program for mobile sources; however, any material emissions above the district's significance threshold will be mitigated through an offsite emission mitigation program to achieve emission reduction due to material hauling in Bay Area AQMD. Potential offsite mitigation programs include the Bay Area AQMD's Carl Moyer Memorial Air Quality Standards Attainment Program (CMP) or other air district emission reduction incentive programs. In addition, even though the project would reduce emissions during the operational phase, the following operational phase measures would be implemented to further reduce emissions and/or impacts:

AQ-MM#6: Reduce the Potential Impact of Toxics. This mitigation measure will apply to HMF operation for all site options. Mitigation measures to be implemented at the HMF will include the following:

- Use of electric or hybrid trucks to serve the facility.
- Use of electric or Clean Switcher Locomotive to minimize the emissions from HMF operation.
- Adjustment of the facility operation and orientation, to the extent practicable, to move emission activities to areas where impacts on the surrounding sensitive areas are lessened, thus reducing localized impacts on surrounding sensitive receptors.
- A minimum buffer distance of 1,300 feet from sensitive receptors for diesel vehicles, limitations on idling of diesel vehicles at the facility, or preparation of a detailed health risk assessment that shows cancer risk to be less than 10 in a million when the site design is refined.

AQ-MM#7: Reduce the Potential Impact of Stationary Sources. This mitigation measure will apply to criteria pollutant sources at the HMF sites. Large stationary equipment (combustion equipment, paint booths, wastewater treatment, etc.) will be operated with best industry practices, or alternative equipment will be used, to the extent practical, to reduce emissions of criteria pollutants.

Construction GHG Significance

The increase in GHG emissions generated during construction would be offset by the net GHG reductions in operation (because of car and plane trips removed) in a little over 1 year for the UPRR/SR 99, BNSF, and Hybrid alternatives.

7.4.2.2 Project Period GHG Impacts, Mitigation Measures, Significance with Mitigation

Project Period Impact

The HST Project, which is included in the AB 32 scoping plan as Measure #T-9, would help the state meet the 29% reduction in GHG emissions by 2020 (CARB 2008). Overall, project operation would have a net beneficial impact on GHG emissions. Table 3.3-15 of the EIR/EIS summarizes the statewide GHG emission changes from the No Project Alternative (expressed in terms of CO2) resulting from the operation of the project. As shown, the project would have a beneficial effect on statewide GHG emissions, reducing CO2 emissions by a total of 4,808,774 metric tons/year when compared to the No Project Alternative and 2,325,232 metric tons/year when compared to existing conditions of 2009. The analysis estimated the emission changes from reduced on-road VMT, reduced intrastate plane travel, and increased electrical demand.

Project Period Mitigation Measures.

Not applicable.

Project Period Significance

With respect to both NEPA and CEQA, the proposed project would have a substantial beneficial effect on GHG emissions.

7.4.2.3 Cumulative GHG Impacts, Mitigation Measures, Significance with Mitigation

Cumulative Project GHG Impacts

Regulatory agencies continue to pass more stringent GHG emission standards with the goal of reducing the amount of pollutant emissions in the atmosphere. While many of these regulations have not yet been implemented, they are anticipated to be in effect prior to the project planning horizon of 2035. Even with these regulatory reductions, the expected growth in the region would result in significant cumulative increases in GHG emissions. There is also a possibility that the HST's demand for electricity would result in indirect GHG emissions impacts from power generation facilities. However, the HST would decrease GHG emissions by reducing vehicle and aircraft trips, as described in Section 3.3 of the EIR/EIS, Air Quality and Global Climate Change. This reduction in GHG emissions would more than offset the increase in GHG emissions associated with project facilities. Therefore, the HST alternatives would result in a net decrease in GHG emissions and would have a cumulatively beneficial effect on global climate change.

Cumulative GHG Mitigation Measures

Not applicable.

Cumulative GHG Conclusion

Increased GHG emissions from past, present, and foreseeable projects in the region would result in significant cumulative effects on global climate change under NEPA. The HST alternatives would result in a net reduction in CO_2 emissions; therefore, the project would have a cumulative beneficial effect on global climate change. Cumulative impacts on GHGs are discussed in more detail in Section 3.19.3.2 of the EIR/EIS.

7.4.3 Air Quality

7.4.3.1 Construction and/or Fill Related Air Quality Impacts, Mitigation Measures, Significance with Mitigation

Construction Air Quality Impacts

Construction of the Hybrid Alternative has the potential to cause temporary and significant localized air quality impacts. The Hybrid Alternative would have the least construction-related impacts of all project alternatives because it has the least amount of elevated guideway of all project alternatives and shortest total length (with the exception of the UPRR/SR 99 Alternative with the West Chowchilla Bypass Option).

Construction Emissions. As discussed in detail in Section 3.3.6.3 of the EIR/EIS, High-Speed Train Alternatives, Construction Period Impacts, direct emissions from the construction phase of the Hybrid Alternative (with or without mitigation) would exceed the GC applicability thresholds for VOC and NOx, and therefore trigger the need for a GC compliance demonstration for these pollutants for all calendar years in which emissions exceed the thresholds (see Table 3.3-9 of the EIR/EIS). VOC and NOx emissions are therefore considered to have the potential to cause substantial air quality impacts during project construction. The impacts from construction emissions would be temporary (particularly at any one location), would take place over 7 years, and would cease once construction is completed. GC thresholds would not be exceeded for any of the other criteria pollutants, and the potential impacts of these pollutants are therefore considered not to be significant.

Emissions from construction of the Hybrid Alternative would exceed the SJVAPCD CEQA thresholds for VOC and NOx (with or without mitigation). Therefore, construction emissions of these pollutants may cause significant impacts on air quality under CEQA and may impede or obstruct implementation of the 8-hour SJVAPCD 2007 Ozone Plan or the 2004 Extreme Ozone 1-hour Plan. Operation of concrete batch plants could also cause localized particulate matter impacts. There is no CEQA threshold for SO2 from SJVAPCD; however, SO2 impacts are expected to be less than significant due to the state requirement of using ultra-low sulfur diesel.

Material Hauling Emissions Outside the SJVAB. Rail would be constructed using 100% ballast and sub-ballast or concrete slabs. Material other than ballast would be available within the SJVAB; however, the ballast material could potentially be transported from areas outside the SJVAB. A preliminary emission evaluation was conducted for transporting ballast materials from outside the SJVAB to the border of the air basin. If the final design considers the use of concrete slabs instead of ballast, there would be a reduction in air quality emissions associated with material hauling. The impact conclusions presented for the 100% ballast and sub-ballast case are the most conservative, and hauling emissions are expected to be reduced if concrete slabs are used.

The emission results demonstrated that the worst-case emissions from all material hauling scenarios would be above the GC thresholds for NOx in the South Coast Air Basin and the Salton Sea Air Basin. The emissions for NOx in the other air basins (Sacramento Valley Air Basin, San Francisco Bay Area Air Basin, Mojave Air Basin, and the San Joaquin Valley Air Basin: Eastern Kern portion) would be below the GC thresholds for all scenarios. The emissions for all other pollutants would be below the GC thresholds for all scenarios in all air basins. Therefore, under NEPA the material-hauling emissions outside of SJVAB would have substantial intensity for NOx emissions in the South Coast Air Basin and the Mojave Air Basin but would have negligible intensity for all other pollutants in these air basins. Under NEPA the material hauling emissions would have negligible intensity for all pollutants in the other air basins.

Material hauling mission results would exceed the CEQA thresholds for NOx for all scenarios in multiple air quality management districts (AQMDs) or air pollution control districts (APCDs). All other pollutants for these scenarios would be below the CEQA thresholds. Under CEQA, the material-hauling emissions outside the SJVAB would exceed the NOx CEQA thresholds in the Mojave Desert AQMD, South Coast

AQMD, Bay Area AQMD, and East Kern County APCD and would therefore be significant for NOx. The material hauling emissions would be less the CEQA thresholds for other pollutants in these AQMDs and APCDs and would therefore be less than significant for all other pollutants. The material hauling emissions would be less than the CEQA thresholds for all pollutants in the Sacramento Metropolitan AQMD and the Butte County AQMD and therefore would be less than significant.

Construction Air Quality Mitigation Measures

The HST Project would, in general, improve air quality because of the reduction in regional emissions. Construction of the project, however, would increase regional emissions and possibly cause or exacerbate an exceedance of an air quality standard. As such, mitigation measures designed to minimize potential air quality impacts focused on the construction phase of the project.

AQ-MM#1: Reduce Criteria Exhaust Emissions from Construction Equipment. This mitigation measure could be applied to heavy-duty construction equipment used during the construction phase. All off-road construction diesel equipment greater than 50 horsepower (hp) could be required to have to meet at least Tier 4 California Emission Standards unless such engines are not available for a particular piece of equipment. In the event that Tier 4 engines are not available for any off-road engine larger than 50 hp, then the engine could have tailpipe retrofit controls that reduce exhaust emissions of NOx and PM to Tier 4 emission levels. A copy of each unit's certified tier specification and any CARB or SJVAPCD operating permit could be made available at the time of mobilization of each piece of equipment. Tier 3 engines could be allowed on a case-by-case basis only when the contractor has documented that no Tier 4 equipment or emissions equivalent retrofit equipment is available for a particular equipment type. Documentation could be provided in such instances by the contractors and at least two construction equipment rental companies.

AQ-MM#2: Reduce Criteria Exhaust Emissions from On-Road Construction Equipment. This mitigation measure could be applied to on-road trucks used to haul construction materials, including fill, ballast, rail ties, and steel. Material hauling trucks could consist of an average fleet mix of equipment model year 2010 or newer.

AQ-MM#3: Reduce the Potential Impact of Concrete Batch Plants. This mitigation measure will apply to the location of concrete batch plants. Concrete batch plants will be at least 1,000 feet from sensitive receptors, including daycare centers, senior care facilities, residences, parks, and other areas where children may congregate. Construction phase emissions were estimated with the above three mitigation measures and the result is that the mitigated emissions would still be greater than the GC significant impact thresholds. As such, construction phase emissions would be offset as follows:

AQ-MM#4: Offset Project Construction Emissions through a SJVAPCD Voluntary Emission Reduction Agreement (VERA). The Authority and SJVAPCD will enter into a contractual agreement to mitigate the project's emissions by providing funds for the district's Emission Reduction Incentive Program to fund grants for projects that achieve emission reductions, thus offsetting project-related impacts on air quality. The project will commit to reduce construction emissions entirely through the VERA program.

AQ-MM#5: Purchase Offsets and Offsite Emission Mitigation for Emissions Associated with Hauling Ballast Material in Certain Air Districts. This mitigation measure will apply to scenarios where the ballast and sub-ballast material is hauled from quarries located outside the SJVAB. NOx offsets will be purchased from the South Coast AQMD, and the Mojave Desert AQMD if offsets are available. The Bay Area AQMD does not have a direct offset program for mobile sources; however, any material emissions above the district's significance threshold will be mitigated through an offsite emission mitigation program to achieve emission reduction due to material hauling in Bay Area AQMD. Potential offsite mitigation programs include the Bay Area AQMD's Carl Moyer Memorial Air Quality Standards Attainment Program (CMP) or other air district emission reduction incentive programs. In addition, even

though the project would reduce emissions during the operational phase, the following operational phase measures would be implemented to further reduce emissions and/or impacts:

AQ-MM#6: Reduce the Potential Impact of Toxics. This mitigation measure will apply to HMF operation for all site options. Mitigation measures to be implemented at the HMF will include the following:

- Use of electric or hybrid trucks to serve the facility.
- Use of electric or Clean Switcher Locomotive to minimize the emissions from HMF operation.
- Adjustment of the facility operation and orientation, to the extent practicable, to move emission activities to areas where impacts on the surrounding sensitive areas are lessened, thus reducing localized impacts on surrounding sensitive receptors.
- A minimum buffer distance of 1,300 feet from sensitive receptors for diesel vehicles, limitations on idling of diesel vehicles at the facility, or preparation of a detailed health risk assessment that shows cancer risk to be less than 10 in a million when the site design is refined.

AQ-MM#7: Reduce the Potential Impact of Stationary Sources. This mitigation measure will apply to criteria pollutant sources at the HMF sites. Large stationary equipment (combustion equipment, paint booths, wastewater treatment, etc.) will be operated with best industry practices, or alternative equipment will be used, to the extent practical, to reduce emissions of criteria pollutants.

Construction Air Quality Conclusion

Under NEPA, VOC and NO_x emissions would exceed GC applicability thresholds for most of the construction phase with or without mitigation, and CO, PM_{10} and $PM_{2.5}$, and SO_2 emissions would be below the GC thresholds for all construction years. As such, with AQ-MM#4, which will offset construction phase VOC and NO_x emissions through the VERA program, the project would have impacts with negligible intensity under NEPA for all pollutants. Material hauling outside the SJVAB would have impacts with substantial intensity in the South Coast Air Basin and the Salton Sea Basin. Mitigation measures AQ-MM#5 would be implemented to reduce NO_x impacts in these air basins to impacts with negligible intensity under NEPA. Other pollutants in these air basins would have impacts with negligible intensity. Material hauling in other air basins for all pollutants would be impacts with negligible intensity under NEPA, and less than significant under CEQA.

Emissions would exceed the SJVAPCD CEQA significance thresholds for VOC and NO_x for most of the construction phase with or without mitigation. Therefore, the project may violate an air quality standard and/or contribute substantially to an existing or projected air quality violation for VOC and NO_x, and, as such, has the potential to result in a significant impact under CEQA. However, this impact would only last through the HST construction period, these emissions would be offset through the VERA program, and the project would result in emission reduction of VOC, NO_x, PM_{10}, and $PM_{2.5}$ throughout the project lifetime once operation starts. There is no SO_2 threshold from SJVAPCD CEQA guidance. However, SO_2 impacts would be expected to be less than significant due to the ultra-low sulfur content of diesel fuel. Impacts on climate change would be less than significant. Air quality impacts of all pollutants would be insignificant after implementing AQ-MM#4, which offsets the emissions through the VERA program.

7.4.3.2 Secondary/Operational Air Quality (Long Term) Impacts, Mitigation Measures, Significance with Mitigation

Operation of the Hybrid Alternative would provide a net regional air quality benefit by reducing regional criteria pollutants and would therefore have a beneficial impact on air quality under NEPA. Common benefits to regional air quality would come from a reduction of VMT and airplane emissions, which would

reduce criteria, and mobile source air toxics. Project/Operational impacts of the project are discussed in Section 3.3.6.3 of the EIR/EIS, High-Speed Train Alternatives, Project/Operational Impacts.

7.4.3.3 Cumulative Air Quality Impacts, Mitigation Measures, Significance with Mitigation

Cumulative Construction Air Quality Impacts

The San Joaquin Valley Air Pollution Control District (SJVAPCD) has adopted a cumulative threshold of significance of 10 tons per year for ozone precursors (VOC and NO_x) and 15 tons per year for PM_{10} and $PM_{2.5}$. Project construction emissions of these pollutants would exceed the threshold, even after mitigation. Although construction emissions would be temporary, they would contribute to air quality degradation and impede the region's ability to attain air quality standards. In addition, past, present, and reasonably foreseeable projects would have significant VOC, NO_X, PM_{10}, and $PM_{2.5}$ emissions, which would be an impact on air quality with substantial intensity under NEPA. Because these projects would be constructed during the same timeframe as the HST alternatives, there would be cumulative construction air quality impacts that would be impacts with substantial intensity under NEPA and cumulatively considerable under CEQA.

Cumulative Project Air Quality Impacts

Although there would be significant cumulative impacts in the region, operation of the HST would help the region attain air quality standards and plans by reducing the amount of regional traffic and providing an alternative mode of transportation. Because operation of the HST alternatives would help the region attain air quality standards, the HST's contribution to the cumulative impact would be an impact with negligible cumulative intensity under NEPA and less than cumulatively considerable under CEQA. Cumulative carbon monoxide impacts are accounted for in the CO hotspot analysis, presented in Section 3.3, Air Quality and Global Climate Change, of the EIR/EIS. The CALINE4 air dispersion modeling evaluation indicated that the HST alternatives would cause a less than significant impact for CO emissions. Therefore, cumulative project CO effects would be impacts with negligible intensity under NEPA and the cumulative impacts would be less than significant under CEQA.

As described in the 2005 Statewide Program EIR/EIS (Authority and FRA 2005) and the 2008 Bay Area to Central Valley Program EIR/EIS (Authority and FRA 2008), the HST System as a whole would have less than significant impacts on air quality. The HST System would reduce VMT and result in system wide air quality benefits. Temporary short-term emissions increases associated with construction activities and localized air pollution increases associated with traffic near proposed HST stations would be substantially reduced by mitigation strategies and design practices. The HST System would result in beneficial impacts related to GHGs and global climate change. Additional carbon entering the atmosphere, whether by emissions from the system itself or by removal of carbon sequestering plants (included agricultural crops), would be more than offset by the beneficial reduction of carbon resulting from the project due to a reduction in automobile VMT (mobile sources) and reduction in the number of airplane trips.

Cumulative Air Quality Mitigation Measures

With implementation of mitigation measures for air quality provided in Section 3.3.6, Cumulative Air Quality Impacts from Construction, of the EIR/EIS would remain impacts with substantial intensity under NEPA; during operations the impacts would be impacts with negligible intensity under NEPA and not cumulatively considerable under CEQA.

Cumulative Air Quality Impact Conclusion

The cumulative construction impacts of the HST alternatives and other past, present, and reasonably foreseeable projects on air quality would be impacts with substantial intensity under NEPA and cumulatively considerable under CEQA. Construction of the HST alternatives would increase regional

pollutant emissions and exceed the SJVAPCD CEQA thresholds of significance. Cumulative operations impacts on air quality caused by the build-out of the projects envisioned by the general plans would be impacts with substantial intensity under NEPA and cumulatively considerable under CEQA. However, operation of the HST alternatives would reduce regional VMT and consequently reduce ozone precursors and PM_{10} emissions. Therefore, operation of the HST would reduce regional emissions and have a cumulative air quality benefit. Cumulative impacts on air quality are discussed in more detail in Section 3.19.3.2 of the EIR/EIS.

7.4.4 Noise

7.4.4.1 Construction and/or Fill Related Noise Impacts, Mitigation Measures, Significance with Mitigation

Affected Environment

The noise environment along the proposed UPRR/SR 99 Alternative is influenced by SR 99, UPRR and BNSF railroad traffic, local community noise, and local roadway traffic. 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 close to Santa Fe Avenue, local roadway traffic dominates the noise environment. Nearing Merced from the north, traffic on SR 99 and freight trains on the UPRR railroad dominate the noise exposure, with roadway traffic contributing more noise near the city center where SR 99, SR 59, and SR 140 converge. Merced Regional Airport is located approximately 2 miles southwest of Merced's city center and contributes aircraft noise to the environment.

South of Merced, noise from SR 99 and UPRR dominates the noise environment in unincorporated areas between Merced and Chowchilla. Because noise-sensitive areas in Chowchilla are farther from SR 99 than the UPRR, freight trains and local community noise dominate the noise environment for both Chowchilla design options. In addition, there is a general aviation airport in Chowchilla located 1 mile southeast of the city center. South of Chowchilla, noise from SR 99 and UPRR dominates the existing noise environment at scattered residences. Upon entering Madera, the HST alignment moves farther from SR 99, and the noise environment near Madera's city center is dominated by UPRR traffic and local community noise. Madera Municipal Airport is located approximately 3 miles northwest of the city center. This general aviation airport contributes aircraft noise to the environment.

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. 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 SR 99 and local community noise. South of the rail yard, the noise environment is dominated by UPRR traffic and local community noise.

Fresno is the most densely populated city along the proposed corridor, with several highways, busy local roads, UPRR, and aircraft noise contributing to the noise environment. SR 99, SR 180, and SR 41 are all near the proposed HST station site in Fresno. Fresno has two airports, Fresno-Yosemite International and Fresno Chandler Downtown. Fresno-Yosemite International Airport is located approximately 3 miles northeast of Fresno's city center and operates scheduled commercial flights. Fresno Chandler is located approximately 2.5 miles southwest of the city center and is a public airport used for general aviation. Sierra Sky Park Airport, a privately owned airport used for general aviation, is located approximately 8 miles northwest of Fresno's city center. Aircraft noise from these three airports adds to the existing noise environment in the Fresno area. The Ave 24 Wye and the Ave 21 Wye are in a rural, unincorporated portion of Madera County. The existing noise environment is dominated by natural sounds, distant traffic, and agricultural activities.

Significance Criteria (NEPA and CEQA)

Pursuant to NEPA regulations (40 CFR 1500-1508), project effects are evaluated based on the criteria of context and intensity. Context means the affected environment in which a proposed project occurs. Intensity refers to the severity of the effect, which is examined in terms of the type, quality, and sensitivity of the resource involved, location and extent of the effect, duration of the effect (short- or long-term), and other consideration of context. Beneficial effects are identified and described. When there is no measurable effect, impact is found not to occur. Intensity of adverse effects is summarized as the degree or magnitude of a potential adverse effect where the adverse effect is thus determined to be negligible, moderate, or substantial. It is possible that a significant adverse effect may still exist when on balance the impact is negligible or even beneficial. For this assessment, FTA terminology of no impact was used rather than the NEPA term negligible.

FRA has established noise standards that apply to the project. If the project results in an insignificant increase in the number of people highly annoyed by the project noise, there would be no impact (FRA's "No Impact" category, as shown in Figure 3.4-3 of the EIR/EIS). If the project results in a change in the cumulative noise level that would be noticeable to most people, but may not be sufficient to generate strong, adverse reactions, the impact is defined as moderate (FRA's "Moderate Impact" category, as shown in Figure 3.4-3 of the EIR/EIS). If the project results in a change in the cumulative noise level that would cause a significant percentage of people to be highly annoyed by the project's noise, the impact is defined as substantial (FRA's "Severe Impact" category, as shown in Figure 3.4-3 of the EIR/EIS). Because of the significant percentage of people who would be highly annoyed, the substantial noise impacts under NEPA would be considered significant.

For vibration, all impacts, as defined by the FRA criteria in Section 3.4.3.3 of the EIR/EIS, would be considered substantial. Because there is only one level of impact in the FRA criteria, all project vibration levels over the impact criteria would be considered significant. The FRA noise and vibration criteria for evaluating effects under NEPA has been used as the CEQA significance criteria. In addition to these criteria, CEQA guidelines also define an impact pertaining to noise and vibration as considered significant if it would result in any of the following environmental effects:

- Exposure of persons to or generation of noise levels in excess of standards for a severe impact established by the FRA for high-speed ground transportation and by the FTA for transit projects. These standards cover both permanent and temporary/periodic increases in ambient noise levels in the project vicinity above levels existing without the project.
- Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels.

Construction Period Impacts

By using the FTA criteria provided in Table 3.4-1 of the EIR/EIS and the noise projections in Table 7.4-1, and assuming that construction noise reduces by 6 dB for each doubling of distance from the center of the site, it is possible to estimate the screening distances for potential construction noise impact. These estimates suggest that the potential for construction noise impact would be minimal for commercial and industrial land use, with impact screening distances of 79 feet and 45 feet, respectively. For residential land use, the potential for temporary construction noise impact would be limited to locations within approximately 141 feet of the alignment. However, the potential for noise impact from nighttime construction could extend to residences as far as 446 feet. The Authority will work to minimize this potential impact. For residences within 141 feet of the alignment, or within 446 feet during nighttime construction, construction impacts would be impacts with moderate intensity under NEPA.

Table 7.4-1
Typical Equipment Noise for Rail Construction

Equipment Item	Typical Maximum Sound Level at 50 Feet (dBA)	Equipment Utilization Factor (%)	L_{eq} (dBA)
Air Compressor	81	50	78
Backhoe	80	40	76
Crane, Derrick	88	10	78
Bulldozer	85	40	81
Generator	81	80	80
Loader	85	40	81
Jackhammer	88	4	74
Shovel	82	40	78
Dump Truck	88	16	80
Total Workday L_{eq} at 50 feet (8-hour workday)			**89**

Source: (Authority and FRA 2012).

Construction Period Mitigation Measures

During construction, noise levels will be monitored to verify compliance with the FTA construction noise limits. The contractor will have the flexibility to meet the FTA construction noise limits in the most efficient and cost-effective manner. The contractor would have the flexibility of either prohibiting certain noise-generating activities during nighttime hours or providing additional noise control measures to meet the noise limits. To meet required noise limits, the following noise control mitigation measures will be implemented as necessary, for nighttime and daytime:

- Install a temporary construction site sound barrier near a noise source.
- Avoid nighttime construction in residential neighborhoods.
- Locate stationary construction equipment as far as possible from noise-sensitive sites.
- Re-route construction-related truck traffic along roadways that will cause the least disturbance to residents.
- During nighttime work, use smart back-up alarms, which automatically adjust the alarm level based on the background noise level, or switch off back-up alarms and replace with spotters.
- Use low-noise emission equipment.
- Implement noise-deadening measures for truck loading and operations.
- Monitor and maintain equipment to meet noise limits.
- Line or cover storage bins, conveyors, and chutes with sound-deadening material.
- Use acoustic enclosures, shields, or shrouds for equipment and facilities.
- Use high-grade engine exhaust silencers and engine-casing sound insulation.
- Prohibit aboveground jackhammering and impact pile driving during nighttime hours.
- Minimize the use of generators to power equipment.
- Limit use of public address systems.
- Grade surface irregularities on construction sites.
- Use moveable sound barriers at the source of the construction activity.
- Limit or avoid certain noisy activities during nighttime hours.

Construction Period Significance

Construction noise and vibration impacts could be substantial for all alternatives. These impacts would be significant because the magnitude of the noise increase that would result in a severe impact under FRA criteria is considered highly annoying by the general population.

7.4.4.2 Project Period Noise Impacts, Mitigation Measures, Significance with Mitigation

Table 7.4-2 summarizes all potential direct noise impacts related to operation of HSTs under the Hybrid Alternative during the design year (2035) for both the ballast and tie and slab track construction alternatives. See Figures 3.4-9 through 3.4-12 of the EIR/EIS for the locations of noise impacts with ballast and tie track and Figures 3.4-13 through 3.4-16 of the EIR/EIS for the locations of noise impacts with slab track under the Hybrid Alternative without mitigation during the design year (2035).

Ballast and Tie Track Construction Alternative

For ballast and tie track, Table 7.4-2 reports the total number of noise impacts projected to occur under all the design variations for the Hybrid Alternative. It indicates that under the Ave 24 Wye design option, severe noise impacts are projected at 447 residences, 3 hotels, and Roeding Park. Moderate noise impacts are projected at 803 residences, 1 hotel, and 3 churches. Under the Ave 21 Wye design option, severe noise impacts are projected at 408 residences, 3 hotels, and Roeding Park. Impacts with moderate intensity are projected at 922 residences, 1 hotel, and 4 churches.

Table 7.4-2
Potential Noise Impacts under the Hybrid Alternative
without Mitigation for Design Year 2035

Hybrid Alternative	Total Number of Impacts for Ballast and Tie Track		Total Number of Impacts for Slab Track	
	Moderate	Severe	Moderate	Severe
Impacts by Project Combination				
Hybrid Alternative Alignment with Ave 24 Wye	803 residences, 1 hotel, 3 churches	447 residences, 3 hotels, 1 park	1,116 residences, 2 hotels, 2 churches, 1 school, 1 cemetery, 1 park	794 residences, 4 hotels, 1 park, 1 church
Hybrid Alternative Alignment with Ave 21 Wye	922 residences, 1 hotel, 4 churches	408 residences, 3 hotels, 1 park	1,265 residences, 2 hotels, 3 churches, 1 school, 1 cemetery, 1 park	779 residences, 4 hotels, 1 park, 1 church
Impacts under the Hybrid Alternative	**803 to 922 residences, 1 hotel, 3 to 4 churches**	**408 to 447 residences, 3 hotels, 1 park**	**1,116 to 1,265 residences, 2 hotels, 2 to 3 churches, 1 school, 1 cemetery, 1 park**	**779 to 794 residences, 4 hotels, 1 park, 1 church**
Source: Authority and FRA (2012).				

The text in this paragraph discusses the impacts of the Hybrid Alternative without mitigation. In the Merced vicinity, no severe noise impacts are projected to occur. Because of the relatively high existing noise levels in this urban area and the significantly fewer HST operations north of the wyes, project noise

would not result in increases sufficient to cause severe impacts. In the Chowchilla and Madera vicinities, severe noise impacts are projected to occur along the north-south alignment at 265 residences for the Ave 24 Wye design option and 185 residences for the Ave 21 Wye design option. Severe noise impacts are projected at 11 residences in the area along the Ave 24 Wye and 52 residences in the area along the Ave 21 Wye. In the Madera Acres vicinity at SR 145, an HST alignment design option that would raise the alignment a maximum additional 8 feet above-grade. would not change the number of impacts, as the change in noise level at the nearest sensitive receptors would be less than 1 dB. In the Fresno vicinity, severe noise impacts are projected to occur at 171 residences, 3 hotels, and Roeding Park.

Slab Track Construction Alternative

For slab track, Table 7.4-2 reports the total number of noise impacts projected to occur under all the design variations for the Hybrid Alternative. It indicates that under the Ave 24 Wye design option, severe noise impacts are projected at 794 residences, 4 hotels, 1 church, and Roeding Park. Without mitigation, moderate noise impacts are projected at 1,116 residences, 2 hotels, 2 churches, 1 school, 1 cemetery, and 1 park. Under the Ave 21 Wye design option, severe noise impacts are projected at 779 residences, 4 hotels, 1 church, and Roeding Park. Impacts with moderate intensity are projected at 1,265 residences, 2 hotels, 3 churches, 1 school, 1 cemetery, and 1 park.

In the Merced vicinity, no severe noise impacts are projected to occur. In the Chowchilla and Madera vicinities, severe noise impacts are projected to occur along the north-south alignment at 421 residences for the Ave 24 Wye design option and 361 residences for the Ave 21 Wye design option. Severe noise impacts are projected at 11 residences in this area along the Ave 24 Wye and 56 residences in this area along the Ave 21 Wye. In the Madera Acres vicinity at SR 145, there is an HST alignment design option that would raise the alignment a maximum additional 8 feet above-grade would not change the number of impacts, as the change in noise level at the nearest sensitive receptors would be less than 1 dB. In the Fresno vicinity, severe noise impacts are projected to occur at 362 residences, 4 hotels, 1 church, and Roeding Park. Moderate noise impact is projected at Addams Elementary School.

Project Period Mitigation Measures

- **N&V-MM#3: Implement Proposed California High-Speed Train Project Noise and Vibration Mitigation Guidelines.** Figures 3.4-18 through 3.4-21 of the EIR/EIS show the locations where the noise mitigation guidelines will be applied for ballast and tie track. Figures 3.4-22 through 3.4-25 of the EIR/EIS show the locations where the noise mitigation guidelines will be applied for slab track. Various options exist to address the potentially severe noise effects from HSTs. With input from local jurisdictions and balancing technological factors, such as structural and seismic safety, cost, number of affected receptors, and effectiveness, mitigation measures will be selected and implemented. For example, where moderate increases in noise affect receptors, noise-reducing measures could be implemented, even though not required. Conversely, in rural areas devoid of receptors where severe noise effects are anticipated, it might be appropriate and acceptable not to apply any noise-reducing treatments. The mitigation measure or suite of mitigation measures for severe noise impacts will be designed to reduce the noise level from HST operations from "severe" to "moderate" according to the provisions of the FRA noise and vibration manual (FRA 2005). The noise guidelines include the following mitigation measures:
    - **Install sound barriers.** Depending on the height and location relative to the tracks, sound barriers can achieve between 5 and 15 dB of noise reduction. The primary requirements for an effective sound barrier are that the barrier must (1) be high enough and long enough to break the line-of-sight between the sound source and the receiver, (2) be of an impervious material with a minimum surface density of 4 pounds per square foot, and (3) not have any gaps or holes between the panels or at the bottom. Because many materials meet these requirements, aesthetics, durability, cost, and maintenance considerations usually determine the selection of materials for sound barriers). Depending on the situation, sound barriers can become visually

intrusive. Typically, the sound barriers style is selected with input from the local jurisdiction to reduce the visual effect of barriers on adjacent lands uses. For example, sound barriers could be solid or transparent, of various colors, materials, and surface treatments.

- The maximum sound barrier height would be 14 feet for at-grade sections; however, all sound barriers would be designed to be as low as possible while still achieving a substantial noise reduction. Berm and berm/wall combinations are the preferred types of sound barriers where space and other environmental constraints permit. On aerial structures, the maximum sound barrier height would also be 14 feet, but barrier material would be limited by engineering weight restrictions for barriers on the structure. Sound barriers on the aerial structure should still be designed to be as low as possible while still achieving a substantial noise reduction. Sound barriers on aerial structures and at-grade could consist of solid, semitransparent, and transparent materials.
- Work with the communities to determine how the use and height of sound barriers would be determined using jointly developed performance criteria. Other solutions may result in higher numbers of residual impacts than reported herein. Options may be to reduce the height of sound barriers and combine barriers with sound insulation or to accept higher than the FRA's current noise thresholds.
- **Install building sound insulation.** Sound insulation of residences and institutional buildings to improve the outdoor-to-indoor noise reduction is a mitigation measure that can be provided when the use of sound barriers is not feasible in providing a reasonable level (5 to 7 dB) of noise reduction. Although this approach has no effect on noise in exterior areas, it may be the best choice for sites where sound barriers are not feasible or desirable and for buildings where indoor sensitivity is of most concern. Substantial improvements in building sound insulation (on the order of 5 to 10 dB) can often be achieved by adding an extra layer of glazing to windows, by sealing holes in exterior surfaces that act as sound leaks, and by providing forced ventilation and air conditioning so that windows do not need to be opened. Establish performance criteria to balance existing noise events and ambient roadway noise conditions as factors for determining mitigation measures.
- Acquire easements on properties severely affected by noise. Another option for mitigating noise impacts is for the Authority to acquire easements on residences likely to be affected by HST operations in which the homeowners would accept the future noise conditions. This approach is usually taken only in isolated cases where other mitigation options are infeasible, impractical, or too costly.

- **N&V-MM#4: Vehicle Noise Specification**. In the procurement of an HST vehicle technology, the Authority will require bidders to demonstrate that their offered technology constitutes "quietest available" technology that will emit a minimum of 3 dB less noise at 220 mph than the FRA model that was used for noise analysis in the EIR/EIS (i.e., the train technology that formed the basis for the EIR/EIS analysis). Depending on the available technology, this could significantly reduce the number of impacts throughout the corridor.

- **N&V-MM#5: Special Trackwork at Crossovers and Turnouts**. Because the impacts of HST wheels over rail gaps at turnouts increases HST noise by approximately 6 dB over typical operations, turnouts can be a major source of noise impact. If the turnouts cannot be moved from sensitive areas, the project can use special types of trackwork that eliminate the gap.

- **N&V-MM#6: Additional Noise Analysis During Final Design**. If final design or final vehicle specifications results in changes to the assumptions underlying the noise analysis, reassess noise impacts and recommendations for mitigation and provide supplemental environmental documentation, as required by CEQA and NEPA.

Project Period Significance

Table 7.4-3 below shows the number and length of sound barriers for the Merced to Fresno Section alternatives that meet the noise mitigation guidelines for both ballast and tie and slab track construction alternatives. Figures 3.4-27 through 3.4-30 of the EIR/EIS show the locations of proposed sound barriers along the HST alternatives for both ballast and tie and slab track construction alternatives. With slab track construction, noise levels prior to mitigation would be 3 dB higher than with ballast and tie track, so there would be more residual severe impacts behind sound barriers.

Table 7.4-3
Proposed Hybrid Alternative Sound Barriers

HST Alternative	Number of Cost-Effective Barriers	Total Length of All Barriers (ft)	Number of Severe Impacts Eliminated[a]	Number of Severe Impacts Remaining
Ballast and Tie Track	8	35,000	225	5
Slab Track	15	64,650	630	60

[a] With the sound barrier, the noise effect is reduced from a severe to a moderate level.

The impacts with substantial intensity identified above are considered significant according to CEQ Regulation 1508.27. With sound barriers as mitigation, the number of significant noise impacts could be reduced as the barriers would shield HST noise. With full implementation of the guidelines, most significant noise impacts would be eliminated. Severe noise effects would remain for some receptors because they are located outside of the area where the barrier is fully effective or the sound barrier does not fully mitigate the effect (i.e., noise is reduced by 5 dB but not below the severe threshold). Furthermore, severe noise effects would remain for receptors mitigated only with indoor sound insulation or when covered by noise easements.

7.4.4.3 Cumulative Noise Impacts, Mitigation Measures, Significance with Mitigation

Cumulative Construction Impacts

Construction would result in noise and vibration effects that would be managed and limited in duration. There are a few areas where SR 99 and other roadway improvements may result in cumulative construction noise and vibration impacts. It is likely that multiple projects would be under construction at the same time in the cities of Merced and Fresno, but construction on these projects would typically occur during daytime hours or with the addition of noise control measures to stay within required noise limits, and would be temporary. Because construction would typically occur during daytime hours and remain within required noise limits, cumulative noise effects would be negligible under NEPA.

Cumulative Construction Mitigation Measures

Mitigation measures for noise and vibration provided in Section 3.4.7 of the EIR/EIS and described above under Project Period Mitigation Measures will be implemented. To minimize the potential cumulative effects of overlapping construction activities within the same area, the Authority would work with local jurisdictions to identify construction schedules of other nearby projects and coordinate construction and project activities. This may reduce cumulative construction noise impacts of multiple projects whose noise impacts may be individually minor but cumulatively considerable.

Significance of Cumulative Construction Impacts

The cumulative impact of the project and other reasonably foreseeable projects on noise during construction would be negligible under NEPA because construction would typically occur during daytime hours and remain within required noise limit.

Cumulative Project Period Impacts

The noise analysis compares conditions under an HST alternative with the existing condition, which is conservative, because noise is expected to be higher with population growth and expanded highways. The alternative is located in an existing transportation corridor which has high noise levels caused by traffic and freight train operations, and the downtown areas of Fresno and Merced have high noise levels from multiple sources. Generally, noise levels would likely increase with the inclusion of the 2035 increases in population and accompanying development. Several planned and potential transportation projects are within the project corridor along the proposed UPRR/SR 99 Alternative alignment. The UPRR estimates that freight traffic may increase. However, these facilities (SR 99 and the railroads) would need to double their capacity to noticeably increase noise levels for the average person (i.e., an increase of 3 dBA).

The Roeding Regional Park and Fresno Chaffee Zoo Facility Master Plans (City of Fresno 2011) environmental review analysis lists the potential for significant cumulative noise impacts in conjunction with the HST alternative. Without mitigation, noise impacts resulting from new and expanded park uses proposed in the master plan, in conjunction with the noise impacts resulting from the HST alternative in the vicinity of Roeding Park, would be impacts with substantial intensity under NEPA.

The HST System would operate more than 200 trains per day after full build-out of the HST System. In rural areas, where typical noise is approximately 60 dBA, passing trains would result in an average noise increase of 11 dBA. In urban areas, the increases would range from 0 to 7 dBA. Noise mitigation (e.g., sound attenuation walls) may be balanced with other objectives of more importance to the adjoining land uses, such as visual aesthetics and integration with the community context. Therefore, there is the possibility of residual severe noise effects during HST operations along the alignment and at the HST stations, which could be cumulatively considerable with other foreseeable projects in the area.

Without mitigation, substantial and cumulatively considerable noise and vibration impacts would result from the project in conjunction with other planned projects, increased development associated with foreseeable projects, and the cumulative condition of the No Project Alternative. The UPRR/SR 99 Alternative has greatest potential for cumulative noise impacts due to the potential increases in noise from SR 99 and the UPRR railroad.

Cumulative Project Period Mitigation Measures

The primary form of noise mitigation for transportation projects is noise barriers. The project and the reasonably foreseeable highway improvements would not benefit from shared noise barriers because of the differences in profile and project location. There would be potential shared benefits, such as the HST guideway shielding traffic noise in locations where the tracks are on a berm. However, even with mitigation measures in place for individual projects, areas of substantial and cumulatively considerable noise impacts are likely to remain.

Mitigation of land development projects associated with the No Project Alternative are likely to be required by local agencies. For example, if residential developments are built near transportation infrastructure, they will require shielding from noise sources. The counties and municipalities where the cumulative projects will occur have all adopted noise standards that require mitigation for significant noise impacts.

Significance of Project Period Cumulative Impacts

Cumulative impacts during operations may have areas of substantial effects under NEPA without mitigation. The combination of project specific mitigation and local mitigation requirements for the cumulative projects noise effects would be reduced to moderate intensity under NEPA and less than significant under CEQA.

7.4.5 Cultural Resources

Because this project is a federal undertaking, Section 106 of the NHPA, 36 CFR 800.4(a)(1), requires establishing a project Area of Potential Effect (APE). The APE is the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The California State Historic Preservation Officer concurred with the initial version Merced to Fresno Section APE on August 16, 2010, prior to the refinement of alternatives. The initial APE was defined as a band centered on the project alternatives, expanding approximately 250 feet on either side of the centerline. The APE included the footprint of actual facilities that would be built (e.g., tracks, stations, switchyards, and maintenance facilities). Following SHPO concurrence with the initial versions of the archaeological and built environment APEs, alternatives were refined and revised. The revised built environment APE was prepared in accordance with the guidance included within Attachment B of the PA. Updated APEs based upon current designs and impacts were prepared and submitted for review and SHPO subsequently concurred with the revised APEs. All cultural resources studies to support this document (HPSR, HASR, and ASR [Authority and FRA 2012a,b,c, respectively]) were undertaken within APEs concurred in by the California State Historic Preservation Officer (SHPO). See Section 3.17.3.1 of the EIR/EIS for additional information.

Construction and/or Fill Related Cultural Resource Impacts, Mitigation Measures, Significance with Mitigation

Affected Environment (Archaeological)

There are 13 significant and/or potentially significant archaeological resources within the boundaries of the APEs for the three build alternatives. Five of these sites were previously recorded, three are newly identified sites, and five are archaeologically sensitive areas identified as areas of concern through consultation with property owners and with Native American contacts.

Construction Cultural Resources Impacts (Archaeological)

Soil excavation or compaction resulting from the use of heavy machinery, installation of improvements, and installation or relocation of utilities and infrastructure on the construction site itself or in staging areas may affect the integrity of artifact-bearing deposits associated with known and as-yet undiscovered archaeological sites within the APE. Common to all alternatives, unknown or unrecorded archaeological resources, including subsurface buried archaeological deposits, may exist, but are currently unknown. Construction areas related to ground disturbance could contain both recorded and unknown archeological resources. Disturbance and removal of archaeological resources could result in adverse effects on archaeological resources under Section 106 and could cause substantial adverse changes in the significance of an archaeological resource pursuant to Section 15064.5 and is therefore considered an impact with substantial intensity under NEPA and a significant impact under CEQA.

The Hybrid Alternative has the potential to affect up to seven archaeological resources (six on the north-south alignment, one on the wye alignment). These archaeological sites include one NRHP-eligible prehistoric site (CA-MER-381), one multi-component site (CA-MER-383/H), four prehistoric sites (P-24-001862, HST-H-JL-01, HST-H-JL-02, HST-H-TC-01), and three potential, but as-yet-unconfirmed, prehistoric sites (two potential ethnographic villages and one potential burial site). The Hybrid Alternative crosses both named and unnamed streams and rivers that are considered to be sensitive for prehistoric archaeological resources, which may be affected by construction activities. All of these resources or

potential resources are subject to construction period impacts, which would be considered an adverse effect under Section 106; and a substantial effect under NEPA and a significant impact under CEQA. See Section 3.17.5 of the EIR/EIS for additional detail.

Construction Cultural Resource Mitigation Measures (Archaeological)

Protective measures, such as archaeological site capping, and recordation of resources would take place prior to construction; other protective measures such as monitoring for archaeological resources during ground-disturbing activities would occur during construction.

- **Arch-MM#4: Conduct Archaeological Monitoring in Proximity to Identified Sites or Areas of Sensitivity.** Ground-disturbing activities that have the potential to affect archaeological remains may occur in areas that have been identified as either the location of a known archaeological site, or in an area known to be sensitive for the presence of buried cultural resources. The Authority will retain the services of a qualified archaeological monitor who will be present during all ground-disturbing construction activities occurring in native sediments/soils. In the event that cultural resources are exposed during construction, the monitor will temporarily halt activities in the immediate vicinity of the discovery as discussed in MM#2. If the archaeologist determines that the cultural resources are unique as defined by Section 21083.2 of CEQA, then the archeologist will conduct additional excavations to avoid impacts on these resources as described in MM#2. See Section 3.17.6.1 of the EIR/EIS for additional details.

- **Arch-MM#1: Conduct Archaeological Training.** Prior to ground-disturbing activities within the project alternatives, a qualified professional archaeologist, who meets the Secretary of Interior's (SOI's) Standards for Archaeology, will develop a training program and printed material to be presented to construction personnel. The purpose of this training and accompanying materials will be to familiarize construction personnel with the relevant legal (Section 106/NEPA) context for cultural resources of the project and with the types of cultural sites, features, and artifacts that could be uncovered during construction activities. These training sessions will be conducted prior to commencing construction within discrete portions of the project alternatives or as needed as construction crews and supervisors may change.

- **Arch-MM#2: Halt Work in the Event of an Archaeological Discovery.** If any cultural resources are discovered during ground-disturbing activities, all work within 50 feet of the resources will halt, and the project proponent will consult with a qualified archaeologist to assess the significance of the find under Section 106 and Section 21083.2 of CEQA, and any work may proceed on other parts of the project site while mitigation for historical resources or unique archaeological resources is being carried out. An Unanticipated Discoveries Plan has been developed, in coordination with the consulting parties, to detail the specific procedures to be followed if archaeological materials are found during construction. The California State Lands Commission (CSLC) will be notified if the find is a cultural resource on or in the submerged lands of California, consequently under the jurisdiction of the CSLC. The project proponent will comply with all applicable rules and regulations promulgated by CSLC with respect to cultural resources located in submerged lands, and in accordance with the Programmatic Agreement (PA). Appendix 3.17A of the EIR/EIS contains a copy of the PA. If human remains are encountered, the project proponent will comply with applicable laws and regulations regarding notification and disposition of the remains. If the coroner determines that the remains are Native American, the coroner will notify the NAHC under Health and Safety Code 7050.5.

  If any find is determined to be significant under Section 106 or unique under Section 21083.2 of CEQA, the project proponent and the archaeologist will meet to determine the appropriate avoidance measures or other appropriate treatment in conjunction with the SHPO and the MOA signatories. In considering any suggested treatment proposed by the consulting archaeologist to reduce or avoid impacts on historical resources or unique archaeological resources, a determination will be made whether avoidance is necessary and feasible in light of factors such as the nature of the find, project

design, costs, and other similar considerations. All significant cultural materials recovered will be, as necessary and at the discretion of the consulting archaeologist, subject to scientific analysis, professional museum curation, and documentation according to current professional standards as determined in the project MOA. Unless the archaeologist determines that the archaeological resource is "unique" under CEQA or of greater interpretive use than research significance, then an archaeological data recovery program shall be implemented to address the resources in a manner that meets the requirements of Section VI(c)(1) of the PA and Section 21083.2 of CEQA. See Section 3.17.6.1 of the EIR/EIS for additional details.

- **Arch-MM#3: Plan an Intentional Site Burial Preservation In-Place**. If project engineering concludes that avoidance is not feasible, a process to determine whether the site can be preserved through intentional site burial will be considered. When complete avoidance is not possible, preservation in-place is the preferred form of mitigation for an "historical resource of an archaeological nature" because it retains the relationships between artifact and context, and may avoid conflicts with groups associated with the site. If intentional site burial in place is necessary, the contracted archaeologist will, in addition to the formal delineation of the site boundaries, prepare and implement a design plan to dictate the conditions of the intentional site burial according to the requirements and recommendations of *A Technique to Protect Against National or Mechanical Loss* (Thorne 1991). See Section 3.17.6.1 of the EIR/EIS for additional details.

Significance of Construction Impacts on Cultural Resources (Archaeological)

The impacts with substantial intensity identified in Section 3.17.4.5 of the EIR/EIS and summarized above, are considered significant because they have the potential to adversely affect a cultural resource, a term used in this NEPA impact subsection and based upon the definition in the CEQ NEPA regulations, 40 CFR section 1508.27. Soil excavation or compaction, demolition, degradation, or unearthing resulting from the use of heavy machinery on the construction site itself or in staging areas may affect the integrity of artifact-bearing deposits associated with known and as yet undiscovered archaeological sites. These impacts would be significant because an archaeological site that has lost its depositional integrity can no longer provide new information with which to formulate a better understanding of prehistory or history.

Creating the potential for archaeological deposits to be revealed, exposing them to potential looting, more traffic, and compaction would also be a significant impact because the loss of some or all of the artifacts from a site prevents a complete understanding of the human activities carried out at that site. The affected archaeological site can therefore no longer provide an accurate picture of the past, nor contribute to a better understanding of prehistory or history. As discussed in Section 3.17.3.4 of the EIR/EIS, although actions determined to have an adverse impact under NEPA may be mitigated and have a lesser effect, for Section 106, the effect determination remains adverse even when mitigated. See Table 7.4-4 at the end of this subsection for CEQA significance determinations before and after mitigation.

Affected Environment (Architectural History and Historical Properties and Resources)

Forty-seven significant historic architectural resources have been identified within the APE. Of these resources, 20 within the APE were listed, have been determined eligible for listing, or appear to be eligible for listing in the NRHP, pending SHPO concurrence. These 20 historic properties are also considered to be historical resources for the purposes of CEQA. The remaining 27 historic architectural resources do not meet the NRHP criteria, but are considered historical resources for the purposes of CEQA. All of these resources are reported in the HPSR (Authority and FRA 2012a), as required in the PA. The 47 historic architectural resources that are either historic properties (Section 106) or historical resources (CEQA), or both, are shown in Table 3.17-6 of the EIR/EIS.

Construction Cultural Resources Impacts (Architectural History and Historical Properties and Resources)

The activities that cause impacts on historical properties and resources are typically associated with the construction of the project: disturbance of the ground, the material or physical alteration of the built environment, or the alteration of the visual setting. Construction activities may cause impacts on cultural resources and can include excavation, staging, heavy equipment usage and movement, drilling, demolition, or relocation, as well as increases in noise or vibration levels, or introduction of new visual elements.

The Hybrid Alternative would cause direct adverse effects under Section 106 and substantial or significant impacts under NEPA and CEQA on the following three historical properties and resources:

- **Robertson Blvd. Tree Row (#14)** is in the direct path of both the Ave 24 and Ave 21 wyes for all three alternatives and would cross the HST alignment with either an overpass or an underpass. Construction would result in the physical demolition, destruction, damage, or substantial alteration of this linear resource between the two wyes. As a result, the proposed project would cause direct adverse effects under Section 106 and impacts with substantial intensity under NEPA.
- **Weber Avenue Overcrossing (#17)** is in the direct path of this alternative, which share a common alignment in this location. Construction would result in the physical demolition, destruction, damage, or substantial alteration of the resource. As a result, the proposed project would cause direct adverse effects under Section 106 and impacts with substantial intensity under NEPA.
- **Belmont Avenue Subway and Traffic Circle (#18)** is in the direct path of this alternative, which share a common alignment in this location. Construction would result in the physical demolition, destruction, damage, or substantial alteration of the resource. As a result, the proposed project would cause direct adverse effects under Section 106 and impacts with substantial intensity under NEPA.

The Hybrid Alternative would cause an indirect adverse effect under Section 106, and an impact with moderate intensity under NEPA and significant impact under CEQA on the following three historic properties/historical resources:

- **Roeding Park:** APN 450-020-08 (#16) is immediately adjacent to this alternative, which share a common alignment in this location. Construction would introduce new visual elements that would diminish the integrity of the significant features of this property. As a result, the proposed project would cause an indirect adverse effect under Section 106 and a impact with moderate intensity under NEPA. Mitigation options are addressed in further detail in Section 3.15, Parks, Recreation, and Open Space, of the EIR/EIS.
- **Southern Pacific Railroad Depot:** APN 467-030-31 (#31) is located immediately adjacent to this alternative, which share a common alignment in this location. The project in this location includes construction of a Tulare Street overcrossing that would be adjacent to the southern side of the resource. Construction would introduce new visual elements that would diminish the integrity of the significant features of this property. As a result, the proposed project would cause an indirect adverse effect under Section 106, and an impact with moderate intensity under NEPA. The project in this location also includes an option for an undercrossing at Tulare Street and this option would have no adverse effect on this property.
- **Bank of America:** APN 467-074-01 (#35) is located adjacent to the Tulare Street overcrossing, which includes roadway changes associated with the project. The construction of roadway overpasses within 15 feet of the resource would introduce new visual elements that would diminish the integrity of the significant features of this property. As a result, the proposed project would cause an indirect adverse effect under Section 106, and a impact with moderate intensity under NEPA. The project in

this location also includes an option for an undercrossing at Tulare Street and this option would have no adverse effect on this property.

Construction Cultural Resources Mitigation Measures (Architectural History and Historical Properties and Resources)

Protective measures, such as building stabilization, and recordation of historical resources would take place prior to construction; other protective measures such as vibration monitoring for built historical resources would occur during construction and would include the following:

- **Hist-MM#1: Avoid Adverse Construction Vibration Effects.** The HST Project will incorporate construction methods (examples of such methods are listed below) to avoid indirect adverse effects or indirect substantial adverse change to any historical properties and resources under Section 106 and CEQA from vibration caused by construction activities. Vibration from impact pile-driving during construction could cause the physical destruction, damage, or alteration of historic properties or historical resources if the pile-driving is within 25 to 50 feet of the building. Because this impact pile-driving could cause adverse effects or substantial adverse changes, alternative construction methods causing less than 0.12 peak particle velocity of one inch per second (0.12 PPV in/sec) measured at the receptor would be incorporated for construction activities near historic properties or historical resources if they are determined to be extremely susceptible to vibration damage. If piling is more than 50 feet from buildings, or if alternative methods such as push piling or auger piling can be used, damage from construction vibration would be avoided. Preconstruction surveys conducted at locations within 50 feet of piling would document existing condition of buildings for comparison to during or after construction conditions. All performance standards set forth in FRA's High-Speed Ground Transportation Noise and Vibration Impact Assessment (2005) for noise and vibration impact evaluations, and set forth in the Built Environment Treatment Plan (BETP) for avoidance of adverse vibration effects on exiting historical properties and resources will be implemented to minimize and mitigate noise and vibration impacts. See Section 3.17.6.2 of the EIR/EIS for additional information.

- **Hist-MM#2: Develop Protection and Stabilization Measures**. Historical Properties and resources subject to this mitigation measure include any that are potentially physically affected, and/or relocated, and/or in close enough proximity to construction of Hybrid Alternative improvements to require protection. This mitigation will be used to confirm that adverse effects on historical properties/historical resources will be either avoided entirely, or minimized to the extent possible. This mitigation will be developed in consultation with the landowner and land-owning agencies, as well as the SHPO and the MOA signatories, as required by and in accordance with the standards set forth in the PA. Such measures may include one or more of the following, but will not be limited to: vibration monitoring of construction in the vicinity of historical properties and resources; cordoning off of resources, such as traffic, equipment storage, and personnel, from construction activities; shielding of resources from dust or debris; and stabilization of buildings adjacent to construction. For buildings that are to be moved (see Hist-MM#3), such measures will include stabilization of buildings and structures before, during, and after relocation; protection of buildings and structures during temporary storage; and relocation at a new site and during subsequent rehabilitation. Moving buildings could result in minor impacts on air emissions from equipment and vehicles and minor effects on developed or undeveloped sites. See Section 3.17.6.2 of the EIR/EIS for additional information.

- **Hist-MM#3: Minimize Adverse Effects through Relocation of Historic Structures**. The BETP identifies historical properties/historical resources that will be relocated to help avoid destruction and minimize the direct adverse effect of their physical damage or alteration. The plan for relocation will be developed, and implementation of relocation will take place prior to construction. The relocation of the historical properties/historical resources will take into account the historical site and layout (i.e., the orientation of the buildings to the cardinal directions), as well as their potential re-use. All structures will be thoroughly recorded in a Historic Structure Report (HSR), and the relocation plan

will provide for stabilization of the structures before, during, and after the move. The relocation plan will be developed pursuant to and will implement all appropriate best practices applicable to the historical resource and/or property being relocated. See Section 3.17.6.2 of the EIR/EIS for additional information.

- **Hist-MM#5: Prepare and Submit NRHP Nominations.** Specific historic properties/historical resources identified for nomination to the NRHP Program of the National Park Service (NPS). Properties subject to this mitigation will be treated in consultation with the landowner, or land-owning agencies, and the lead agency. Current photographs of the property used in the nomination(s) will be taken prior to the start of project construction. The nomination document may also use other current and/or historic images prepared as part of other mitigation activities. See Section 3.17.6.2 of the EIR/EIS for additional information.

- **Hist-MM#6: Prepare and Submit CRHR Nominations.** Specific historical resources shall be identified for nomination to the CRHR Program at the California OHP consistent with best practices within the professional historic preservation community. Current photographs of the resource used in the nomination(s) will be made prior to the start of construction. The nomination document may also use current and/or historic images prepared as part of other mitigation activities. See Section 3.17.6.2 of the EIR/EIS for additional information. Nominated resources will be protected pursuant to the mitigation measures specified in this document for existing and already listed historical properties and resources.

- **Hist-MM#7:** Prepare and Submit Historic American Building Survey (HABS)/Historic American Engineering Record (HAER)/Historic American Landscape Survey (HALS) Documentation. Specific historical resources that would be physically altered, damaged, relocated, or destroyed by the project in compliance with the HABS/HAER/HALS programs. Consultation with the SHPO, NPS, and the consulting parties will be required if any of the resources must be documented to these standards. Prior to the start of construction, in consultation with the Western Regional Office of the NPS, Oakland, California, large-format (4-inch by 5-inch, or larger, negative-size) black and white photographs will be taken of these historic properties/historical resources showing them in context, as well as details of character-defining features. It is anticipated that the recordation of historic properties will be completed to Level II HABS written data standards, and will include archival and digital reproduction of historic images, plans, and drawings, if available. Copies of the documentation will be offered to the appropriate local governments, historical societies and agencies, and libraries. The documentation will also be offered in printed and electronic form to any repository or organization upon which SHPO, the Authority, and local agency with jurisdiction over the property, through consultation, may agree. See Section 3.17.6.2 of the EIR/EIS for additional information.

- **Hist-MM#8: Prepare Historic Structure Reports.** Historic properties/historical resources that would be physically altered, damaged, or relocated that would be subject to an HSR have been identified in the BETP. The HSR for these resources will be prepared prior to the start of construction. The HSR will follow the general guidelines for such reports as described in the California OHP publication, "Historic Structure Report Format" (OHP n.d.). The scope of each HSR will be developed in consultation with the land-owning agencies, the SHPO, and appropriate consulting parties. The HSR will include documentation of existing landscaping, if appropriate. The HSRs may be used in the ongoing planning process and re-use of the properties, and may be coordinated with the other mitigation documentation activities, such as HABS/HAER records. See Section 3.17.6.2 of the EIR/EIS for additional information.

- **Hist-MM#9: Prepare Interpretive Exhibits.** Some historic properties/historical resources may be identified for historic interpretation. Interpretive exhibits will provide information regarding the specific historic property or historical resource. The interpretive exhibits will utilize images, narrative history, drawings, or other material produced for the mitigation described above, including the HABS/HAER reports, NRHP and CRHR nominations, or other archival sources, and will be consistent

with Best Practices within the professional historic preservation community based on the type of historical resources addressed. The interpretive exhibits may be in the form of, but are not limited to, interpretive display panels and/or printed material for dissemination to the public. The interpretive exhibits may be installed at local libraries, historical societies, or public buildings. All historic properties/historical resources demolished by the project will be the subject of informative permanent metal plaques that will be installed at the site of the demolished historic property, or at nearby public locations. The plaques will provide a brief history of the property, its engineering/architectural features and characteristics, and the reasons for and date of its demolition. See Section 3.17.6.2 of the EIR/EIS for additional details.

- **Hist-MM#10: Plan Repair of Inadvertent Damage.** The BETP provides a plan for the repair of inadvertent damage to historical properties/historical resources. The plan has been developed prior to construction, and states that damage resulting from the project to any of the historical properties/historical resources near construction activities will be repaired in accordance with the SOI's Standards for Rehabilitation. The HSR, and/or HABS/HAER, recordation will photographically document the condition of historic properties/historical resources prior to the start of construction to establish the baseline condition for assessing damage. A copy of this photographic documentation will be provided to the landowner or land-owning agencies. Prior to implementation, plans for any repairs to historic properties will be submitted for SHPO review and comment to verify conformance with the SOI's Standards for Rehabilitation. See Section 3.17.6.2 of the EIR/EIS for additional information.

Significance of Construction Cultural Resources Impacts (Architectural History; Historical Properties and Resources)

The impacts with substantial intensity identified in Section 3.17.4.5 of the EIR/EIS and summarized above, are considered significant because they have the potential to adversely affect a cultural resource, a term used in this NEPA impact subsection and based upon the definition in the CEQ NEPA regulations, 40 CFR section 1508.27. Physical impacts such as material or structural alteration, especially demolition of an NRHP-listed or eligible historic property, would be an impact with substantial intensity t under NEPA. These direct impacts would have significant intensity because the impacts could directly alter the physical integrity, use, or setting. As a result, the historic property may no longer be able to convey its significance through its physical characteristics and, therefore, may no longer be eligible for the NRHP.

Introduction of new visual elements or alteration of the visual setting when it is part of the property's integrity would result in an impact with moderate intensity t under NEPA because the historic property may no longer be able to convey its significance and, therefore, may no longer be eligible for the NRHP. Construction or operational noise that impacts historic properties that have an inherent quiet nature that is part of their identification as well as their significance would cause impacts with moderate intensity under NEPA because they would permanently degrade the elements that make the historic property eligible for the NRHP. To the extent that visual effects and vibration could degrade the elements that make the resource eligible, these long-term effects would be of moderate intensity and would be adverse. As discussed in Section 3.17.3.4 of the EIR/EIS, although actions determined to have an adverse impact under NEPA may be mitigated and have a lesser effect, for Section 106, the effect determination remains adverse even when mitigated. Table 7.4-4 below contains the CEQA significance determinations before and after mitigation.

Table 7.4-4
CEQA Significance Determinations for the Hybrid Alternative

Impact	CEQA Level of Significance before Mitigation	Mitigation Measure	CEQA Level of Significance after Mitigation
Arch#1: Effect on Significant Prehistoric and Historic-Era Archaeological Resources During Construction Hybrid Alternative would impact 9 resources.	Significant	**Arch-MM#1:** Conduct Archaeological Training; **Arch-MM #2:** Halt Work in the Event of an Archaeological Discovery; **Arch-MM#3:** Plan an Intentional Site Burial Preservation In-Place; **Arch-MM#4:** Conduct Archaeological Monitoring in Proximity to Identified Sites or Areas of Sensitivity	Less than Significant
Hist#1: Effect on Historically Significant Built-Environment Resources During Construction The Hybrid alternative would adversely affect up to 7 resources listed or eligible for the NRHP (Section 106) and 6 historical resources (CEQA).	Significant	**Hist-MM#1:** Avoid Adverse Vibration Effects; **Hist-MM#2:** Develop Protection and Stabilization Measures; **Hist-MM#3:** Minimize Adverse Effects through Relocation of Historic Structures; **Hist-MM#4:** Minimize Adverse Noise Effects; **Hist-MM#5:** Prepare and Submit NRHP Nominations; **Hist-MM#6:** Prepare and Submit CRHR Nominations; **Hist-MM#7:** Prepare and Submit HABS/ HAER/ HALS Documentation; **Hist-MM#8:** Prepare Historic Structure Reports; **Hist-MM#9**: Prepare Interpretive Exhibits; **Hist-MM#10:** Plan Repair of Inadvertent Damage	Significant and Unavoidable

Impact	CEQA Level of Significance before Mitigation	Mitigation Measure	CEQA Level of Significance after Mitigation
Hist#2: Effect on Historically Significant Built-Environment Resources During Operation The Hybrid Alternatives would indirectly adversely affect 2 resources listed or eligible for the NRHP (Section 106) and 0 historical resources (CEQA).	Significant	**PK-MM#4:** Address Noise at Roeding Park with City of Fresno **Hist-MM#4:** Minimize Adverse Noise Effects	Less than Significant with mitigation for the residence at 24302 Road 15 It is possible that the City of Fresno would view the projected noise levels as acceptable and preferable to the implementation of mitigation measures. In this case, the impacts on Roeding Park, both as a park and a historic resource, would remain significant under CEQA.

7.4.5.1 Project Period Cultural Resource Impacts, Mitigation Measures, Significance with Mitigation

Project Period Archaeological Impacts

Archaeological sites would only be subject to adverse effects during construction activities for the Hybrid Alternative, but not during operations. Increasing public access to archaeological sites during operations could lead to their intentional or unintentional disturbance or destruction by people who previously would not have been able to enter the property where the site is located. However, the HST alternatives, including the Hybrid Alternative, would not create new access for any areas that contain archaeological resources. In remote areas, the guideway would be fenced; therefore, it would not provide access for persons to loot sites and would not expose sites to the adverse effects of compaction through pedestrian or vehicular traffic. Because the HST System for the Hybrid Alternative would allow only maintenance persons or vehicles within the operating corridor, it is unlikely that operation of the HST would affect archaeological sites. The related roadway modifications would not cause more traffic near identified archaeological sites. There is a possibility for new sites to be discovered during construction of the Hybrid Alternative, but these would be managed under supervision of a trained archaeologist in accordance with the Section XI of the PA, which details the procedures to be implemented in the event of an unanticipated discovery. The PA is included in Appendix 3.17-A of the EIR/EIS. Therefore, project operation would not result in effects on archaeological resources under NEPA or CEQA. The impact during operations is considered negligible under NEPA and less than significant under CEQA.

Project Period Archaeological Mitigation Measures

None needed.

Significance of Project Period Archaeological Impacts

Negligible under NEPA and Section 106; Less than Significant under CEQA.

Project Period Architectural History Impacts

Adverse effects on historic architectural resources would largely occur during construction activities associated with all HST alternatives, including the Hybrid Alternative. There would be no vibration impacts for most locations along the Merced to Fresno Section under any of the HST alternatives, including the Hybrid Alternative. This is because of the very inefficient propagation of vibration through the soils in the project vicinity, the low vehicle input force, and the presence of elevated structures, which provide significant attenuation of vibration levels in heavily populated areas where vibration-sensitive receptors are primarily located. In addition, any buildings and structures actually within the construction footprint were not included in the vibration analysis because it is anticipated that they would be destroyed. As a result, there would be no operational vibration effects on historical properties or resources under NEPA (see Sections 3.17.5 and 3.4 of the EIR/EIS).

Operational noise has the potential to cause adverse effects or substantial adverse change to historical properties and historical resources. Historical properties and historical resources that are sensitive to noise include resources such as residences, parks, libraries, museums and schools. These types of resources have an inherent quiet nature that is part of their identification as well as their significance. There are two historic properties within the APE that are considered potentially sensitive to increases in noise: Roeding Park and the residence at 24302 Road 15.

The Hybrid Alternative would not have any *direct* adverse vibration or noise effects on any historic properties or historic resources as the result of operational activities. The Hybrid Alternative would cause an *indirect adverse effect* under Section 106 and CEQA on the following two historic properties as shown in Table 3.17-9 of the EIR/EIS as a result of operational activities:

- **Roeding Park: APN 450-020-08 (#16)** is located immediately adjacent to these alternatives, which share a common alignment in this location. According to FRA Noise Impact Criteria, the park would experience severe noise impacts. A substantial increase in the noise levels of the pastoral setting of the passive recreational portion of the park, particularly at those inherently quiet and contributing sites mentioned above, would not be consistent with the historic setting, feeling, and association and would diminish the historic integrity of Roeding Park. As described in Section 3.4, Noise and Vibration, of the EIR/EIS noise impacts are anticipated to be severe without mitigation, which would be decided in consultation with the City of Fresno (See EIR/EIS Section 3.15, Parks, Recreation, and Open Space).
- **the residence at 24302 Road 15: APN 026-233-011 (#13)** is located immediately adjacent to the north side of a proposed overpass at Road 15 along the Ave 24 Wye. According to FRA Noise Impact Criteria, the residence would experience severe noise impacts during operation of the HST. As described in Section 3.4, Noise and Vibration, of the EIR/EIS noise impacts are anticipated to be severe without mitigation.

Project Period Architectural Mitigation Measures.

- **Hist-MM#4: Minimize Adverse Operational Noise Effects.** Properties subject to this mitigation will be treated in consultation with the landowner, or land-owning agencies, and the lead agency and noise impacts will generally be mitigated consistently with the noise standards and maximum levels described in the Noise section. Preliminary project design options have been developed to help reduce noise impacts and follow FRA methodologies and noise reduction performance standards for noise abatement. These options will be further developed during project design and will be implemented during construction. Historic properties/historical resources subject to this mitigation measure will be thoroughly recorded in the appropriate format of the Historic American Building Survey (HABS)/Historic American Engineering Record (HAER)/Historic American Landscape Survey (HALS) programs prior to construction of the HST Project. See Section 3.17.6.2 of the EIR/EIS for additional details.

Significance of Project Period Impacts on Historical Properties and Resources

Construction or operational noise that impacts historic properties that have an inherent quiet nature that is part of their identification as well as their significance would cause impacts of moderate intensity under NEPA because they would permanently degrade the elements that make the historic property eligible for the NRHP. To the extent that visual effects and vibration could degrade the elements that make the resource eligible, these long-term effects would be moderate and adverse. As discussed in Section 3.17.3.4 of the EIR/EIS, although actions determined to have an adverse impact under NEPA may be mitigated and have a lesser effect, for Section 106, the effect determination remains adverse even when mitigated. See Table 7.4-4 at the end of the prior subsection for CEQA significance determinations before and after mitigation.

7.4.5.2 Cumulative Cultural Resource Impacts, Mitigation Measures, Significance with Mitigation

Cumulative Construction Cultural Resource Impacts

Prehistoric sites are common in riverbank and floodplain areas, and burial sites are sometimes encountered during ground-disturbing activities. It is likely that known and unknown archaeological resources could be disturbed and cultural resources damaged or destroyed during project construction activities. Significant and unavoidable losses of unique archaeological resources or a historical resource could occur when excavations encounter archaeological deposits that cannot be removed or recovered (e.g., under levees) or where recovery would not sufficiently prevent the loss of significant cultural resources. If such permanent losses occurred, cumulative construction impacts would be moderate under NEPA.

Further, under the No Project Alternative, three reasonably foreseeable projects could also adversely affect cultural resources. The Tesoro Viejo Specific Plan (for the area approximately 10 miles northeast of the project) would potentially affect a burial area. The Madera County Dairy Standards Programmatic Final EIR (Madera County 2008) states that this project has the potential to affect cultural resources. The cumulative cultural resource impacts of these projects would be significant *but by law mitigation will be required per regulatory standards so likely mitigated to a level that is less than significant*. The *Roeding Regional Park Master Plan* and *Fresno Chaffee Zoo Facility Master Plans* (City of Fresno 2011) would affect cultural resources in the Roeding Park Historic District, but these effects would be less than significant after mitigation.

Future growth under the No Project Alternative would result in the urbanization of land outside of existing urban areas but within urban spheres of influence. Historical architectural resources could also be damaged or require removal from areas in and around the study area. Furthermore, local projects and the secondary effects of redevelopment pressures around the HST stations would potentially result in the removal of historical buildings in Downtown Merced and Downtown Fresno. If these resources meet the definition of a historical resource or a historic resource (as defined in Section 106, 36 CFR 800 and Section 21083.2 of CEQA), their modification or destruction would be significant. Although the implementation of mitigation measures would reduce the effects on significant cultural resources, significant impacts may still occur. There could be a loss of significant cultural artifacts, and due to this likelihood, cumulative impacts could be substantial under NEPA.

As described in the 2005 Statewide Program EIR/EIS (Authority and FRA 2005) and the 2008 Bay Area to Central Valley Program EIR/EIS (Authority and FRA 2008), the HST System as a whole could have a significant impact on archaeological resources and historical structures, and therefore may contribute to a cumulatively considerable impact. Potential impacts would likely occur in areas that cross formations with paleontological sensitivity, such as the Colma Formation (San Francisco to San Jose Section), and in areas where the HST alternative alignments, including the Hybrid Alternative, use existing rail corridors, as

these corridors and potential stations in urban centers typically are surrounded by historical structures and districts.

Cumulative Cultural Resource Mitigation Measures

The Hybrid Alternative will minimize cumulative impacts on cultural resources by implementing all the mitigation measures described above, and by adhering to federal, state, and local cultural resource protection regulations and providing guidance on the treatment of significant properties (as defined in Section 106 evaluation criteria). Implementation of Mitigation measures for cultural resources summarized above and discussed in Section 3.17.6 of the EIR/EIS and compliance with applicable federal, state and local cultural resources protection regulation will minimize and mitigate the project's contribution to cultural resources impacts to a level that is not cumulatively considerable, thereby reducing cumulative impacts. Although implementation of mitigation measures can reduce cumulative impacts, it cannot avoid them entirely.

Significance of Cumulative Cultural Resources Impacts

The cumulative construction and operations impacts of the project and other reasonably foreseeable projects on cultural resources would be impacts of moderate intensity under NEPA and significant under CEQA, but would be minimized and mitigated to a level that is less than significant.

7.4.6 Farmland

7.4.6.1 Construction and/or Fill Related Agricultural Impacts, Mitigation Measures, and Significance with Mitigation

As described in Section 3.14 of the EIR/EIS, farmland impacts are defined based on the California Department of Conservation (DOC) Farmland Mapping and Monitoring Program (FMMP). Categories of "Important Farmland" are Prime Farmland, Farmland of Statewide Importance, Unique Farmland, and Farmland of Local Importance. The categories are defined according to USDA land inventory and monitoring criteria, as modified for California. Temporary use of Important Farmland during construction would be negligible because the land would not be permanently converted to a nonagricultural use. Disruptions to individual parcels during construction (e.g., severing irrigation systems) are economic effects that would be addressed (e.g., by agreeing to compensation) during the right-of-way acquisition process, and there would be no impact to Important Farmland.

7.4.6.2 Secondary/Operational Agricultural Impacts, Mitigation Measures, and Significance with Mitigation

The UPRR/SR 99 Alternative would affect between 1,027 and 1,149 acres of Important Farmland, the BNSF Alternative would affect 1,417 to 1,483 acres, and the Hybrid Alternative would affect 1,285 to 1,433 acres. These impacts are significant and unavoidable. The variations in design options and wye connections account for differences among the three alternatives. In addition, each of the HST alternatives would result in the acquisition of property from several confined animal facilities, including dairies (see EIR/EIS Appendix 3.14B, Impacts to Confined Animal Agriculture). Because confined animal facilities are not classified as Important Farmland, there would be no loss of Important Farmland.

The project would implement this measure to reduce substantial adverse environmental impacts resulting from the project:

- The Authority will enter into an agreement with the DOC California Farmland Conservancy Program to implement the preservation of farmland. The Authority will fund the California Farmland Conservancy Program's work to identify suitable agricultural land for mitigation of impacts and to fund the purchase of agricultural conservation easements from willing sellers. The performance standards for this measure are to preserve Important Farmland in an amount commensurate with the quantity and

quality of the converted farmlands, within the same agricultural regions as the impacts occur, at a replacement ratio of not less than 1.5:1. The California Farmland Conservancy Program will work with local, regional, or statewide entities whose purpose includes the acquisition and stewardship of agricultural conservation easements.

- The Authority and California Farmland Conservancy Program will develop selection criteria under this agreement to guide the pursuit and purchase of conservation easements. These will include, but are not limited to, provisions to ensure that the easements will conform to the requirements of Public Resources Code Section 10252 and to prioritize the acquisition of willing seller easements on lands that are adjacent to other protected agricultural lands or that would support the establishment of greenbelts and urban separators.

Loss of farmland cannot be mitigated to a less-than-significant level; the impact would remain significant and unavoidable following implementation of the above mitigation measure.

All alternatives would sever farmlands as discussed in EIR/EIS Section 3.14.5.3 (under the subheading Parcel Severance). Alternatives that do not follow an existing transportation corridor would sever more farmlands than alternatives that closely follow existing transportation corridors. Severance would be greatest at the northern and southern ends of the BNSF Alternative, the southern end of the Hybrid Alternative, all wye transitions, and the UPRR/SR 99 Alternative with the West Chowchilla design option.

The project would implement this measure to reduce indirect effects from parcel severance resulting from the project.

- The Authority will establish and administer a farmland consolidation program to sell remnant parcels to neighboring landowners for consolidation with adjacent farmland properties. In addition, the program will assist the owners of remnant parcels in selling those remnants to adjacent landowners, upon request. The goal of the program is to provide for continued agricultural use on the maximum feasible amount of remnant parcels that otherwise may be non-economic to farm. The program will focus on severed remainder parcels, including those that were under Williamson Act or Farmland Security Act contract at the time of right-of-way acquisition and have become too small to remain in the local Williamson Act or Farmland Security Act program. The program will assist landowners in obtaining lot line adjustments where appropriate to incorporate remnant parcels into a larger parcel that is consistent with size requirements under the local government general plan. The program will operate for a minimum of 5 years after construction of the section is completed.

Indirect effects from parcel severance would be reduced to a less-than-significant level following implementation of the above mitigation measure.

HST operations would result in noise and vibration impacts with negligible intensity on farm animals at two dairies and no impacts at other confined animal facilities (see EIR/EIS Appendix 3.14B, Impacts to Confined Animal Agriculture). Wind effects on bees, including pollination by bees, and adjacent cropland would be impacts with negligible intensity under NEPA and would not affect agricultural productivity (see EIR/EIS Appendix 3.3A, Induced Wind). Similarly, the HST vertical structures would not interfere with aerial application of pesticides and would not render agricultural lands unusable for farming.

7.4.6.3 Cumulative Agricultural Impacts, Mitigation Measures, and Significance with Mitigation

Construction of other past, present, and reasonably foreseeable projects could also result in the temporary conversion of farmland for construction-related uses. It is anticipated that this land would be restored and returned to agricultural use after construction is completed. Therefore, cumulative construction impacts on farmland would be impacts with negligible intensity under NEPA.

Approximately 1% of the Important Farmland and Grazing Land in Merced, Madera, and Fresno counties was converted to nonagricultural uses between 2000 and 2006. This trend is expected to continue in the future because more urbanization would continue to occur under the No Project Alternative. By 2035, an additional 23,200 acres of farmland is projected to be converted to urban uses. Although conversion to urban uses in many cases is consistent with local plans and policies that identify areas for planned future growth, loss of Important Farmland would be substantial for all HST alternatives. The HST alternatives would require the acquisition of up to approximately 1,483 acres of farmland, and conversion of farmland to nonagricultural uses is considered a cumulatively considerable impact. The HST Project will implement the mitigation measure listed above to preserve the total amount of Important Farmland, thereby reducing cumulative impacts. However, even with the implementation of the mitigation measure, farmland impacts will remain impact with substantial intensity under NEPA.

7.4.7 Use, Disturbance, Disposal Storage or Transport of Hazardous Materials

7.4.7.1 Construction and/or Fill Related Hazardous Materials and Wastes Impacts, Mitigation Measures, and Significance with Mitigation

Construction Hazardous Materials and Wastes Impacts

Construction of the Merced to Fresno Section of the HST System would result in increased hazardous materials use and waste generation, including ACM and lead-based materials. Construction could also inadvertently disturb sites with previously undocumented contamination. The potential for accidental spills and releases would be reduced to an impact with negligible intensity under NEPA with implementation of regulatory requirements, including employee training and preparation of management plans.

Construction of the Hybrid Alternative could affect sites with known contamination. These include five known high-risk sites of current environmental concern; four medium-risk sites of current environmental concern; and 19 to 23 sites that are conceivable sites of potential environmental concern. To the extent feasible, project design would avoid known sites, for example, by elevating the track. Construction at contaminated sites would be contingent on coordination with regulatory agencies, and would require pre-construction study and potential remediation. Impacts are considered to be impacts with negligible intensity under NEPA.

Construction could also disturb oil wells and landfills, or their surrounding environments. The potential for a methane gas release as a result of altered subsurface conditions that could lead to an increased explosion risk is an impact with moderate intensity under NEPA. Pre-construction investigation and compliance with existing regulations, including the implementation of BMPs such as methane gas monitoring would mediate the potential explosion risk. This impact would be an impact with negligible intensity under NEPA.

As noted in Table 3.10-3 of the EIR/EIS, 12 schools are located in the vicinity of potential construction activity for the Hybrid Alternative. Prior to construction, schools within the construction footprint would be relocated; this would eliminate any further impact on these schools. The project would comply with all federal and state regulations that are generally anticipated to reduce the potential for the release of large quantities of hazardous materials and wastes into the environment to an acceptable level. These standard procedures would not obviate the potential for the accidental release of an extremely hazardous substance (as defined in PRC Section 21151.4) in a quantity equal to or greater than the state threshold quantity specified pursuant to subdivision (j) of Section 25532 of the Health and Safety Code within 0.25 mile of a school, however. Because of the potential for the accidental release of extremely hazardous materials, the effect of HST construction related to routine transport and handling of hazardous or acutely hazardous materials within 0.25 mile of an existing or proposed school would be an impact with moderate intensity under NEPA.

Construction Hazardous Materials and Wastes Mitigation Measures

To mitigate for potential impacts on schools within 0.25 mile of the construction footprint, the following mitigation measure could be implemented:

HMW-MM#1: Limit use of extremely hazardous materials near schools. The contractor shall not handle an extremely hazardous substance (as defined in California Public Resources Code Section 21151.4) or a mixture containing extremely hazardous substances in a quantity equal to or greater than the state threshold quantity specified pursuant to subdivision (j) of Section 25532 of the Health and Safety Code within 0.25 mile of a school. Signage would be used to delimit all work areas within 0.25 mile of a school and the contractor would be required to monitor all use of extremely hazardous substances.

Conclusion

With the implementation of standard procedures and the commitment to not handle an extremely hazardous substance (as defined in California Public Resources Code Section 21151.4) or a mixture containing extremely hazardous substances in a quantity equal to or greater than the state threshold quantity specified pursuant to subdivision (j) of Section 25532 of the Health and Safety Code within 0.25 mile of a school, the potential impact from the use of such materials within 0.25 mile of the school would be eliminated.

7.4.7.2 Secondary/Operational Hazardous Materials and Wastes Impacts, Mitigation Measures, and Significance with Mitigation

Operational Hazardous Materials and Wastes Impacts

Operation of the Merced to Fresno Section of the HST System would result in increased hazardous materials use and waste generation. The potential for accidental spills and releases would be reduced to negligible intensity with implementation of regulatory requirements. The project would have a beneficial impact on schools, as improved traffic conditions are anticipated to reduce the likelihood of transportation accidents that would cause the release of hazardous materials. The impacts associated with the operation of the HST near existing oil wells and landfills would be impacts with negligible intensity under NEPA due to established facility monitoring and project design features that would prevent derailment. None of the NEPA impacts identified would be significant under Council on Environmental Quality (CEQ) regulations 1508.27.

Operational Hazardous Materials and Wastes Mitigation Measures

There are no mitigation measures necessary for operational use of hazardous materials or handling of hazardous wastes.

Conclusion

There would be no secondary hazardous materials or wastes impacts during operation.

7.4.7.3 Cumulative Hazardous Materials and Wastes Impacts, Mitigation Measures, and Significance with Mitigation

Potential Cumulative Hazardous Materials and Wastes Impacts

The HST would result in an increase in the use of hazardous materials and generation of hazardous wastes, primarily during construction. Following construction, environmental quality would increase due to remediation of contaminated sites and the reduced congestion of transportation corridors. Projects considered under the cumulative condition may use hazardous materials during construction, impact existing sites of contamination, or generate hazardous wastes.

Construction. Construction of the Hybrid Alternatives and past, present, and reasonably foreseeable projects would temporarily increase, and, therefore, contribute incrementally to the regional transportation, use, storage, and disposal of hazardous materials and petroleum products (such as diesel fuel, lubricants, paints, solvents, and cement products containing strong basic or acidic chemicals). While hazardous materials handling may increase during construction, compliance with regulations and implementation of mitigation that would reduce hazardous materials use near schools would result in potential cumulative impacts that would be impacts with negligible intensity under NEPA.

Operation. The 68% increase in population by the year 2035 is anticipated to result in increased transport, storage, use, and disposal of hazardous substances within the Merced to Fresno corridor. Households, industrial sites, and agricultural operations use hazardous materials and generate hazardous waste. Although HMF operations would incrementally increase the use, storage, and disposal of hazardous materials and petroleum products, HMF operations would comply with regulatory requirements to minimize the risk of exposure to or release of hazardous materials. In addition, the improved mobility of the regional transportation network anticipated with the implementation of the HST, may result in a reduced risk of accidental spills or releases of hazardous materials during routine transport of such materials.

Further, property acquisition and construction of new projects may result in improved environmental quality of the study area through the necessary remediation of known and unknown contamination. For this reason, it is possible that there would be fewer contaminated sites under the cumulative condition in 2035. Overall cumulative impacts from the transportation, use, storage, and disposal of hazardous materials would be impacts with negligible intensity under NEPA.

Cumulative Mitigation Measures

Because all projects in the study area, including the HST, would comply with existing regulations related to the use, transport, and disposal of hazardous materials, no cumulative mitigation measures would be necessary.

Conclusion

Construction and operations impacts on the transportation, use, storage, and disposal of hazardous materials would be impacts with negligible intensity under NEPA because the HST alternatives and other future projects would comply with regulatory requirements that minimize the risk of exposure to or release of hazardous materials.

7.4.8 Impacts to Public Utilities

7.4.8.1 Construction and/or Fill Related Public Utilities and Energy Impacts, Mitigation Measures, and Significance with Mitigation

Construction Public Utilities and Energy Impacts

Potential impacts to public utilities and energy as a result of construction would include disruption of utility service, use of water and energy, and the generation of construction and demolition (C&D) waste. The Authority would positively locate public utilities within the potential impact area (by probing, potholing, electronic detection, as-built designs, or to other means) prior to construction, in compliance with state law, to avoid accidental service disruptions. Advance notice would be given for scheduled service interruptions, and design and phasing would minimize impacts; as a result, utility customers would experience negligible effects.

Project construction would require water. Existing land use is heavily agriculture-based and requires significant amounts of water to maintain operations. Because various existing sources would provide adequate water supply during construction and because of the overall decrease in demand, the effect is

an impact with negligible intensity under NEPA. Construction of the project would require removal of existing facilities, including roads and buildings. These activities would generate demolition waste, including hazardous waste (e.g., asbestos-containing materials). As standard construction practice, the contractor would divert C&D waste from landfills by reusing or recycling. Although there are three landfills in the immediate area that accept C&D material, other regional facilities may be used for waste disposal. Because regional solid waste and hazardous waste landfills have adequate capacity, the effect would be an impact with negligible intensity under NEPA.

The HST project would implement BMPs to avoid wasteful and inefficient use of energy during construction. Energy required for construction would be offset in less than 1 year by the projected energy savings associated with regional use of the HST rather than other forms of travel. This impact would be an impact with moderate intensity under NEPA.

Construction Public Utilities and Energy Mitigation Measures

There are no mitigation measures necessary for construction of the Merced to Fresno HST.

Conclusion

With the implementation of standard procedures and project commitments, potential impacts to public utilities from the construction of the HST would be impacts with negligible intensity under NEPA. Construction impacts from energy use would be impacts with moderate intensity under NEPA.

7.4.8.2 Secondary/Operational Public Utilities and Energy Impacts, Mitigation Measures, and Significance with Mitigation

Operational Public Utilities and Energy Impacts

The Hybrid Alternative could affect developed areas in the cities of Merced and Fresno and the community of Madera Acres. With the Ave 21 Wye, the Hybrid Alternative could also affect the City of Chowchilla. The project would conflict with existing underground and aboveground utilities. The Hybrid Alternative design options would cross approximately 25 to 41 high-risk utilities and approximately 90 to 125 low-risk utilities. In the City of Fresno, the alignment would affect T-Mobile's regional switching office and stormwater basins. The operation and maintenance of the Hybrid Alternative could result in permanent relocation and extensions of utilities; reduced access to existing utilities in the project footprint; and increased demand for water, wastewater, and waste disposal services.

Where it is not possible to avoid utilities, the project would protect them in place while maintaining access by moving or encasing linear utilities, resulting in a an impact with negligible intensity under NEPA. Upgrades of existing power lines and substations would be conducted in accordance with applicable regulations and would result in a an impact with negligible intensity under NEPA. In addition, the Hybrid Alternative would not physically encroach on the footprint of water or wastewater treatment facilities, water pump stations, or power plants.

An electrical substation northeast of the Madera city limits would be located in the study area for road improvements associated with the Hybrid Alternative. The Hybrid Alternative with the Ave 21 Wye would also affect a substation along the Ave 21 Wye. Where the Hybrid Alternative alignment would conflict with existing electrical substations, there is a potential for an impact with substantial intensity.

Operation of the HST stations and HMF would increase the demand for water supply, wastewater treatment, and waste disposal. Project operation activities that would generate solid waste include passenger refuse disposal and materials used for HST maintenance. Waste generated at the Downtown Merced Station would be disposed of at the Highway 59 Landfill, while waste from the Downtown Fresno Station would be disposed of at the American Avenue Landfill. Impacts would be impacts with negligible

intensity under NEPA because all utility service providers have sufficient capacity and groundwater drawdown effects would be impacts with negligible intensity under NEPA.

Operation of the HST System would increase the demand for electricity and reduce the overall demand for energy as a result of the decreased number of road vehicle and airplane trips. Operation of the Merced to Fresno Section of the HST System would contribute approximately 10% to the increase in demand for electricity, while resulting in an overall reduction of energy consumption in California.

Operational Public Utilities and Energy Mitigation Measures

The following mitigation measures will be implemented during the final design phase to address impacts to public utilities:

- **PUE-MM#1**: **Redesign to avoid substation.** Roadway modifications associated with the Hybrid Alternative would affect a substation. The final project design will avoid these conflicts through refinements of project features.
- **PUE-MM#2: Move existing substation.** If the Ave 21 Wye requires relocation of a substation, the existing substation will be moved to one of five potential locations, as shown in Figure 3.6-8 of the EIR/EIS. Each location would affect prime farmland. Alternative relocation sites 1 and 2 include farmland under Williamson Act contracts. Mitigation for these effects is described in Section 3.14, Agricultural Lands, of the EIR/EIS.

Conclusion

The project design incorporates precautions to avoid existing utilities and design elements that minimize electricity consumption (e.g., using regenerative breaking, and energy-saving equipment and facilities). Operation of the HST System would increase the demand for electricity and reduce the overall demand for energy as a result of the decreased number of road vehicle and airplane trips. Roadway modifications associated with the Hybrid Alternative would be refined to avoid impacts to a substation. Another substation along the Ave 21 Wye would require relocation to a new, nearby location. With implementation of these mitigation measures, the impacts on the existing substations would be impacts with negligible intensity under NEPA.

7.4.8.3 Cumulative Public Utilities and Energy, Mitigation Measures, and Significance with Mitigation

Potential Cumulative Public Utilities and Energy Impacts

There would be an increased demand for utilities and energy to support the projected 2035 population and employment growth in the Central Valley. Many of the planned and potential projects in the area reflect this increased growth, including numerous subdivisions and commercial developments.

Construction

Impacts that could result from the temporary shutdown of utility lines and accidental disturbance of utilities would be limited due to established industry practices of utility location and phasing, and the short duration of shutdown. Project demand for public utilities would be within the capacity of existing facilities. The Authority's goal for diversion of non-hazardous construction and demolition waste is 75%. Remaining construction waste would be disposed at a landfill facility with sufficient permitted capacity to accommodate the project's solid waste disposal needs.

Operation

The incremental draw on utilities, including natural gas, petroleum, and telecommunications services, would be equivalent to similar commercial uses in the area and would be an impact with negligible

intensity under NEPA. The Hybrid Alternative would not cumulatively contribute to overall demand for utility services (compared to the added demand created by 352,000 new households associated with the cumulative condition under the No Project Alternative). Project demand for public utilities would be within the capacity of existing facilities. The Fairmead Landfill in Chowchilla would not be used for the disposal of wastes generated at the HST stations. Impacts on existing utilities would be impacts with negligible intensity under NEPA. Further, the HST alternatives are beneficial from an energy conservation perspective.

Cumulative Mitigation Measures

The Hybrid Alternative may require the relocation of an electrical substation. Following such relocation, the conflict would be eliminated. Similarly, all other utility conflicts would be remediated prior to HST operation. The HST would not contribute substantially to the landfill capacity shortage in the City of Chowchilla, because waste would be transmitted to one of the many landfills in the area with permitted capacity. Further mitigation would not be required.

Conclusion

During construction and operations, the HST would not cumulatively contribute to overall demand for utility services (when compared to the added demand created by 352,000 new households associated with the No Project Alternative); therefore operations impacts on existing utilities would be impacts with negligible intensity under NEPA. The additional demand caused by project operations in conjunction with the No Project Alternative and other reasonably foreseeable projects would not contribute to substantial or cumulatively considerable water resource impacts. Existing solid waste facilities have permits to operate through the early 2030s and can serve the projected increase in population and operations requirements of the HST System. Therefore, the cumulative impacts would be impacts with negligible intensity under NEPA.

7.4.9 Other Anticipated Changes to Non-Jurisdictional Areas that Have Been Determined to be within the Corps' NEPA Scope of Analysis

7.4.9.1 Construction and/or Fill Related Displacement Impacts, Mitigation Measures, Significance with Mitigation

Affected Environment

From the Downtown Merced Station site to north of Chowchilla, community and neighborhood characteristics are the same as those described under the UPRR/SR 99 Alternative. The Hybrid Alternative with the Ave 24 Wye is the same as the UPRR/SR 99 Alternative with the West Chowchilla design option. This alignment then travels east along the Ave 24 Wye through agricultural land and joins the BNSF corridor. From that point (north of Madera Acres) south to the site of the Downtown Fresno Station, community and neighborhood characteristics are the same as those described for the BNSF Alternative. The Hybrid Alternative with the Ave 21 Wye is the same as the UPRR/SR 99 Alternative with the East Chowchilla design option and this alignment travels east along the Ave 21 Wye and joins the BNSF corridor, similar to the Hybrid Alternative with the Ave 24 Wye.

Construction Period Impacts

The construction period of the project also includes purchasing of the right-of-way and testing of HST vehicles, in addition to the heavy construction (e.g., grading, excavating, and laying the HST railbed and guideway).Refer to Chapter 2, Alternatives, for information on the construction period timeframe. Although property acquisitions would occur prior to construction, the impacts would be permanent and

are discussed in the Project Impacts section below. The assumption that displacements would be permanent provides a conservative, worst-case estimate.

7.4.9.2 Project Period Displacement Impacts, Mitigation Measures, Significance with Mitigation

Project Period Impacts

Table 7.4-6, provides a detailed breakdown of the number of displacements caused by each alternative and its associated routing options. The detailed breakdown is discussed in more detail in Section VI(E) as well. The table below provides an aggregated range of displacements.

With the Hybrid Alternative, the majority of the residential and business displacements identified in the table above would occur in Madera Acres and the cities of Madera and Fresno. The Hybrid Alternative would not travel through the City of Madera, which would be affected by the UPRR/SR 99 Alternative, or the unincorporated community of Le Grand, which would be affected by the BNSF Alternative.

Table 7.4-6
Displacement Impacts by Alternative

Resource Categories	Displacement Impacts by HST Alternative[a]			Explanation of Measured Impact
	UPRR/ SR 99 Alternative	Hybrid Alternative	BNSF Alternative	
Operation Community Impacts				
Displacements	185 to 222	196 to 226	207 to 238	Total Number of Residential Displacements
Displacements	281 to 286	210 to 218	214 to 228	Total Number of Business/Institution Displacements

For all three HST alternatives, most of the businesses that would likely be affected are within the alignment rights-of-way, including the HST station footprints. These businesses include auto dealerships, restaurants, gas stations, motels, businesses that serve the surrounding agricultural community, and industrial and warehouse facilities. The majority of the businesses that would be affected are located in the downtown areas of Merced, Madera, and Fresno. There are no business districts (e.g., a cluster of stores) within these downtown areas that would be negatively affected by the acquisitions. In the urban areas, where such businesses are located, the guideway would be elevated, minimizing the amount of required right-of-way to construct the project. It is also likely that some businesses would be able to relocate under the guideway after construction is complete, which would minimize impacts. In rural areas, the guideway would pass through agricultural land. The largest industries, based on the number of employees, in the three counties are associated with agriculture, services, and government.

In addition to the potential direct impacts on businesses, the HST alternatives may result in physical deterioration of areas if property values decline because of the project. Physical deterioration is not expected in the downtown areas of Merced and Fresno, because the HST stations would likely be a catalyst for new development and redevelopment in those areas. In areas where there is no HST station, such as downtown Madera, the elevated guideways could have a negative impact on businesses; however, as previously discussed, implementation of mitigation measures may result in beneficial effects for the downtown area. Refer to Appendix 3.13-B, Land Use and Communities, for additional information on the adjacent land uses and how development would not be precluded in these areas.

Project Period Mitigation Measures

The project would comply with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Uniform Relocation Act). The Uniform Relocation Act and its amendments provide mandatory rules and requirements on how federal, state, and local agencies compensate for impacts on property owners or tenants who need to relocate if they are displaced by a federally funded project. In addition, housing of last resort would be available, if required. Housing of last resort may require replacement housing payments that exceed the maximum amounts allowed under the Uniform Relocation Act or other methods of providing comparable decent, safe, and sanitary housing within the displaced person's financial means.

SO-MM#2: Develop a relocation mitigation plan. Before any acquisitions occur, the Authority will develop a relocation mitigation plan, in consultation with affected cities and counties. In addition to establishing a program to minimize the economic disruption related to relocation, the relocation mitigation plan will be written in a style that also enables it to be used as a public information document. The plan will be intended to meet the following objectives:

- Provide affected property and business owners and tenants a high level of individualized assistance in situations when relocation is necessary.
- Make a best effort to minimize the permanent closure of displaced businesses and non-profit agencies as a result of relocations.
- Within the limits established by law and regulation, minimize the economic disruption caused to tenants and residents by relocation.
- In individual situations where warranted, consider the cost of obtaining the entitlement permits necessary to relocate to a suitable location and take those costs into account when establishing the fair market value of the property.
- Provide those business owners who require complex permitting (such as dairies) with regulatory compliance assistance.

The relocation mitigation plan will include the following components:

- A description of the appraisal, acquisition, and relocation process that describes the activities of the appraisal and relocation specialists, for the benefit of the reader.
- A means of assigning appraisal and relocation staff to affected property owners, tenants, or other residents on an individual basis.
- Individualized assistance to affected property owners, tenants, or other residents in applying for funding, including research to summarize loans, grants, and federal aid available, and research of demographically similar areas for relocation.
- Creation of an ombudsman's position to act as a single point of contact for property owners, residents, and tenants with questions about the relocation process. The ombudsman would also act to address property owners', tenants', and other residents' concerns about the relocation process as it applies to their situations.

Relocation Mitigation Plans are commonly used for large infrastructure projects that remove a large number of residences and businesses, such as this project, and are considered successful in minimizing the impact to individual property owners.

SO-MM#4: Implement measures to reduce impacts associated with the relocation of community facilities. Minimize impacts associated with the acquisition of the homeless shelter in

Merced, which is affected by all alternatives, and Joe Stefani Elementary School, Merced Lao Family Community, Merced Senior Center, McCombs Youth Center, which are affected by the Castle Commerce Center HMF, by conducting outreach and coordinating with the facility prior to acquisition. Coordinate with the respective parties prior to land acquisition to reconfigure or relocate facilities, as necessary, to minimize disruption to activities. To reduce disruption to the use of these community facilities, the Authority will make sure that reconfiguring of land uses or buildings or relocating of community facilities is completed before the demolition of any existing structures. Work with the City of Merced and Merced City School District to facilitate the construction of the facilities prior to demolition of the existing structures. During the design process, the Outreach Team will conduct targeted outreach efforts for these facilities to understand and determine their needs for siting criteria. This mitigation measure will be effective in minimizing the impacts of the project by completing new facilities prior to relocation being necessary, and by involving affected facilities in the process of identifying new locations for their facilities.

SO-MM#6: Avoid displacements or consider housing options in Franklin-Beachwood, Le Grand, Fairmead, and rural areas. Displaced residents in these minority communities and rural areas may be unable to relocate within the same community because comparable replacement housing may not be available or limited at the time of acquisition. During property acquisition in these communities and rural areas, the Authority will consider all comparable replacement housing options to allow displaced residents to remain in their communities, including but not limited to the following:

- Construct new housing on vacant lots within the communities.
- For any large parcels, relocate the residential structure or structures on the property if that is feasible and would move them outside the project area.
- Move the residential structures to nearby vacant parcels.

This mitigation measure will be effective by minimizing the distances that residences or businesses have to relocate within these communities and by working to keep them within their current community.

Project Period Significance

At the regional level, the overall impacts of property acquisitions would be moderate under NEPA and less than significant under CEQA because of the number of housing displacements within the three counties and there are a number of suitable relocation opportunities.

Impacts on agricultural enterprises, farm businesses, and specialized industries including quarries, granaries, and processor facilities would be substantial under NEPA because relocation would be disruptive, and some businesses might not be able to relocate. The project's economic effects are not effects on the physical environment. Therefore, no significance determination is required under CEQA.

7.4.9.3 SECTION 4(F)

The Hybrid Alternative would result in the use of four Section 4(f) resources, half the number that would be used by the UPRR Alternative. These uses, Camp Pashayan, Robertson Tree Row, Belmont Avenue Subway and Traffic Circle in Fresno, and the Weber Avenue Bridge, and the measures to minimize harm for these uses are identical to those described for the UPRR Alternative in Section VI (B). But, the UPRR Alternative would use an additional four Section 4(f) resources that the Hybrid does not use. The Hybrid Alternative avoids any use of a significant historic resource, the SPRR Station in Madera. The SPRR station would be demolished by the UPRR Alternative, an impact that will not occur with the Hybrid Alternative.

8.0 Summary Comparison of Proposed Project and Other Potentially Practicable Alternatives

In December 2011, the Authority identified the Hybrid Alternative as the Preferred Alternative for the Merced to Fresno Section of the California HST Project. This section provides a comparison of the Hybrid Alternative (also referred to as the Proposed Project or the Authority's Preferred Alternative) and the UPRR/SR 99 and BNSF alternatives for the Merced to Fresno Section HST Project. Pursuant to the analysis set forth in the February 2012 administrative draft of the EIR/EIS for the Merced to Fresno Section High-Speed Train (HST) Project, all of the HST alternatives studied would:

- As a whole, considering the context, magnitude, intensity and duration of likely environmental impacts as required by NEPA, have a substantial effect on the environment; and
- Result in a number of significant adverse environmental impacts under CEQA, some of which can be mitigated to a level that is less than significant; and
- Result in a number of significant adverse impacts (taking into account direct, indirect and cumulative effects) on the environment that are not likely to be avoided or fully mitigated under NEPA by alternative project design features or mitigation measures, and that would remain significant despite avoidance, minimization and mitigation measures under CEQA.

In accordance with the Section 404(b)(1) Guidelines (40 CFR Part 230), the USACE cannot issue a permit if there is a practicable alternative to the proposed discharge that would have less adverse impact on the aquatic ecosystem and would not have other significant adverse environmental consequences (40 CFR § 230.10(a); referred to as the LEDPA requirement). Practicable alternatives are project alternatives that are available and capable of being implemented after taking into account considerations of cost, existing technology and logistics, in light of overall purpose and need of the project (40 CFR § 230.3(q)).

This section provides a summary comparative analysis of Merced to Fresno Section HST project (MF HST project) Alternatives to support the LEDPA determination. In an effort to provide a clear comparison both within and among the build alternatives, the text below discusses for each MF HST project alternative the best case design option (the combination of design options and avoidance and mitigation measures resulting in the least potential impacts to the environment) and worst case design option (the combination of design options and avoidance and mitigation measures resulting in the greatest potential impacts to the environment).

8.1 Impacts to Aquatic Ecosystem

8.1.1 Impacts to Jurisdictional Waters

For the purposes of determining impacts to jurisdictional waters for the Checkpoint C Summary, jurisdictional waters consist of all wetlands and water features identified as the preliminary jurisdictional delineation, including, without limitation, all seasonal wetlands, vernal pools, and other wetlands. For purposes of this evaluation and consistent with the preliminary jurisdictional determination, all jurisdictional waters identified in the wetland study area (WSA) were assumed to be potential waters of the U.S. The analysis of impacts on jurisdictional waters is based on information from the Watershed Evaluation Report (WER), which documents field survey results, aerial imagery interpretation, and desktop GIS analysis using existing sets of mapped aquatic resources data within the 8-digit hydrologic unit code watersheds traversed by the project (e.g., NWI, GAP, NHD). The WER is provided as Appendix B. Jurisdictional features identified in the WSA are categorized as vernal pools, seasonal wetlands, freshwater marsh, palustrine forested wetlands, natural watercourses, constructed

watercourses, constructed basins, and open water. These eight jurisdictional waters categories are further defined in the WER.

For purposes of evaluating impacts to jurisdictional waters, the area of adverse impact generally consists of the following areas:

- A 100-foot project construction footprint for track segments;
- The actual construction footprint for any ancillary project improvements to be constructed in the vicinity of jurisdictional waters (e.g., MF HST Project stations, power distribution facilities, and/or maintenance facilities); and
- An area of potential adverse impacts within a 250-foot buffer around the construction footprint for track or ancillary project improvements proposed for construction in proximity to jurisdictional waters.

Further, for this evaluation of impacts, it is conservatively assumed (to determine the maximum direct impact that might result from each MF HST Project alternative) that:

- All aquatic resources present within the entire construction footprint identified for any ancillary MF HST Project facilities located in proximity to jurisdictional waters would be directly and permanently lost due to construction of such facilities;
- All aquatic resources present within the entire 100-foot track segment construction footprint would be directly and permanently lost due to construction of at-grade grade track segments as a result of the introduction of compacted soil and ballast material and the construction of the track improvements;
- All aquatic resources within 60 feet of the 100-foot track segment construction footprint would be directly and permanently lost due to construction of elevated track segments as a result of construction of pier supports, fill embankments, and track improvements for elevated track segments;
- All aquatic resources within the remaining 40 feet of the track segment construction footprint would be temporarily impacted by construction of elevated track segments due to ground disturbance, vegetation removal, and vegetation disturbance associated with construction within the 60-foot wide area, but no fill would be placed within the 40-foot area for purposes of constructing elevated segments and the 40 foot area would be restored to its original condition (contour, vegetation, etc.) following disturbance;
- All aquatic resources within 250 feet of the project footprint for ancillary improvements and within 250 feet of the 100-foot track segment construction footprint would be subject to permanent indirect impacts.

Potential indirect impacts on jurisdictional waters include potential adverse impacts on water quality caused by runoff, erosion, and siltation; potential changes in hydrologic regime and water quality function caused by damage associated with permanent constructed facilities to the hardpan soil layer, sedimentation, stream or wetland fragmentation, soil compaction, disruption of the upland micro watershed area, barriers to water flow (e.g., the rail bed); and potential changes in the quantity and quality of wetland and riparian plant communities from disturbance, shading, introduction or spread of invasive plant species, and similar causes.

CRAM was used to evaluate the ecological condition of all jurisdictional waters within the WSA. CRAM assesses waterbody condition based on functional capacity. Waterbody functions are defined as processes or services that take place in a wetland, riparian or open water area, and these functions fall into three broad categories: habitat, hydrologic, and water quality (Novitzki, Smith, and Fretwell 1997).

Habitat functions are those services that benefit wildlife and include provision of food, shelter, water, and breeding grounds. Hydrologic functions include groundwater recharge and discharge, water storage, and reduction in flow velocity. Water quality functions include trapping sediment and nutrient removal and transformation. Although waterbody functions generally fall into these three broad groups, many functions are interdependent and if one function is impaired, it can affect other functions. CRAM is designed to measure the ability of a particular waterbody to provide ecological functions. Therefore the higher the CRAM score, the better the functional condition of the jurisdictional water.

Values are the benefits that waterbody functions provide, and can be ecological, social, or economic (Novitzki, Smith, and Fretwell 1997). The relative value of a particular waterbody function can vary considerably depending on the weight policy makers give to various interests. Thus, CRAM cannot assign a value to a waterbody, but can only assess the relative functional condition of that waterbody.

The USACE requires mitigation resulting in no net loss of the functions of jurisdictional waters as a condition of issuing Section 404 permits under the Clean Water Act. Therefore it has been assumed that all wetland functions are of concern to USACE and the federal agencies they are required to coordinate with each other during the permitting process (i.e., USFWS and EPA), and that all functions are equally valuable. Because CRAM provides a measurement of the functional capacity of a waterbody, USACE and EPA can use the CRAM scores to help determine the value of a given waterbody based on its ability to perform habitat, hydrologic, and water quality related functions.

8.1.2 Relative Quantity of Jurisdictional Waters Impacted by Alternatives

Section 3 (Hybrid Alternative), Section 6.2 (UPRR/SR 99 Alternative), Section 6.3 (BNSF Alternative), and Section 7 of this document provide a detailed discussion of impacts to jurisdictional waters by alternative, including tables which show breakdowns by north-south alignment and design options. Table 8.1-1 in this section below provides an overall summary of impacts to quantity of jurisdictional waters by alternative.

As summarized in Table 8.1-1 below, the BNSF Alternative would have the greatest impact on jurisdictional waters in terms of acreage of jurisdictional waters affected. As shown in Table 8.1-1, each of the BNSF design option combinations would result in substantially greater acreage of total impacts (i.e., direct permanent, indirect permanent, and direct temporary) on jurisdictional waters than any of the UPRR/SR 99 Alternative or Hybrid Alternative design option combinations. Under the best-case scenario for the BNSF Alternative (Mariposa Way with Le Grand with Ave 24 Wye design option), total impacts would occur to approximately 165 acres of jurisdictional waters. The design option with the greatest impacts to jurisdictional waters for the Hybrid Alternative (the West Chowchilla with Ave 24 Wye) would impact a total of approximately 148 acres of jurisdictional waters, or nearly 20 acres less than the best-case design option under the BNSF Alternative.

Table 8.1-1
Summary of Assumed Quantitative Impacts on Jurisdictional Waters for the HST by Alternative and Design Options

North-South Alignment Isolated and with Wye Design Option	UPRR/SR 99 Alternative			Hybrid Alternative		BNSF Alternative							
						Mariposa Way Design Options				Mission Ave Design Options			
	East Chowchilla Design Option	East Chowchilla Design Option	West Chowchilla Design Option	East Chowchilla Design Option	West Chowchilla Design Option	Le Grand	East of Le Grand	Le Grand	East of Le Grand	Le Grand	East of Le Grand	Le Grand	East of Le Grand
	Ave 21	Ave 24	Ave 24	Ave 21	Ave 24	Ave 21		Ave 24		Ave 21		Ave 24	
Total Direct Impacts on Vernal Pools (acres)	1.44	0.87	1.05	4.16	3.81	15.69	11.90	15.74	11.95	16.41	16.11	16.46	16.16
Total Indirect Impacts on Vernal Pools (acres)	2.64	1.62	1.18	11.62	6.92	38.26	41.37	36.46	39.57	35.53	42.29	33.73	40.49
Total Direct Impacts on Jurisdictional Waters (acres)	35.02	32.50	37.43	38.97	41.44	43.73	41.38	45.88	43.53	47.95	49.34	50.11	51.48
Total Indirect Impacts on Jurisdictional Waters (acres)	77.53	78.53	88.11	87.20	94.54	128.35	135.25	110.67	117.56	120.88	129.68	115.51	124.31
Total Temporary Impacts on Jurisdictional Waters (acres)	13.25	13.74	12.25	11.99	11.54	6.79	17.86	8.37	8.62	6.49	6.87	8.05	8.45
Total Impacts on Jurisdictional Waters (acres)	125.8	124.77	137.79	138.16	147.52	178.87	194.49	164.92	169.71	175.32	185.89	173.67	184.24

The UPRR/SR 99 Alternative would have the least total impacts on affected jurisdictional waters in terms of acreage. Under the best-case design option for the UPRR/SR 99 Alternative (the East Chowchilla Ave 24 design option combination), a total of approximately 125 acres of jurisdictional waters would be temporarily and permanently, directly and indirectly impacted. Under the best-case design option for the Hybrid Alternative (the East Chowchilla Ave 21 design option combination), a total of approximately 138 acres would be temporarily and permanently, directly and indirectly impacted; a difference of about 13 acres. However, the bulk of this 13-acre difference in total impact acreage actually consists of indirect, rather than permanent direct impacts to jurisdictional waters associated with the Hybrid Alternative. More specifically, the difference between the best-case design options for these two alternatives indicates that the Hybrid Alternative would directly impact only approximately 6.5 acres more jurisdictional waters than the UPRR/SR 99 Alternative (32.5 acres vs. 38.97 acres).

With respect to indirect impacts, the best-case design option for the UPRR/SR 99 Alternative would result in approximately 78 acres of indirect impacts; the best-case design option for the Hybrid Alternative would result in approximately 87 acres of indirect impacts. These indirect impacts would occur in jurisdictional waters located outside of the construction footprint, within 250-foot buffer conservatively identified by the Authority and FRA for purposes of assuring that all potential indirect impacts are fully assessed pending further site specific analysis (which is not feasible at this stage of the MF HST Project). For example, of the approximately 16 acres of vernal pools that exist in and within the 250-foot buffer area adjacent to the Hybrid Alternative East Chowchilla and Ave 21 design option construction footprint, only 4 acres of pools would be directly removed by project implementation. The remaining 12 acres of pools are conservatively considered subject to indirect impacts solely because they are located within 250 feet of the project footprint. However, this 12-acre estimate of indirect impacts to vernal pools, and the estimates of indirect impacts to all jurisdictional resources within the 250-foot buffer are almost certainly conservatively overstated for a number of reasons.

First, by way of example, many of the vernal pools within the 250-foot construction impact buffer area that are determined to be indirectly impacted pursuant to the selected environmental analysis methodology are likely to have very small watersheds that are completely isolated from the construction footprint. Therefore, changes in hydrology assumed in the environmental analysis to indirectly impact these vernal pools would not actually be expected to result from project implementation when a more detailed level of site-specific analysis is feasible to conduct. Furthermore, indirect impacts are assumed in the environmental analysis to adversely affect aquatic features within the buffers, even if those features are located upstream or upgradient of the construction footprint. However, such impacts would likely be minimal or non-existent when site-specific hydrology is considered, and project design features would further minimize potential indirect hydrology and water quality impacts on jurisdictional waters through management of stormwater and pollutant discharge control measures, erosion control measures, and application of other best management practices. As a result, when site specific context is considered in evaluating predicted indirect impacts to jurisdictional waters, the indirect impacts to jurisdictional waters associated with all Alternatives and design option combinations are anticipated to be negligible. Further, for the reasons discussed above and in the WER, the level of indirect impacts on jurisdictional waters is not realistically expected to differ substantially as between the Hybrid and UPRR/SR-99 Alternatives, despite the stated differences in indirect impact acreage between those Alternatives.

In addition to considering relative differences in the predicted indirect impacts associated with the Hybrid and UPRR Alternatives in light of site-specific context, it is important to consider the relative differences in predicted indirect and direct impacts to jurisdictional waters for those two alternatives in the watershed context. As described in the WER, the construction footprint for the Hybrid and UPRR/SR99 Alternatives traverses three 8-HUC watersheds: Middle San Joaquin-Lower Chowchilla, Upper Chowchilla-Upper Fresno, and Upper Dry. Implementing either of the alternatives would not directly affect any jurisdictional waters within the Upper Dry watershed and would affect only a small percentage of the existing jurisdictional waters in the other two watersheds. For example, the UPRR/SR 99 Alternative would affect (permanently and temporarily, directly and indirectly impact) approximately 8 percent of existing vernal pool acreage within the three watersheds, and the Hybrid Alternative would affect approximately

10 percent of existing vernal pool acreage within the three watersheds. Evaluation of these predicted impacts in this watershed context indicates that significant avoidance of impacts to the bulk of jurisdictional waters is achieved by both the Hybrid and UPRR/SR99 Alternatives.

Because the difference in acreage of jurisdictional waters that would be directly and permanently lost between the UPRR/SR 99 and Hybrid Alternatives is relatively small, particularly in the watershed context, and because the level of indirect impacts associated with each Alternative is expected to be negligible and substantially the same as between the UPRR/SR 99 and Hybrid Alternatives, particularly when site-specific context can be fully evaluated, the Hybrid Alternative cannot be dismissed from consideration as the Preferred Alternative or the LEDPA based solely on the acreage of direct and indirect impacts to jurisdictional waters. Instead, it is appropriate to consider and compare the relative quality of jurisdictional waters impacted by each alternative, as well as the other sensitive environmental resources adversely impacted by each alternative, and the relative practicability of each alternative in terms of physical and operational characteristics, and construction costs of each alternative.

8.1.3 Relative Condition of Jurisdictional Waters Impacted by Alternatives

While the UPRR/SR 99 would impact fewer acres of jurisdictional waters than the Hybrid Alternative, the quality of the resources impacted must also be taken into consideration in order to determine which alternative would have the least adverse impact on aquatic ecosystem.

Based on the distribution of project CRAM scores from 46 riverine assessment areas and 23 non-riverine assessment areas, jurisdictional waters were organized into categories of poor, fair, and good quality, with a CRAM score of 25-49 being considered poor quality, 50-74 being considered fair quality, and 75-100 being considered good quality. Approximately 50 percent of jurisdictional waters within the WSAs are of fair quality, while 4 percent are of good quality and 46 percent are of poor quality. That means that 96 percent of jurisdictional waters within the overall WSA are poor to fair quality and only 4 percent are of good quality. These condition categories are relative to statewide CRAM scores (which average approximately 74).

CRAM assessment area scores for impacted riverine features:

- BNSF Alternative - 16 sites assessed, with a mean score of 55 (fair);
- UPRR/SR 99 Alternative - 15 sites assessed, with a mean score of 51 (fair); and
- Hybrid Alternative - 15 sites assessed, with a mean score of 54 (Fair).

CRAM assessment scores for impacted non-riverine features (i.e., vernal pools and seasonal wetlands):

- BNSF Alternative - 13 sites assessed, with a mean score of 51 (fair);
- Hybrid Alternative - 8 sites assessed, with a mean score of 50 (fair); and
- UPRR/SR 99 Alternative - 2 sites assessed, with a mean score of 42 (poor).

Based on the mean CRAM scores for jurisdictional waters impacted by each of the 3 Alternatives, in general lower quality jurisdictional waters are impacted by the MF HST Project, regardless of the alternative. Although all CRAM scores for waters impacted by all alternatives are low (well below the State-wide average of about 74, and generally at the high end of poor/ low end of fair even for the region), the BNSF Alternative would impact the highest quality riverine and non-riverine jurisdictional waters. Further, though the quality of resources impacted by the BNSF Alternative ranges from poor to good, overall, resources impacted by the alternative are of fair quality. The Hybrid Alternative would impact the lower quality riverine and non-riverine jurisdictional waters than the BNSF Alternative, and, though the quality of resources impacted ranges from poor to good, overall, resources impacted are of low/fair quality. The UPRR/SR 99 Alternative would impact somewhat lower quality riverine and non-

riverine jurisdictional waters than the Hybrid Alternative, and, though the quality of resources impacted ranges from poor to good, overall, resources impacted are of low/fair quality.

Although the UPRR/SR 99 Alternative impacts jurisdictional waters with somewhat lower CRAM Scores (3 to 8 points lower than those of the Hybrid Alternative), from a statistical perspective, the quality of resources impacted by the Hybrid Alternative is not likely to be appreciably better than the quality of resources impacted by the UPRR Alternative. Based on statistical analysis, total CRAM scores need to be at least 10 points from each other to conclude the quality of resources scored is appreciably different. Only the scores for non-riverine features impacted by the BNSF and UPRR/SR 99 Alternatives exhibit at least 10 points difference. In general, the CRAM scores for resources impacted by the UPRR/SR99 Alternative are not 10 points higher than the CRAM scores for resources impacted by the Hybrid Alternative, and the relative function of jurisdictional waters impacted by both alternatives is approximately equivalent.

In addition, all of the mean scores for both the Hybrid and UPRR/SR 99 alternatives are low as compared to jurisdictional waters statewide and in the region, and indicate a low quality (in general) of all waterbody resources within the impact areas for all of the Merced to Fresno alternatives. The lower quality resources found within the impact areas for all alternatives results from the Authority's adherence to Streets and Highways Code § 2704.9 requirements to use existing transportation or utility corridors for construction of the HST Project to minimize impacts on environmental resources.

8.1.4 Relative Quantity and Quality of Impacts to Jurisdictional Waters

The quantitative differences between impacts to jurisdictional waters associated with the Hybrid Alternative and the UPRR/SR 99 Alternative are relatively insubstantial when considered in the site-specific and watershed contexts, as discussed in the preceding section. Further, based on a comparison of CRAM scores for jurisdictional waters impacted by the Hybrid Alternative (i.e., the Proposed Project) as compared to the UPRR/SR 99 Alternative, the two alternatives would have impacts on jurisdictional waters of relatively comparable, and generally quite low quality waters as compared to waters of the state and the region.

8.1.5 Riparian Habitat

This section discusses relative impacts of the Alternatives on riparian habitats that generally are outside of the median high-water mark and therefore may be partially within, and partially outside of jurisdictional waters. Nevertheless, impacts to riparian habitat, whether or not they are located completely within jurisdictional waters, provide a meaningful comparison of relative aquatic impacts for the alternatives. The identified impact area for purposes of evaluating direct impacts of the Alternatives to riparian habitats consists of the construction footprint as identified in Section 8.1 above for at-grade track segments, elevated track segments, and ancillary MF HST Project facilities. In addition, to evaluate indirect impacts, a 100-foot radius buffer around project elements was assumed for at-grade track and ancillary facilities, and a 140-foot radius buffer around project elements was assumed for elevated track segments (in light of the narrower, 60-foot construction footprint for such segments).

Within the study area, these riparian habitats generally consist of narrow bands of mixed riparian forest and other riparian habitats; such as willow riparian forest and woodland, riparian scrub, and valley oak riparian forest; located at crossings of natural watercourses. The riparian habitat types found in the study area are described in the WER.

Table 8.1-2 provides a summary of impacts on riparian habitat by alternative design option combination. Under the best-case design option for the UPRR/SR 99 Alternative (with the East Chowchilla and Ave 21

Table 8.1-2
Summary of Impacts on Riparian Habitats for the HST by Alternative and Design Options

North-South Alignment Isolated and with Wye Design Option	UPRR/SR 99 Alternative			Hybrid Alternative		BNSF Alternative							
						Mariposa Way Design Options				Mission Ave Design Options			
	East Chowchilla Design Option	East Chowchilla Design Option	West Chowchilla Design Option	East Chowchilla Design Option	West Chowchilla Design Option	Le Grand	East of Le Grand	Le Grand	East of Le Grand	Le Grand	East of Le Grand	Le Grand	East of Le Grand
	Ave 21	Ave 24	Ave 24	Ave 21	Ave 24	Ave 21		Ave 24		Ave 21		Ave 24	
Total Riparian Direct Permanent (acres)	4.54	10.71	13.89	4.29	11.36	6.22	7.55	9.44	10.78	4.56	4.47	7.86	7.77
Total Riparian Direct Temporary (acres)	4.74	5.34	4.27	4.31	4.16	3.14	3.34	3.43	3.63	2.25	2.38	2.53	2.66
Total Riparian Indirect Permanent (acres)	19.66	42.16	47.22	21.24	44.6	32.45	32.33	37.59	37.46	21.29	21.64	26.77	26.77
Total Riparian Impacts (acres)	28.94	58.21	65.38	29.84	60.12	41.81	43.22	50.46	51.87	28.1	28.49	37.16	37.2

Wye combination), approximately 29 acres of riparian habitat would be directly and indirectly impacted. The worst-case design option under the UPRR/SR 99 Alternative would result in approximately 65 acres of direct and indirect impacts on riparian habitat. The best-case design option, in terms of direct and indirect impacts to riparian habitat, for the Hybrid Alternative (with the East Chowchilla and Ave 21 Wye combination) would result in approximately 30 acres of total impacts to riparian habitat, or a little less than 1 acre more of impact than under the UPRR/SR 99 best-case scenario. Under the worst-case design option for the Hybrid Alternative, approximately 60 acres of riparian habitat would be impacted, or 5 acres less impact than under the UPRR/SR 99 worst-case design option.

Under the BNSF Alternative, each of the Mission Ave with Ave 21 Wye design options would result in approximately 28 acres of riparian habitat impacts, which would be approximately 1 acre less direct and indirect riparian habitat impact than under the best-case UPRR/SR 99 Alternative design option, and approximately 2 acres less impact than under the best case Hybrid Alternative design option. The Mariposa Way East of Le Grand with Ave 24 design option combination would result in approximately 52 acres of riparian habitat impacts and would be the worst-case design for the BNSF Alternative, with less impact on riparian habitat than the worst-case design options under either the UPRR/SR 99 or Hybrid Alternatives. However, while the BNSF Alternative impacts less riparian habitat than the UPFRR/SR99 and Hybrid Alternatives, these riparian habitat impact comparisons must be considered in light of the fact that the BNSF results in substantially more overall impacts to jurisdictional waters, in terms of both quantity and quality, than the other two alternatives.

8.1.6 Summary Comparison of Impacts to Riparian Habitats

The best-case design option for the BNSF Alternative, as discussed above, would have the least impact on riparian habitat of design options for any alternatives; however, the best-case design option for each of the alternatives results in relatively equivalent total riparian impacts at approximately 28 acres under BNSF Alternative, 29 acres under the UPRR/SR 99 Alternative, and a little less than 30 acres under the Hybrid Alternative. In general, the remaining BNSF design options tend to have less impact to riparian habitats than the remaining UPRR/SR 99 Alternative and Hybrid Alternative design options. But despite lower direct and indirect impacts to riparian resources associated with the BNSF Alternative design options, the BNSF design options have substantially greater overall impacts on jurisdictional waters in terms of acreage and waterbody functions. As a result, although the BNSF Alternative results in fewer total impacts to riparian vegetation, it fails to achieve the level of avoidance for jurisdictional waters that the UPRR/SR 99 and Hybrid Alternatives achieve.

Between the UPRR/SR 99 and Hybrid Alternatives, the difference in riparian habitat impact acreage is not substantially different between the best-case scenarios for each (only a little less than 1 acre of impact difference). With respect to the worst case impact scenarios for the UPRR/SR 99 and Hybrid Alternatives, the Hybrid Alternative results in about 5 acres less impact to riparian habitats than the UPRR/SR99 Alternative and is therefore preferable from the standpoint of riparian habitat impacts.

8.2 Practicability

The 404(b)(1) Guidelines state that an alternative is practicable "if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of the overall project purposes." 40 CFR § 230.3(q). The purpose of the statewide HST System is to provide a reliable high-speed electric-powered train system that links the major metropolitan areas of the state, and that delivers predictable and consistent travel times. The purpose of the MF HST Project is to implement the Merced to Fresno Section of the California HST System to provide the public with electric-powered high-speed rail service that provides predictable and consistent travel times between major urban centers and connectivity to airports, mass transit systems, and the highway network in the south San Joaquin Valley, and to connect the northern and southern portions of the system.

The HST System must meet California's need for reliable, high speed, lower emissions transit in a manner that is consistent with provisions of Proposition 1A, the Safe, Reliable, High-Speed Passenger Train Bond Act, adopted by California voters in November 2008 (Streets & Highways Code § 2704, et seq.). That initiative states, in part: "[i]n order to reduce impacts on communities and the environment, the alignment for the high-speed train system shall follow existing transportation or utility corridors to the extent feasible and shall be financially viable, as determined by the authority." Streets & Highways Code § 2704.09(g). In addition, the project must be designed to "[p]reserv[e] wildlife corridors and mitigat[e] impacts to wildlife movement, where feasible as determined by the authority, in order to limit the extent to which the system may present an additional barrier to wildlife's natural movement" *Id.* § 2704.09(j).

As discussed in Section 6.2 and 6.3, the UPRR/SR 99 Alternative and the BNSF Alternative each raise substantial practicability issues and concerns.

8.2.1 Relative Construction Costs

Taking into account that tax revenues and public monies are the primary source of currently available funding for the MF HST Project, and consistent with the legal requirement that the HST System, including the MF HST Project must be "financially viable," the construction costs of the UPRR/SR 99 Alternative alone preclude the implementation of that Alternative in a manner that is consistent with the project purpose and need. As a result it has not been designated as the Preferred Alternative and is not practicable to implement. Further, the BNSF Alternative is more expensive to construct than the Hybrid Alternative, and impacts more jurisdictional waters than the Hybrid Alternative, so it has not been designated as the Preferred Alternative and is not appropriate to implement.

Detailed and reasonably reliable construction and capital cost estimates cost estimates have been prepared for each Alternative and design option for the MF HST Project as set forth in the *Capital Cost Estimate Report, Merced to Fresno Section High Speed Train Project* (February 2012) (Capital Cost Estimate Report). The cost estimates for each Alternative and design option combination include estimated costs of MF HST Project construction, including costs of planning, design, engineering and construction, acquisition of right-of-way, costs of project entitlement and environmental approvals, permits and clearances, and costs of construction management services. Costs of project financing have not yet been developed, but will be developed prior to MF HST project construction. Costs of HST vehicle acquisition and other operational costs are not included in the Capital Cost Estimate Report, which is limited to a comparison of construction costs of various alternatives and design options for the MF HST Project.

In preparing the Capital Cost Estimate Report, detailed Capital Cost budgets were compiled using cost estimates established pursuant to FRA guidelines for estimating capital costs for each and all Standard Cost Categories (SCCs) established by the FRA under the grant application requirements of the American Recovery and Reinvestment Act that are applicable to the MF HST Project. Each estimate for each SCC was derived by applying the proper Work Breakdown Structure to develop costs estimates for that particular SCC. The cost estimate for each applicable SCC is further based on a 15% engineering design level, and, where applicable, unit costs for the SCC estimate are established by use of historical bid data and/or by unit cost or cost rate analyses, as appropriate, for labor, equipment and material costs. Right-of-way acquisition and mitigation site cost estimates are based on cost projections derived from analysis of historical cost data. All SCC costs are then further adjusted as may be appropriate for anticipated economic conditions by use of appropriate escalators, de-escalators, or other FRA established cost factor adjustments. Cost estimates for all SCCs are then cumulated, and the resulting total capital cost budget estimate for each alternative/design option combination is then reviewed in light of current ridership demand and system capacity forecasts. SCC cost estimates and the total construction and capital cost budget have been subjected to a validation process as required by FRA guidance, pursuant to which each SCC cost estimate and the total budget for each alternative and Design option combination has been reviewed by independent subject matter experts to assure proper and appropriate scope, assumptions, historical data, and estimating methods have been used.

The capital and construction cost budgets for each alternative and design option combination, and the supporting cost estimates by SCC for each such combination (totaling approximately 200 pages of cost estimate tables) are set forth in the Capital Cost Estimate Report provided in Attachment 9 to this Checkpoint C Summary Report. Total construction and capital costs for the three primary alternatives and related design options are summarized in Table 8.2-1 and Section 6.2.2, Practicability of UPRR/SR 99 Alternative.

Table 8.2-1
Capital Cost of the HST Alternatives (2010 $Thousands)

FRA Standard Cost Categories	UPRR/ SR 99 Alternative with Ave 24 Wye	UPRR/ SR 99 Alternative with Ave 21 Wye	UPRR/ SR 99 Alternative West Chowchilla Design Option with Ave 24 Wye	BNSF Alternative with Ave 24 Wye	BNSF Alternative with Ave 21 Wye	Hybrid Alternative with Ave24 Wye	Hybrid Alternative with Ave 21 Wye
10 Track Structures & Track	$3,485,000	$3,008,000	$2,629,000	$1,961,000	$1,844,000	$1,383,000	$2,059,000
20 Stations, Terminals, Intermodal	$170,000	$170,000	$170,000	$170,000	$170,000	$170,000	$170,000
30 Support Facilities: Yards, Shops, Admin. Bldgs	$12,000	$12,000	$27,000	$12,000	$12,000	$27,000	$27,000
40 Sitework, Right Of Way, Land, Existing Improvements	$1,416,000	$1,348,000	$1,205,000	$1,325,000	$1,138,000	$1,218,000	$1,318,000
50 Communica-tions & Signaling	$151,000	$129,000	$116,000	$156,000	$140,000	$117,000	$135,000
60 Electric Traction	$486,000	$417,000	$374,000	$504,000	$452,000	$378,000	$440,000
70 Vehicles	Considered a systemwide cost and not included as part of individual HST study alternatives						
80 Professional Services (applies to Cats. 10-60)	$723,000	$637,000	$561,000	$511,000	$461,000	$393,000	$509,000
90 Unallocated Contingency	$251,000	$222,000	$197,000	$178,000	$162,000	$141,000	$180,000
100 Finance Charges	Estimate to be developed prior to project construction						
Total	$6,694,000	$5,943,000	$5,279,000	$4,817,000	$4,379,000	$3,827,000	$4,838,000

As shown in Table 8.2-1, the UPRR/SR 99 Alterative would cost an estimated $6.7 billion with the Ave 24 Wye design option and an estimated $5.9 billion for the Ave 21 Wye design option. The Hybrid Alternative would cost between $3.8 billion for the Ave 24 Wye design option and $4.8 billion for the Ave 24 Wye design option. Thus, the UPRR/SR 99 Alternative would cost the public between $1.1 to $2.9 billion more to construct than the Hybrid Alternative with the equivalent wye design option. While the BNSF Alternative is less costly than the UPRR/SR 99 Alterative, the BNSF Alternative is still estimated to cost at least $500 million more to implement than the Hybrid Alternative with an equivalent wye connection.

The UPRR/SR Alternative costs substantially more that the Hybrid Alternative primarily because the UPRR/SR Alternative proposes substantially more elevated structures and guideways, the largest number of roadway and railroad overcrossings, and some of the most costly overcrossings. In addition, the UPRR/SR Alternative requires the most linear feet of track, and construction of the most linear feet of track, the most linear feet of elevated guideway, and the largest number of overcrossings through urban areas, all of which increase project costs. At-grade and elevated structures and guideways in urban areas are more complex and, therefore, more costly to construct than at-grade or elevated structures and guideways in rural areas, contributing to the substantially higher costs of the UPRR/SR 99 Alternative as compared to the Hybrid Alternative. The Hybrid Alternative would have substantially fewer elevated guideways and structures in urban areas, and fewer constructability conflicts and complexities. As a result, depending on the wye design option, the UPRR/SR Alternative is between 135 percent and 145 percent more costly than the Hybrid Alternative.

As stated in the California High Speed Rail Program Draft 2012 Business Plan, the Authority has secured $3.5 billion as part of the American Recovery and Reinvestment Act of 2009 (Recovery Act or ARRA) and the potential for $9.5 billion from the sale of bonds authorized under Proposition 1A to fund the entire HST System. It is extremely important to note that these funding sources apply to the whole of the high speed rail program. Thus, the UPRR Alternative's potential total cost of $6.7 billion would consume over 51 percent of the total currently available funding for the entire HST program solely to build the MF HST Project, which is a relatively small segment of the total 800-mile HST System track alignment.

Taking into account that tax revenues and public monies are the source of funding for the MF HST Project, and in light of the legal mandate that the HST System (including the MF HST Project) must be "financially viable," the implementation of the UPRR Alternative in a manner consistent with the purpose and need for the MF HST Project is precluded because that Alternative would cost between $5.2 to $6.7 billion, and between 135 and 145 percent more than the preferred Hybrid Alternative, and would consume an inordinate percentage of the total HST System budget that is not commensurate with the portion of the HST System project completed by the Alternative. As a result, the UPRR/SR 99 Alternative is not the Preferred Alternatives, and does not appear to qualify as a practicable alternative that meets the purpose and need of the MF HST Project, as defined by Streets & Highways Code § 2704, et seq.

8.2.2 Logistics of Implementation

8.2.2.1 Highway/Railroad and Utility Crossings

All alternatives would cross SR 99 and other existing roadways as well as existing railroads. Interaction with other existing infrastructure complicates construction of the alternative, resulting in additional construction times and costs, and results in a longer construction period that interrupts use of existing transportation facilities, adversely affecting traffic and transport patterns in the vicinity of the construction and the adjacent community. The UPRR/SR 99 and BNSF Alternatives would require from 6 to 10 railroad crossings, whereas the Hybrid Alternative would require 4 to 6 crossings. Further, the Hybrid Alternative would cross SR 99 and the UPRR railway at more favorable crossing angles, making it easier to construct than the crossings associated with the BNSF and UPRR/SR 99 Alternatives.

The UPRR/SR 99 Alternative also raises serious logistical construction concerns with respect to roadway crossings that the other alternatives do not. As discussed in more detail in Section 6.2, the UPRR/SR 99 Alternative would require 11 crossings over existing, generally heavily traveled Caltrans facilities, including SR 99. The Hybrid Alternative and the BNSF Alternative would have far fewer crossings over Caltrans facilities at 2 and 3 crossings respectively. Several of these 11 crossings necessary to implement the UPRR/SR 99 Alternative would require a straddle bent support system to elevate the HST over SR 99. The straddle bent support system, which would carry the HST at a nearly parallel crossing angle over SR 99, requires additional planning, design, and construction measures to implement.

Caltrans' design and safety standards for its highway facilities emphasize the importance of eliminating potential obstructions to motorists' ability to recover when their vehicles veer outside of highway main lanes; Caltrans calls this "clear recovery area." Placing columns both within the median and at the outside shoulders as required for straddle bent improvements presents planning and design complexities associated with assuring proper column placement, a stable elevated structure, and sufficient clear recovery areas in the post-construction condition. In addition, due to the need to construct not only overcrossing spans, but also columns within the footprint of operating facilities, construction of straddle bent improvements over existing operating roadway and railroad facilities is especially challenging, particularly when such construction involves major transit arteries such as the SR 99. Careful construction planning and additional safety and operational measures must be taken during construction of straddle bent improvements for continued traffic and rail operation to continue during construction. These complexities significantly increase construction and logistical challenges associated with the implementation of the UPRR/SR 99 Alternative.

The UPRR/SR 99 Alternative would also involve an elevated crossing within the City of Madera at the existing UPRR tracks; no other alternative would necessitate this crossing. As discussed in Section 6.2, the elevation for that crossing must be an unusually high, particularly taking into account the intensity and typical vertical profile of existing buildings, structures, and intrastate in the community of Madera within the vicinity of the proposed crossing. To clear the existing railroad grade separations which go over the UPRR tracks at 24-feet of clearance, and given other engineering constraints caused by the existing conditions at this location, the high speed rail facilities would need to be constructed up to 60 to 70 feet in elevation (top of rail) to clear existing grade separations and other constraints. Such a crossing would be expensive to construct, and all of the increased planning, design and construction complexities and increased construction impacts related to elevated improvements discussed above would be further increased in direct proportion to the height of this crossing required for the UPRR/SR 99 Alternative. In addition to these planning, design and construction challenges and impacts, the City of Madera has been extremely vocal in their opposition to the UPRR/SR 99 Alternative due to the significant adverse and permanent environmental impacts, including visual, aesthetic and noise impacts that this alternative, and in particular, this crossing, would have within the heart of their city.

Conflicts between proposed construction with existing underground and aboveground utilities result in similar complexity, constructability and construction impacts issues to those encountered for roadway and railroad overcrossings, though utility issues and impacts are generally lower in magnitude than those associated with roadway and railway crossings. The Hybrid Alternative design options would cross approximately 115 to 166 utility corridors, between 25 to 41 of which are high risk conflicts. In contrast, the UPRR/SR 99 Alternative, depending on design option, would result in 170 and 192 utility conflicts (the greatest number of conflicts of all the alternatives), between 37 and 47 of which are high risk utility conflicts.

Due to the logistical, constructability, and environmental impacts on local community resources and receptors associated with the number and character of railroad, roadway, and highway, and utility crossings required to implement the UPRR/SR 99 Alternative, the UPRR/SR 99 Alternative is not the preferred alternative, and appears to be impracticable to implement.

8.2.2.2 Other Constructability and Construction Impact Concerns

While construction is typically considered a temporary effect, the HST project construction period would endure for approximately 7 years of heavy construction and another 2 years of track testing. This duration intensifies environmental impacts on local communities and related receptors. Construction effects on community resources and receptors include dust; noise; closing access to parks; rerouting of traffic patterns circulation, and diversion of traffic that can lead to reduced business activity; and air quality effects. These effects adversely impact businesses, result in health concerns for school children and other sensitive receptors, result in noise impacts on sensitive community receptors, and generally result in increased frustration and lower the community quality during the construction period.

The noise, dust, local traffic, park closure, other construction impacts on community resources and receptors, and related economic effects resulting from those impacts are directly proportionate to the miles of track constructed through urbanized areas associated with each Alternative. Table 8.2-2 compares the miles track constructed through urbanized areas for each Alternative.

Table 8.2-2
Linear Miles of Track by Alternative

Alternative:	UPRR/SR 99 Alternative					BNSF Alternative							
						Mariposa Way				Mission Ave			
Design Features:	East Chow-chilla		West Chow-chilla	Hybrid Alternative		Le Grand Design Option		East of Le Grand Design Option		Le Grand Design Option		East of Le Grand Design Option	
Wye:	Ave 24	Ave 21	Ave 24	Ave 24	Ave 21	Ave 24	Ave 21	Ave 24	Ave 21	Ave 24	Ave 21	Ave 24	Ave 21
Total length (linear miles)	90	86	74	75	76	94	92	95	93	94	92	95	93
At-grade profile (linear miles)	49	49	43	60	59	71	71	71	71	71	71	71	71
Elevated profile (linear miles) (including retained fill)	41	37	32	15	17	23	21	24	22	23	21	24	22

As shown in Table 8.2-2, the Hybrid Alternative would require the least amount of new track miles to be constructed to provide rail service. The Hybrid Alternative would require about 75 miles of total track to be established. With the exception of the UPRR/SR 99/West Chowchilla/Ave. 24 Alternative and Design Option, which is approximately equivalent to the Hybrid Alternative, the number of track miles required to implement the Hybrid Alternative is substantially less than all other UPRR/SR 99 and BNSF Alternatives and design options.

The UPRR/SR 99 Alternative would also require construction of the most miles of HST track within urbanized areas, followed by the BNSF and the Hybrid Alternatives, which require construction of similar lengths of track in urbanized areas. Because the Hybrid Alternative would require construction of substantially fewer miles of track, both in total and through urbanized areas, than the UPRR/SR 99

Alternative, the Hybrid Alternative is expected to result in fewer construction related impacts on community resources and receptors during the extended construction phase.

In addition to the linear miles track to be constructed within urban areas, the UPRR/SR 99 Alternative would require construction of 32 to 41 miles of elevated guideway in urbanized areas to avoid conflicts with transportation circulation. The Hybrid Alternative would require construction of only 15 to 17 miles of elevated guideway, depending on the design option chosen, while the BNSF would require construction of 21 to 24 miles of elevated guideway. The UPRR/SR 99 Alternative must remain elevated through downtown Madera, because an at-grade option would have required multiple roadway over- and under-crossings and even closure of some major arterials in the congested downtown area. Such effects from an at-grade profile along the UPRR/SR 99 Alternative would have resulted in greater significant and unavoidable traffic and noise impacts, and therefore greater overall environmental impacts for the UPRR/SR 99 Alternative, and would have resulted in a larger division of the Madera community than the elevated guideway would cause. In total, as a result, elevated guideway has been integrated into the UPRR/SR 99 Alternative, but that alternative now requires up two times more elevated guideway than the BNSF Alternative requires. The Hybrid Alternative requires the least elevated guideway, and would require only 36 and 50 percent of the amount of elevated guideway required by the UPRR/SR 99 Alternative.

Construction of elevated guideway requires the use of substantially greater amounts of concrete and construction equipment than typical construction of at-grade sections, and the greater complexity of construction requires a longer construction period than is needed for at-grade sections. More construction equipment requirements and the longer construction period associated with implementing elevated guideway increases air quality impacts during construction. The Hybrid Alternative would have the least severe air quality impacts during construction because, with substantially less elevated guideway, the construction period for the Hybrid Alternative would generally be shorter than the period required for the other Alternatives, and the Alternative would require less concrete and construction equipment, resulting in lower emissions.

The BNSF Alternative also would pose more elevated structure constructability issues in Madera Acres as compared to the Hybrid Alternative. The alignments for both BNSF and the Hybrid Alternatives would pass through a constrained urban community of Madera Acres. The wye connection for the BNSF Alternative would occur in this area, requiring elevated crossover of the turn-out tracks adjacent to an at-grade track profile in a residential area. The BNSF Alternative is elevated through Madera Acres because of the grade separated track connection to Merced. The mainline track is also elevated because the lower speed track to Merced (150 mph in this area) can better weave through the mainline track support columns. On the other hand, the Hybrid Alternative at this location would consist only of two at-grade tracks because there is no track connection in Madera Acres as the wye connection for the Hybrid Alternative is farther to the north and west along the alignment. The constructability issues in Madera Acres associated with the BNSF Alternative, in addition to the greater impacts to overall jurisdictional water associated with that Alternative, make it a less suitable Alternative to meet MF HST Project purpose and need.

Because the Hybrid Alternative results in the least constructability issues and minimizes construction noise, air quality, traffic and transport impacts, it is the Preferred Alternative. The BNSF and UPRR Alternatives result in substantially greater constructability issues and increased construction noise, air quality, traffic and transport impacts. Therefore, these alternatives are not the Preferred Alternative and appear to be impracticable for implementation.

8.2.3 Operational Concerns

The Hybrid Alternative offers the second best travel time, taking only 30 seconds longer between San Francisco and Los Angeles, a minute more between Merced and Fresno, and the same between San Francisco and Merced, compared to the UPRR/SR 99 Alternative. Given the relatively small differences in

total travel times as between the Hybrid Alternative and the UPRR/SR 99 Alternative, the two alternatives are considered roughly equivalent operationally. The BNSF Alternative would have the same travel time as the Hybrid Alternative between San Francisco and Los Angeles, but otherwise it would take as much as 4 minutes longer than the other two alternatives for every other HST Project segment. Roughly equivalent travel time for alternatives are important because the HST System is required to meet a strict travel time between San Francisco and Los Angeles—a total of 2 hours and 40 minutes to travel over 500 miles. Both the Hybrid and UPRR/SR 99 Alternatives will meet the project purposes and need with respect to operational travel times.

8.2.4 Displacement Impacts

Construction delays and construction cost increases tend to rise in direct proportion to the number of residential and nonresidential property owners that must be displaced to implement an infrastructure project. As a result, increased displacement impacts tend to result in greater construction delay impacts (including increased construction period air quality, noise, park closure and traffic impacts associated with a longer construction periods as described above), as well as increased constructability issues and higher construction costs.

The number of residential units displaced would be similar among the three alternatives. See Table 8.2-3. However, the UPRR/SR 99 Alternative would have substantially higher nonresidential displacements (nearly 100 more displacements than the BNSF or Hybrid Alternatives). Id. These significantly higher numbers of nonresidential displacements associated with the UPRR/SR 99 Alternative are primarily due to the fact that that UPRR/SR 99 Alternative alignment would traverse the Madera and Chowchilla industrial development areas. The BNSF and Hybrid Alternatives would result in similar and substantially fewer nonresidential displacements, with the BNSF Alternative resulting in approximately 10 more nonresidential displacements than the Hybrid Alternative.

Based on the relatively high number of nonresidential displacements associated with the UPRR/SR 99 Alternative, substantially greater construction costs, greater construction delay impacts (including increased construction period noise, air quality, traffic and park closure impacts), and greater constructability issues are anticipated to be associated with that Alternative. As a result, the UPRR/SR99 Alternative was not selected as the Preferred Alternative, and does not appear to be a practicable alternative.

Table 8.2-3
Displacement Impacts by Alternative

Resource Categories	Range of Potential Impacts by HST Alternative			Explanation of Measured Impact
	UPRR/ SR 99 Alternative	Hybrid Alternative	BNSF Alternative	
Displacement	187-222	198-226	210-238	Total Number of Residential Displacements
Displacement	281 to 283	210 to 216	216-226	Total Number of Non-residential Displacements

8.2.5 Summary of Practicability Analysis

Extraordinary cost and serious logistical and construction complexity issues, increased construction impacts, and constructability issues associated with the UPRR/SR 99 Alternative render that alternative

impracticable for meeting the MF HST Project purpose and need. Additional cost and more pronounced logistical and construction complexity issues, construction impacts, and constructability concerns associated with the BNSF Alternative, in addition to the greater impacts to jurisdictional waters associated with that alternative, make it an unsuitable alternative to meet MF HST Project purpose and need. Based on the comparison of construction costs, logistical and construction complexity issues, increased construction impacts, and constructability concerns, the Hybrid Alternative is the Preferred Alternative and available evidence, technical information, and analysis supports its designation as the LEDPA.

8.3 Other Significant Environmental Consequences

This subsection discusses the alternatives based on biological impacts and environmental impacts to local community resources and receptors. While the UPRR/SR 99 Alternative would have fewer impacts to jurisdictional waters (based on acreage) and in some cases fewer biological impacts as discussed below than the Hybrid Alternative, the UPRR/SR 99 Alternative would have equivalent impacts to the Hybrid Alternative in terms of quality of jurisdictional waters impacted, and would result in other more significant adverse environmental consequences than the Hybrid Alternative. The Hybrid Alternative (Proposed Project/Preferred Alternative) would have fewer other significant environmental consequences than either the UPRR/SR 99 Alternative or the BNSF Alternative.

8.3.1 Biological Impacts

8.3.1.1 Special-Status Plants[1]

It is assumed that any special-status plant species and their habitat present within the construction footprint (defined as set forth in the subsection above entitled Impacts to Jurisdictional Waters) would be permanently removed with project implementation. Special-status plant species and their habitat within a buffer area of 100 feet to 140 feet (for the at-grade and elevated track segments respectively) of the construction footprint are considered subject to indirect impacts. Potential indirect impacts on special-status plant species include erosion, siltation, and runoff into natural and constructed watercourses; soil and water contamination from construction equipment leaks; construction-related dust affecting plants by reducing their photosynthetic capability (especially during flowering periods); and an increased risk of fire (e.g., construction equipment use and smoking by construction workers) in adjacent open spaces. In areas where special-status plant surveys were not conducted to determine presence or absence, it is conservatively assumed that potentially suitable habitats for special-status plants within the project construction footprint and buffer area are occupied by populations of special-status plants. A total of 36 special-status plant species were identified as having potential to occur in the study areas for the alternatives. However, it should be noted that no special-status plant species have been detected in the construction footprint or impact buffer area of any of the alternatives. Implementing any of the alternatives has the potential to result in the loss of or damage to all 36 special-status plant species, based on assumptions of presence within potentially suitable habitats.

Of the 36 potentially occurring special-status plant species, five are federally listed species that are associated with vernal pool habitats (Colusa grass, San Joaquin Valley Orcutt grass, Hairy Orcutt grass, Greene's tuctoria, and succulent owl's clover). Table 8.3-1 provides a comparison of habitat impacts on these species by alternative. As demonstrated by in Table 8.3-1, the BNSF Alternative, with any combination of design options, would impact the greatest amount of potentially suitable habitat for these federally listed plant species. In addition, the BNSF Alternative is the only alignment that would impact designated critical habitat, i.e., habitat determined by USFWS as necessary for the recovery of species listed as threatened or endangered under the federal ESA. Direct impact acreage to potentially suitable

[1] Special-status species evaluated here consist of plant and animal species that are legally protected under the federal Endangered Species Act of 1973 (federal ESA), the California Endangered Species Act (CESA), and/or other regulations, such as those species that meet the definitions of rare or endangered under CEQA Guidelines Sections 15380 and 15125.

listed plant habitat from the BNSF Alternative range from 0.01 acre for Colusa grass to 18.78 acres for San Joaquin Valley Orcutt grass depending on design option and species being considered. Direct impacts for the UPRR/SR 99 Alternative range from 0.14 acre for Colusa grass habitat to 2.45 acres of impact to San Joaquin Valley Orcutt grass for the East Chowchilla design option. The Hybrid Alternative would generally affect a greater amount of potentially suitable habitat for San Joaquin Valley Orcutt grass, Hairy Orcutt grass, and Green's turctoria than the UPRR/SR 99 Alternative, but the amount of potentially suitable habitat that would be affected by the Hybrid Alternative is relatively small as compared to the BNSF Alternative. Because no special-status plant species have been observed in the footprint of any of the alternative alignments, the impact acreages in Table 8.3-1 are based solely on impacts to habitats deemed suitable for the plant species in question and are likely conservatively overstated.

8.3.1.2 Special-Status Wildlife

Federally listed wildlife species that are considered potentially affected by the Proposed Project include Conservancy fairy shrimp, vernal pool fairy shrimp, vernal pool tadpole shrimp, valley elderberry longhorn beetle, California tiger salamander, and San Joaquin kit fox.

Impacts to suitable habitats for these species were calculated according to the following methodology. It is conservatively assumed that any suitable habitat for special-status wildlife species within the project footprint would be directly and permanently impacted. Outside of the project footprint, species habitat would be considered to be permanently and indirectly impacted depending on the species in question. Suitable habitat for valley elderberry longhorn beetle within 100 feet of the project footprint would be considered indirectly impacted. Suitable habitat for fairy shrimp species and California tiger salamander (upland habitat) within 250 feet of the project footprint would be considered indirectly impacted. Suitable habitat for San Joaquin kit fox within 1,000 feet of the project footprint would be considered indirectly impacted. Table 8.3-2 summarizes the estimated direct and indirect impact to potential species' habitat by alternative. All impacts on special-status wildlife species were determined using a habitat-based approach, where species presence is assumed in areas that contain suitable habitat for the species in question.

8.3.1.3 Summary Comparison of Impacts to Special-Status Species

Implementing the BNSF Alternative would have greatest impacts, in terms of both direct and indirect impacts, to potential habitat for special-status plant and wildlife species because the construction footprint for this alternative would traverse greater acreage of potential special-status species habitat. The worst-case impact acreage for all potential habitat for special-status plant and wildlife species as shown in Tables 8.3-1 and 8.3-2 occurs within one of the BNSF Alternative design options. Implementing the Hybrid Alternative would generally result in higher direct and indirect impacts to potentially suitable habitats for special-status species than the UPRR/SR 99 Alternative. However, the extent of potential impacts from the UPRR/SR 99 Alternative and the Hybrid Alternative are likely overstated by the conservative impacts assessment methodology chosen. The Hybrid Alternative results in the least estimated impact to potentially suitable habitat for the valley elderberry longhorn beetle.

8.3.1.4 Other Habitats of Concern

For this evaluation, other habitats of concern consist of designated critical habitat, core recovery areas, mitigation banks/reserves, wildlife corridors, and essential fish habitat. The EIR/EIS also includes assessment of impacts to special-status plant communities (i.e., sensitive natural communities tracked in the CNDDB) in the "Habitats of Concern" section; however, the only special-status plant communities identified in the study area are riparian communities and communities that qualify as jurisdictional waters. Because impacts to jurisdictional waters and riparian communities are addressed under separate headings above, they are not included in this discussion of impacts to other habitats of concern.

Table 8.3-1
Summary of Special-status Plant Habitat Impacts by Alternative

North-South Alignment Isolated and with Wye Design Option	HST Alternatives and Design Options													Station Alternative	
	UPRR/SR 99 Alternative			Hybrid Alternative		BNSF Alternative									
	East Chowchilla Design Option	East Chowchilla Design Option	West Chowchilla Design Option	East Chowchilla Design Option	West Chowchilla Design Option	Mariposa Way Design Options				Mission Ave Design Options				Kern Street Design Option	Mariposa Station Design Option
						Le Grand	East of Le Grand	Le Grand	East of Le Grand	Le Grand	East of Le Grand	Le Grand	East of Le Grand		
	(Ave 21)	(Ave 24)	(Ave 24)	(Ave 21)	(Ave 24)	(Ave 21)		(Ave 24)		(Ave 21)		(Ave 24)		(Ave 21)	(Ave 24)
Colusa grass															
Direct Permanent Effect (acres)															
North-South Alignment	0.14	0.14	0.14	0.14	0.14	0.01	0.07	0.01	0.07	0.13	0.13	0.13	0.13	0.00	0.00
Ave 24 Wye	NA	0.00	0.00	NA	0.00	NA	NA	0.00	0.00	NA	NA	0.00	0.00	NA	NA
Ave 21 Wye	0.00	NA	NA	0.00	NA	0.00	0.00	NA	NA	0.00	0.00	NA	NA	NA	NA
Total Direct Permanent Effect (acres)	**0.14**	**0.14**	**0.14**	**0.14**	**0.14**	**0.01**	**0.07**	**0.01**	**0.07**	**0.13**	**0.13**	**0.13**	**0.13**	**0.00**	**0.00**
Indirect Permanent Effects (acres)															
North-South Alignment	0.07	0.07	0.07	0.07	0.07	1.24	1.37	1.24	1.37	0.74	0.74	0.74	0.74	0.00	0.00
Ave 24 Wye	NA	0.00	0.00	NA	0.00	NA	NA	0.00	0.00	NA	NA	0.00	0.00	NA	NA
Ave 21 Wye	0.00	NA	NA	0.00	NA	0.00	0.00	NA	NA	0.00	0.00	NA	NA	NA	NA
Total Indirect Permanent Effect (acres)	**0.07**	**0.07**	**0.07**	**0.07**	**0.07**	**1.24**	**1.37**	**1.24**	**1.37**	**0.74**	**0.74**	**0.74**	**0.74**	**0.00**	**0.00**
San Joaquin Valley Orcutt grass															
Direct Permanent Effect (acres)															
North-South Alignment	1.92	1.85	1.53	5.40	4.69	17.72	13.14	17.63	13.06	18.46	18.07	18.38	17.98	0.00	0.00
Ave 24 Wye	NA	0.00	0.00	NA	0.00	NA	NA	0.40	0.40	NA	NA	0.40	0.40	NA	NA
Ave 21 Wye	0.53	NA	NA	0.07	NA	0.27	0.27	NA	NA	0.27	0.27	NA	NA	NA	NA
Total Direct Permanent Effect (acres)	**2.45**	**1.85**	**1.53**	**5.47**	**4.69**	**17.99**	**13.41**	**18.04**	**13.46**	**18.73**	**18.33**	**18.78**	**18.38**	**0.00**	**0.00**
Indirect Permanent Effects (acres)															
North-South Alignment	2.03	1.32	1.50	5.53	4.67	16.84	17.38	16.81	17.36	17.05	20.50	17.03	20.48	0.00	0.00
Ave 24 Wye	NA	0.23	0.00	NA	0.00	NA	NA	0.54	0.54	NA	NA	0.54	0.54	NA	NA
Ave 21 Wye	0.29	NA	NA	0.00	NA	0.73	0.73	NA	NA	0.73	0.73	NA	NA	NA	NA
Total Indirect Permanent Effect (acres)	**2.32**	**1.54**	**1.50**	**5.53**	**4.67**	**17.57**	**18.11**	**17.36**	**17.90**	**17.79**	**21.24**	**17.57**	**21.02**	**0.00**	**0.00**

Table 8.3-1
Summary of Special-status Plant Habitat Impacts by Alternative

North-South Alignment Isolated and with Wye Design Option	HST Alternatives and Design Options													Station Alternative	
	UPRR/SR 99 Alternative			Hybrid Alternative		BNSF Alternative									
	East Chowchilla Design Option	East Chowchilla Design Option	West Chowchilla Design Option	East Chowchilla Design Option	West Chowchilla Design Option	Mariposa Way Design Options				Mission Ave Design Options				Kern Street Design Option	Mariposa Station Design Option
						Le Grand	East of Le Grand	Le Grand	East of Le Grand	Le Grand	East of Le Grand	Le Grand	East of Le Grand		
	(Ave 21)	(Ave 24)	(Ave 24)	(Ave 21)	(Ave 24)	(Ave 21)		(Ave 24)		(Ave 21)		(Ave 24)		(Ave 21)	(Ave 24)
Hairy Orcutt grass															
Direct Permanent Effect (acres)															
North-South Alignment	1.95	1.95	1.95	5.61	5.47	7.20	7.20	7.22	7.22	7.32	7.32	7.35	7.35	0.00	0.00
Ave 24 Wye	NA	0.00	0.00	NA	0.00	NA	NA	0.25	0.25	NA	NA	0.25	0.25	NA	NA
Ave 21 Wye	0.00	NA	NA	0.00	NA	0.24	0.24	NA	NA	0.24	0.24	NA	NA	NA	NA
Total Direct Permanent Effect (acres)	**1.95**	**1.95**	**1.95**	**5.61**	**5.47**	**7.44**	**7.44**	**7.47**	**7.47**	**7.57**	**7.57**	**7.60**	**7.60**	**0.00**	**0.00**
Indirect Permanent Effects (acres)															
North-South Alignment	0.62	0.62	0.62	4.85	4.15	6.87	6.87	6.84	6.84	6.37	6.37	6.35	6.35	0.00	0.00
Ave 24 Wye	NA	0.00	0.00	NA	0.00	NA	NA	0.51	0.51	NA	NA	0.51	0.51	NA	NA
Ave 21 Wye	0.00	NA	NA	0.00	NA	0.47	0.47	NA	NA	0.47	0.47	NA	NA	NA	NA
Total Indirect Permanent Effect (acres)	**0.62**	**0.62**	**0.62**	**4.85**	**4.15**	**7.34**	**7.34**	**7.35**	**7.35**	**6.84**	**6.84**	**6.86**	**6.86**	**0.00**	**0.00**
Greene's tuctoria															
Direct Permanent Effect (acres)															
North-South Alignment	1.19	1.19	0.86	3.94	3.47	16.29	11.71	16.31	11.73	17.03	16.64	17.05	16.66	0.00	0.00
Ave 24 Wye	NA	0.00	0.00	NA	0.00	NA	NA	0.40	0.40	NA	NA	0.40	0.40	NA	NA
Ave 21 Wye	0.00	NA	NA	0.00	NA	0.24	0.24	NA	NA	0.24	0.24	NA	NA	NA	NA
Total Direct Permanent Effect (acres)	**1.19**	**1.19**	**0.86**	**3.94**	**3.47**	**16.53**	**11.96**	**16.71**	**12.14**	**17.27**	**16.88**	**17.45**	**17.06**	**0.00**	**0.00**
Indirect Permanent Effects (acres)															
North-South Alignment	0.65	0.65	0.62	3.12	2.58	14.70	15.24	14.72	15.26	14.91	18.36	14.94	18.39	0.00	0.00
Ave 24 Wye	NA	0.00	0.00	NA	0.00	NA	NA	0.54	0.54	NA	NA	0.54	0.54	NA	NA
Ave 21 Wye	0.00	NA	NA	0.00	NA	0.47	0.47	NA	NA	0.47	0.47	NA	NA	NA	NA
Total Indirect Permanent Effect (acres)	**0.65**	**0.65**	**0.62**	**3.12**	**2.58**	**15.17**	**15.71**	**15.26**	**15.81**	**15.38**	**18.84**	**15.48**	**18.93**	**0.00**	**0.00**

Table 8.3-1
Summary of Special-status Plant Habitat Impacts by Alternative

North-South Alignment Isolated and with Wye Design Option	HST Alternatives and Design Options													Station Alternative	
	UPRR/SR 99 Alternative			Hybrid Alternative		BNSF Alternative									
	East Chowchilla Design Option	East Chowchilla Design Option	West Chowchilla Design Option	East Chowchilla Design Option	West Chowchilla Design Option	Mariposa Way Design Options				Mission Ave Design Options				Kern Street Design Option	Mariposa Station Design Option
						Le Grand	East of Le Grand	Le Grand	East of Le Grand	Le Grand	East of Le Grand	Le Grand	East of Le Grand		
	(Ave 21)	(Ave 24)	(Ave 24)	(Ave 21)	(Ave 24)	(Ave 21)		(Ave 24)		(Ave 21)		(Ave 24)		(Ave 21)	(Ave 24)
Succulent owl's-clover															
Direct Permanent Effect (acres)															
North-South Alignment	1.88	1.82	1.50	2.62	2.05	13.21	8.64	13.10	8.53	13.95	13.56	13.84	13.45	0.00	0.00
Ave 24 Wye	NA	0.00	0.00	NA	0.00	NA	NA	0.15	0.15	NA	NA	0.15	0.15	NA	NA
Ave 21 Wye	0.53	NA	NA	0.07	NA	0.03	0.03	NA	NA	0.03	0.03	NA	NA	NA	NA
Total Direct Permanent Effect (acres)	**2.42**	**1.82**	**1.50**	**2.69**	**2.05**	**13.24**	**8.66**	**13.25**	**8.68**	**13.98**	**13.58**	**14.00**	**13.60**	**0.00**	**0.00**
Indirect Permanent Effects (acres)															
North-South Alignment	2.00	1.28	1.47	2.82	2.68	13.30	13.84	13.30	13.84	13.51	16.97	13.52	16.97	0.00	0.00
Ave 24 Wye	NA	0.23	0.00	NA	0.00	NA	NA	0.03	0.03	NA	NA	0.03	0.03	NA	NA
Ave 21 Wye	0.29	NA	NA	0.00	NA	0.26	0.26	NA	NA	0.26	0.26	NA	NA	NA	NA
Total Indirect Permanent Effect (acres)	**2.29**	**1.51**	**1.47**	**2.82**	**2.68**	**13.56**	**14.10**	**13.33**	**13.88**	**13.78**	**17.23**	**13.55**	**17.00**	**0.00**	**0.00**

Table 8.3-2
Summary of Special-status Wildlife Habitat Impacts by Alternative

North-South Alignment Isolated and with Wye Design Option	HST Alternatives and Design Options													Station Alternative	
	UPRR/SR 99 Alternative			Hybrid Alternative		BNSF Alternative									
	East Chowchilla Design Option	East Chowchilla Design Option	West Chowchilla Design Option	East Chowchilla Design Option	West Chowchilla Design Option	Mariposa Way Design Options				Mission Ave Design Options				Kern Street Design Option	Mariposa Station Design Option
						Le Grand	East of Le Grand	Le Grand	East of Le Grand	Le Grand	East of Le Grand	Le Grand	East of Le Grand		
	(Ave 21)	(Ave 24)	(Ave 24)	(Ave 21)	(Ave 24)	(Ave 21)		(Ave 24)		(Ave 21)		(Ave 24)		(Ave 21)	(Ave 24)
Conservancy Fairy Shrimp															
Direct Permanent Effect (acres)															
North-South Alignment	7.39	7.39	7.06	22.78	16.15	50.17	46.24	50.12	46.19	47.22	52.01	47.17	51.96	0.00	0.00
Ave 24 Wye	NA	0.00	0.00	NA	0.00	NA	NA	0.80	0.80	NA	NA	0.80	0.80	NA	NA
Ave 21 Wye	0.00	NA	NA	0.00	NA	0.54	0.54	NA	NA	0.54	0.54	NA	NA	NA	NA
Total Direct Permanent Effect (acres)	**7.39**	**7.39**	**7.06**	**22.78**	**16.15**	**50.71**	**46.79**	**50.92**	**46.99**	**47.77**	**52.56**	**47.97**	**52.76**	**0.00**	**0.00**
Indirect Permanent Effects (acres)															
North-South Alignment	1.21	1.17	0.82	5.61	5.34	24.46	24.06	24.46	24.06	24.20	23.26	24.20	23.26	0.00	0.00
Ave 24 Wye	NA	0.00	0.00	NA	0.00	NA	NA	0.23	0.23	NA	NA	0.23	0.23	NA	NA
Ave 21 Wye	0.00	NA	NA	0.00	NA	0.39	0.39	NA	NA	0.39	0.39	NA	NA	NA	NA
Total Indirect Permanent Effect (acres)	**1.21**	**1.17**	**0.82**	**5.61**	**5.34**	**24.85**	**24.45**	**24.69**	**24.29**	**24.58**	**23.65**	**24.42**	**23.49**	**0.00**	**0.00**
Vernal Pool Fairy Shrimp															
Direct Permanent Effect (acres)															
North-South Alignment	10.28	9.94	9.80	25.75	18.59	53.11	49.18	52.83	48.91	50.16	54.95	49.88	54.68	0.00	0.00
Ave 24 Wye	NA	0.37	0.31	NA	0.41	NA	NA	1.16	1.16	NA	NA	1.16	1.16	NA	NA
Ave 21 Wye	0.90	NA	NA	0.44	NA	0.83	0.83	NA	NA	0.83	0.83	NA	NA	NA	NA
Total Direct Permanent Effect (acres)	**11.18**	**10.31**	**10.10**	**26.20**	**18.99**	**53.94**	**50.01**	**53.99**	**50.06**	**50.99**	**55.78**	**51.04**	**55.83**	**0.00**	**0.00**
Indirect Permanent Effects (acres)															
North-South Alignment	5.39	4.51	4.28	10.47	8.71	28.35	27.94	28.35	27.94	28.08	27.15	28.08	27.15	0.00	0.00
Ave 24 Wye	NA	0.02	0.02	NA	0.04	NA	NA	0.27	0.27	NA	NA	0.27	0.27	NA	NA
Ave 21 Wye	0.50	NA	NA	0.68	NA	2.57	2.57	NA	NA	2.57	2.57	NA	NA	NA	NA
Total Indirect Permanent Effect (acres)	**5.89**	**4.54**	**4.30**	**11.14**	**8.75**	**30.92**	**30.52**	**28.61**	**28.21**	**30.65**	**29.72**	**28.35**	**27.41**	**0.00**	**0.00**
Vernal Pool Tadpole Shrimp															
Direct Permanent Effect (acres)															

Table 8.3-2
Summary of Special-status Wildlife Habitat Impacts by Alternative

North-South Alignment Isolated and with Wye Design Option	HST Alternatives and Design Options													Station Alternative	
	UPRR/SR 99 Alternative			Hybrid Alternative		BNSF Alternative									
	East Chowchilla Design Option	East Chowchilla Design Option	West Chowchilla Design Option	East Chowchilla Design Option	West Chowchilla Design Option	Mariposa Way Design Options				Mission Ave Design Options				Kern Street Design Option	Mariposa Station Design Option
						Le Grand	East of Le Grand	Le Grand	East of Le Grand	Le Grand	East of Le Grand	Le Grand	East of Le Grand		
	(Ave 21)	(Ave 24)	(Ave 24)	(Ave 21)	(Ave 24)	(Ave 21)		(Ave 24)		(Ave 21)		(Ave 24)		(Ave 21)	(Ave 24)
North-South Alignment	7.15	7.15	6.82	20.00	13.36	47.38	43.46	47.33	43.40	44.43	49.23	44.38	49.17	0.00	0.00
Ave 24 Wye	NA	0.00	0.00	NA	0.00	NA	NA	0.80	0.80	NA	NA	0.80	0.80	NA	NA
Ave 21 Wye	0.00	NA	NA	0.00	NA	0.54	0.54	NA	NA	0.54	0.54	NA	NA	NA	NA
Total Direct Permanent Effect (acres)	**7.15**	**7.15**	**6.82**	**20.00**	**13.36**	**47.93**	**44.00**	**48.13**	**44.21**	**44.98**	**49.77**	**45.18**	**49.98**	**0.00**	**0.00**
Indirect Permanent Effects (acres)															
North-South Alignment	1.21	1.17	0.82	2.25	1.98	21.10	20.70	21.10	20.70	20.83	19.90	20.83	19.90	0.00	0.00
Ave 24 Wye	NA	0.00	0.00	NA	0.00	NA	NA	0.23	0.23	NA	NA	0.23	0.23	NA	NA
Ave 21 Wye	0.00	NA	NA	0.00	NA	0.39	0.39	NA	NA	0.39	0.39	NA	NA	NA	NA
Total Indirect Permanent Effect (acres)	**1.21**	**1.17**	**0.82**	**2.25**	**1.98**	**21.49**	**21.08**	**21.33**	**20.93**	**21.22**	**20.29**	**21.06**	**20.13**	**0.00**	**0.00**
Valley Elderberry Longhorn Beetle															
Direct Permanent Effect (acres)															
North-South Alignment	1.50	1.49	1.79	1.22	1.31	2.92	2.92	2.96	2.96	2.17	2.17	2.21	2.21	0.00	0.00
Ave 24 Wye	NA	4.26	4.15	NA	3.95	NA	NA	1.00	1.00	NA	NA	1.00	1.00	NA	NA
Ave 21 Wye	0.42	NA	NA	0.42	NA	0.45	0.45	NA	NA	0.45	0.45	NA	NA	NA	NA
Total Direct Permanent Effect (acres)	**1.91**	**5.74**	**5.94**	**1.63**	**5.26**	**3.38**	**3.38**	**3.96**	**3.96**	**2.62**	**2.62**	**3.21**	**3.21**	**0.00**	**0.00**
Indirect Permanent Effects (acres)															
North-South Alignment	1.63	1.57	2.64	1.15	2.39	4.07	4.07	4.03	4.03	2.10	2.10	2.06	2.06	0.00	0.00
Ave 24 Wye	NA	7.96	4.94	NA	5.12	NA	NA	1.54	1.54	NA	NA	1.54	1.54	NA	NA
Ave 21 Wye	1.40	NA	NA	0.97	NA	1.53	1.53	NA	NA	1.53	1.53	NA	NA	NA	NA
Total Indirect Permanent Effect (acres)	**3.03**	**9.53**	**7.59**	**2.12**	**7.51**	**5.59**	**5.59**	**5.57**	**5.57**	**3.62**	**3.62**	**3.60**	**3.60**	**0.00**	**0.00**
CTS															
Direct Permanent Effect (acres)															
North-South Alignment	45.20	46.45	38.60	82.12	72.19	168.81	131.98	167.78	130.94	158.93	145.24	157.89	144.20	0.00	0.00
Ave 24 Wye	NA	0.15	0.31	NA	0.41	NA	NA	10.85	10.85	NA	NA	10.85	10.85	NA	NA

Table 8.3-2
Summary of Special-status Wildlife Habitat Impacts by Alternative

North-South Alignment Isolated and with Wye Design Option	HST Alternatives and Design Options													Station Alternative	
	UPRR/SR 99 Alternative			Hybrid Alternative		BNSF Alternative									
	East Chowchilla Design Option	East Chowchilla Design Option	West Chowchilla Design Option	East Chowchilla Design Option	West Chowchilla Design Option	Mariposa Way Design Options				Mission Ave Design Options				Kern Street Design Option	Mariposa Station Design Option
						Le Grand	East of Le Grand	Le Grand	East of Le Grand	Le Grand	East of Le Grand	Le Grand	East of Le Grand		
	(Ave 21)	(Ave 24)	(Ave 24)	(Ave 21)	(Ave 24)	(Ave 21)		(Ave 24)		(Ave 21)		(Ave 24)		(Ave 21)	(Ave 24)
Ave 21 Wye	2.39	NA	NA	1.93	NA	1.09	1.09	NA	NA	1.09	1.09	NA	NA	NA	NA
Total Direct Permanent Effect (acres)	**47.58**	**46.59**	**38.91**	**84.05**	**72.60**	**169.90**	**133.06**	**178.62**	**141.79**	**160.01**	**146.33**	**168.74**	**155.05**	**0.00**	**0.00**
Indirect Permanent Effects (acres)															
North-South Alignment	93.52	93.86	72.73	167.67	128.41	340.85	352.42	337.16	348.73	339.12	329.84	335.42	326.15	0.00	0.00
Ave 24 Wye	NA	0.30	0.02	NA	0.04	NA	NA	15.31	15.31	NA	NA	15.31	15.31	NA	NA
Ave 21 Wye	2.65	NA	NA	2.72	NA	3.11	3.11	NA	NA	3.11	3.11	NA	NA	NA	NA
Total Indirect Permanent Effect (acres)	**96.16**	**94.16**	**72.75**	**170.38**	**128.45**	**343.96**	**355.53**	**352.47**	**364.04**	**342.22**	**332.95**	**350.73**	**341.46**	**0.00**	**0.00**
Kit Fox															
Direct Permanent Effect (acres)															
North-South Alignment	48.19	49.74	48.38	113.22	111.48	188.19	153.56	187.11	152.48	180.06	164.67	178.97	163.58	0.00	0.00
Ave 24 Wye	NA	8.66	2.91	NA	2.92	NA	NA	17.99	17.99	NA	NA	17.99	17.99	NA	NA
Ave 21 Wye	17.82	NA	NA	13.56	NA	9.53	9.53	NA	NA	9.53	9.53	NA	NA	NA	NA
Total Direct Permanent Effect (acres)	**66.01**	**58.39**	**51.28**	**126.79**	**114.40**	**197.72**	**163.09**	**205.09**	**170.46**	**189.58**	**174.19**	**196.96**	**181.57**	**0.00**	**0.00**
Indirect Permanent Effects (acres)															
North-South Alignment	424.81	465.60	430.93	1109.16	1052.36	1880.24	1872.89	1875.66	1868.31	1846.78	1849.39	1842.21	1844.82	0.00	0.00
Ave 24 Wye	NA	34.91	9.62	NA	9.61	NA	NA	33.26	33.26	NA	NA	33.26	33.26	NA	NA
Ave 21 Wye	29.50	NA	NA	30.91	NA	40.72	40.72	NA	NA	40.72	40.72	NA	NA	NA	NA
Total Indirect Permanent Effect (acres)	**454.31**	**500.51**	**440.55**	**1,140.07**	**1,061.97**	**1,920.95**	**1,913.60**	**1,908.92**	**1,901.57**	**1,887.50**	**1,890.11**	**1,875.47**	**1,878.08**	**0.00**	**0.00**

The BNSF Alternative would have the greatest impact on other habitats of concern because it traverses more undeveloped lands and encroaches upon a number of designated critical habitat areas, conservation banks, and ecological reserves (Figures 8.3-1 through 8.3-4). Habitats of concern traversed by the BNSF Alternative include critical habitat for vernal pool tadpole shrimp, vernal pool fairy shrimp, conservancy fairy shrimp, San Joaquin Valley Orcutt grass, succulent owl's clover, and Greene's tuctoria; and the Great Valley Conservation Bank, which provides habitat for California tiger salamander, San Joaquin Valley Orcutt grass, vernal pool tadpole shrimp, vernal pool fairy shrimp, western spadefoot, burrowing owl, and San Joaquin kit fox. The UPRR/SR 99 and Hybrid alternatives would each cross within close proximity (within approximately 550 feet) of a designated critical habitat area for vernal pool tadpole shrimp and vernal pool fairy shrimp, but would not actually cross through any critical habitat areas. Therefore, the UPRR/SR 99 Alternative and the Hybrid Alternative would not have impacts on designated critical habitat.

All three project alternatives would encroach on the 31-acre Camp Pashayan unit of the San Joaquin River Ecological Reserve and all three alternatives would cross a wildlife corridor identified as the Eastman Lake-Bear Creek Essential Connectivity Area (ECA) established by CDFG and Caltrans as part of the Essential Connectivity Project. ECAs are areas deemed important for ecological connectivity between natural blocks of habitat that support native biodiversity. Identification of the ECA is based primarily on

the concept of ecological integrity and not on the needs of individual species and is intended to inform land use planning decisions. There is no existing management or conservation plan for the Eastman Lake-Bear Creek ECA and it is already dissected by SR 99 and the UPRR and BNSF railroad lines. This ECA is also severely impaired by existing land uses, primarily agriculture. The BNSF would cross approximately 6 miles of this ECA while the UPRR/SR 99 and Hybrid Alternatives would cross approximately 4 miles of the ECA. Locating project improvements for each alternative within existing UPRR/SR 99 and BNSF railroad facility rights-of-way as required by Streets and Highways Code §§ 2705 et seq. assists in minimizing impacts on wildlife corridors. Refer to Table 8.3-2 for a comparison of impacts of the alternatives on these habitats of concern.

All three alternatives would cross over essential fish habitat for Chinook salmon where the alignment crosses the San Joaquin River. Essential fish habitat is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." In the case of each alternative, the alignment would be elevated where it crosses the river, but pilings may be placed within the river channel, resulting in direct impacts to fish habitat, and indirect impacts to essential fish habitat may also result from each of the three Alternatives

8.3.1.5 Summary Comparison of Impacts to Habitats of Concern

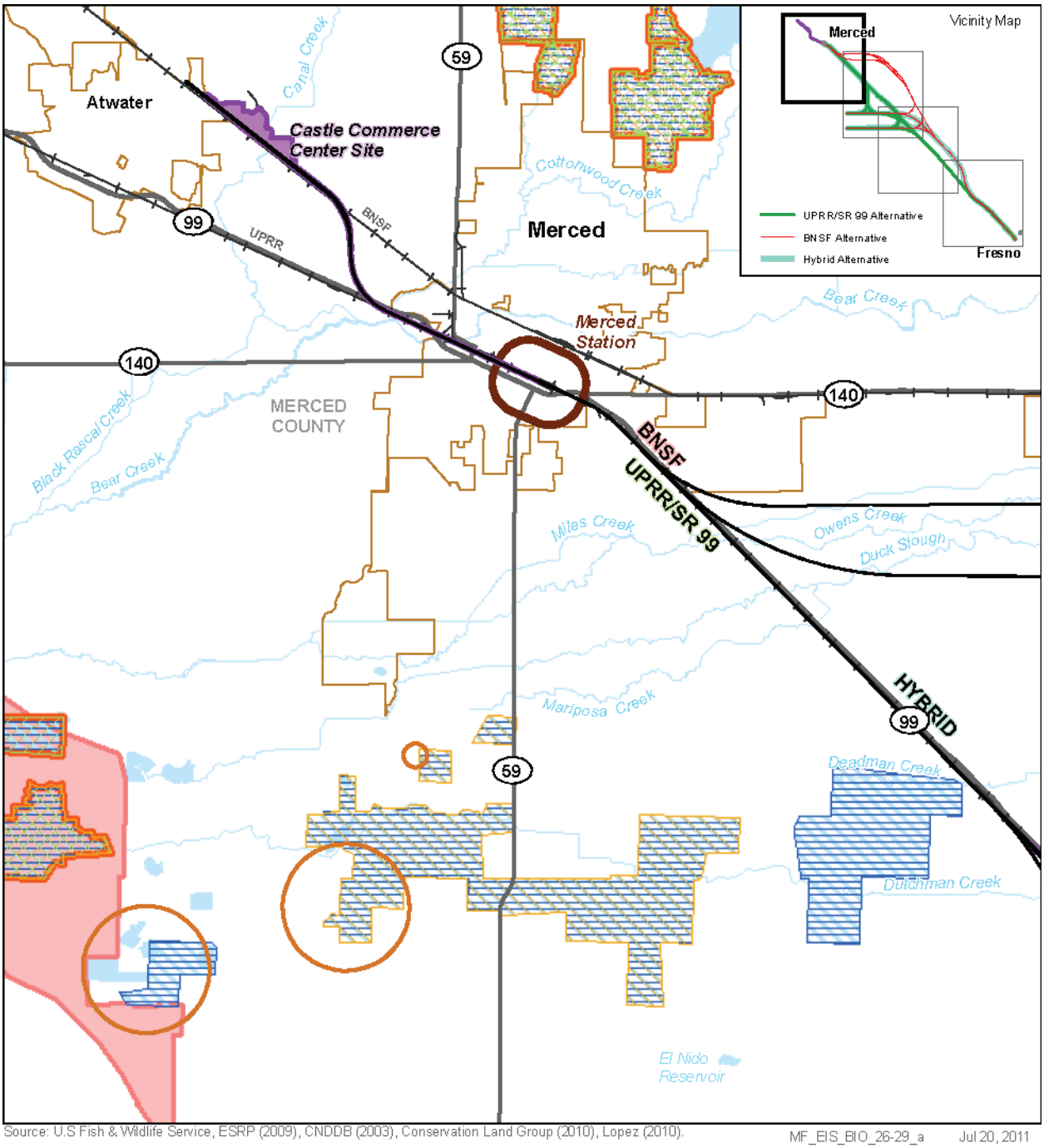
Implementing the BNSF Alternative would have greater impacts, both direct and indirect, to habitats of concern than the UPRR/SR 99 and Hybrid Alternatives.

Potential impacts, direct and indirect, on habitats of concern do not differ between the UPRR/SR 99 Alternative and the Hybrid Alternative in quantity or magnitude, regardless of design options.

8.3.1.6 Overall Summary Comparison of Non-Aquatic Biological Impacts

The BNSF Alternative would result in the greatest significant adverse impacts to non-aquatic biological resources of concern.

The UPRR/SR 99 Alternative generally results in less substantial impacts TO biological resources than the Hybrid Alternative, except for impacts to riparian habitat, critical habitat and potentially suitable habitat for the valley elderberry longhorn beetle. However, both the Hybrid and UPRR/SR 99 Alternative have significantly less impacts to these habitats than the BNSF Alternative.



Source: U.S Fish & Wildlife Service, ESRP (2009), CNDDB (2003), Conservation Land Group (2010), Lopez (2010).

MF_EIS_BIO_26-29_a Jul 20, 2011

N

0 2.5
Miles

Critical Habitat
- Hoover's spurge
- San Joaquin Valley Orcutt grass
- hairy Orcutt grass
- succulent owl's-clover
- Greene's tuctoria
- Colusa grass
- Conservancy fairy shrimp
- vernal pool fairy shrimp
- vernal pool tadpole shrimp
- Central Valley steelhead
- California tiger salamander

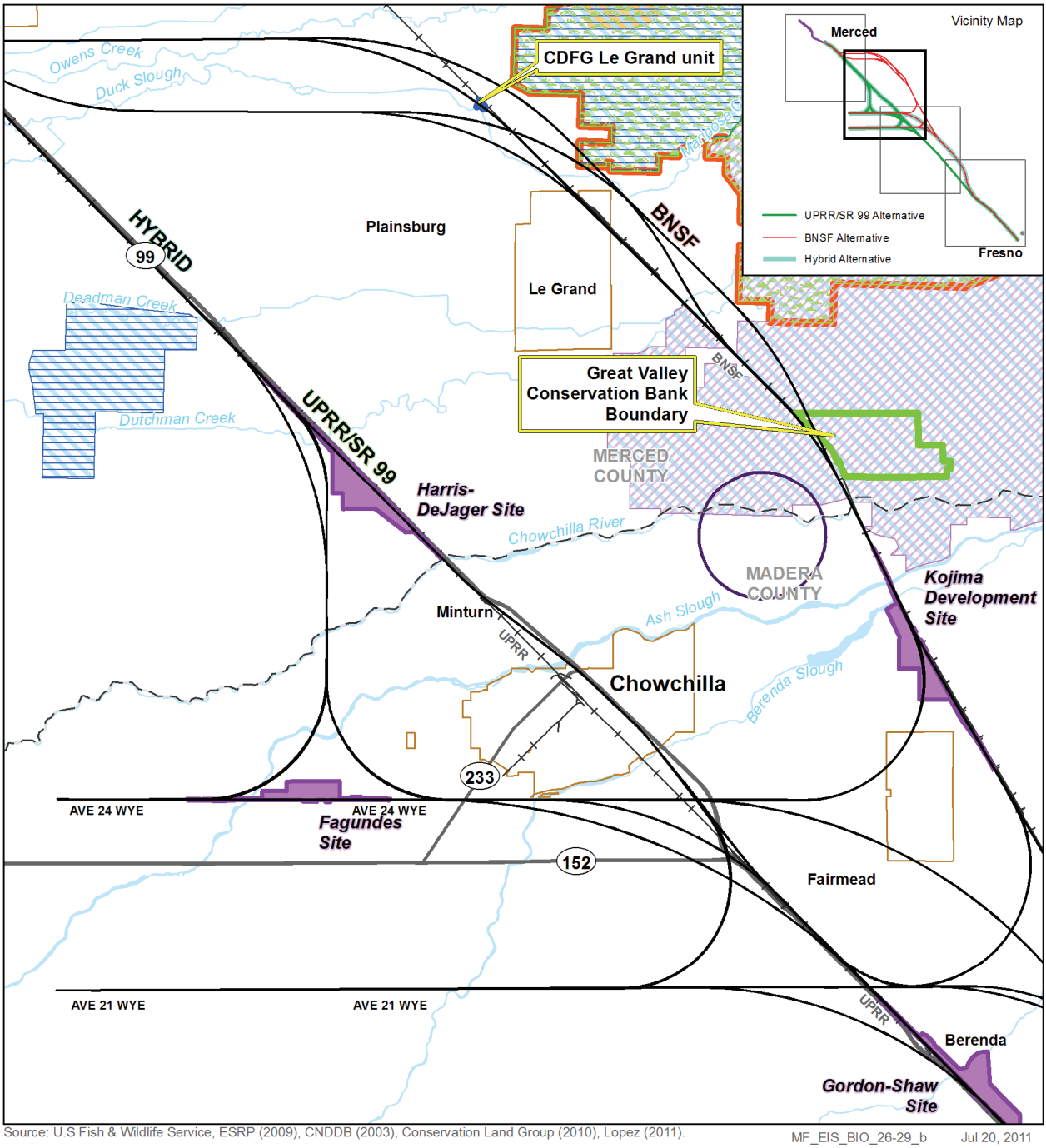
Caltrans Observed Data
- vernal pool

Mitigation Banks/Reserves
- San Joaquin River Ecological Reserve
- CDFG Le Grand Unit
- Great Valley Conservation Bank Boundary
- Grasslands Ecological Area

Special-Status Plant Communities
- Northern Claypan Vernal Pool
- Northern Hardpan Vernal Pool
- Valley Sacaton Grassland
- Valley Sink Scrub

- HST Alignment
- Potential Heavy Maintenance Facility
- Station Study Area
- City Limit
- County Boundary
- Railroad

Figure 8.3-1
Regional Habitats of Concern (Merced Area)



Source: U.S Fish & Wildlife Service, ESRP (2009), CNDDB (2003), Conservation Land Group (2010), Lopez (2011).

MF_EIS_BIO_26-29_b Jul 20, 2011

N

0 2.5
Miles

Critical Habitat
- Hoover's spurge
- San Joaquin Valley Orcutt grass
- hairy Orcutt grass
- succulent owl's-clover
- Greene's tuctoria
- Colusa grass
- Conservancy fairy shrimp
- vernal pool fairy shrimp
- vernal pool tadpole shrimp
- Central Valley steelhead
- California tiger salamander

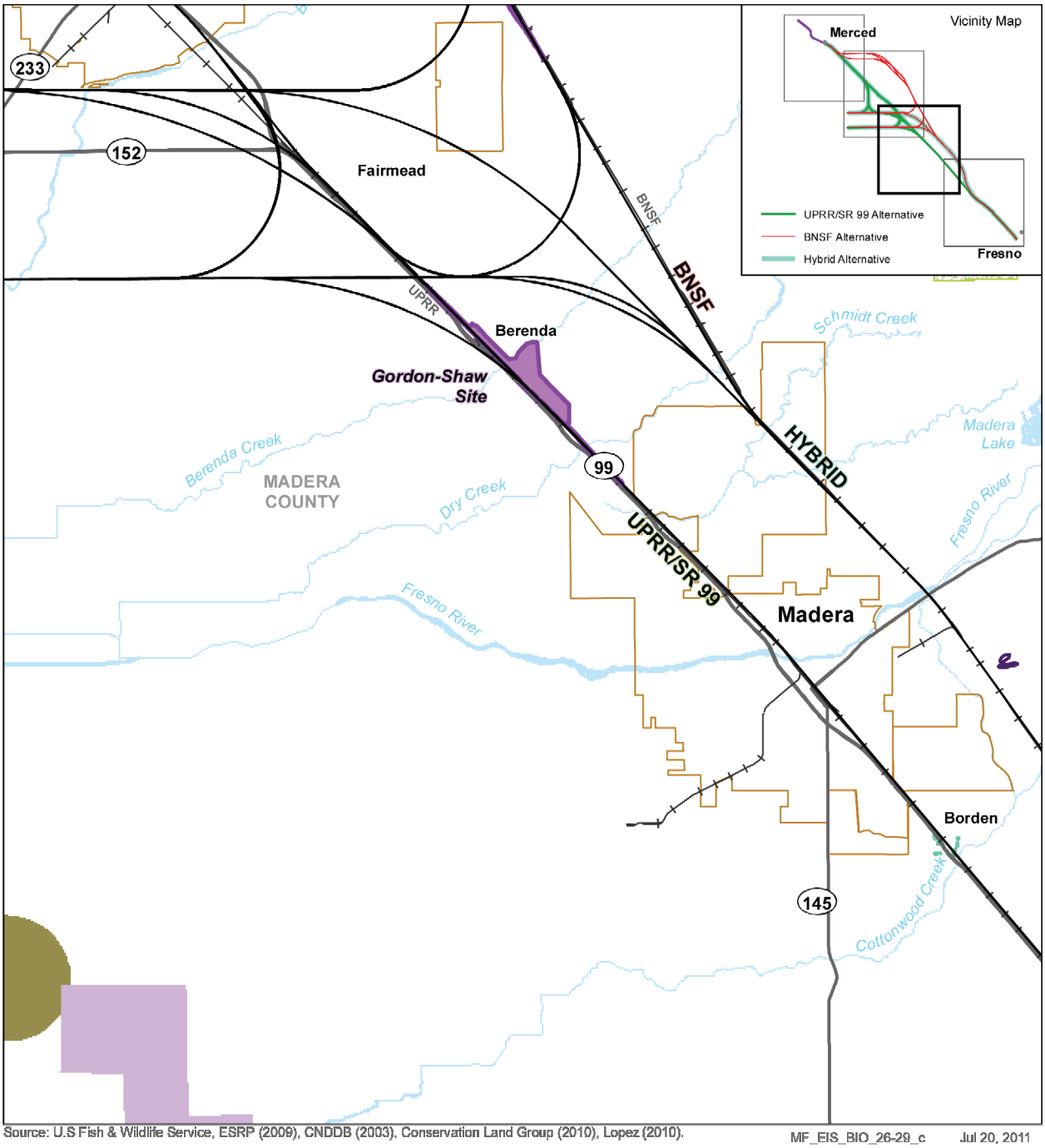
Caltrans Observed Data
- vernal pool

Mitigation Banks/Reserves
- San Joaquin River Ecological Reserve
- CDFG Le Grand Unit
- Great Valley Conservation Bank Boundary
- Grasslands Ecological Area

Special-Status Plant Communities
- Northern Claypan Vernal Pool
- Northern Hardpan Vernal Pool
- Valley Sacaton Grassland
- Valley Sink Scrub

- HST Alignment
- Potential Heavy Maintenance Facility
- Station Study Area
- City Limit
- County Boundary
- Railroad

Figure 8.3-2
Regional Habitats of Concern (Chowchilla Area)



Source: U.S Fish & Wildlife Service, ESRP (2009), CNDDB (2003), Conservation Land Group (2010), Lopez (2010).

MF_EIS_BIO_26-29_c Jul 20, 2011

N

0 2.5
Miles

Critical Habitat
- Hoover's spurge
- San Joaquin Valley Orcutt grass
- hairy Orcutt grass
- succulent owl's-clover
- Greene's tuctoria
- Colusa grass
- Conservancy fairy shrimp
- vernal pool fairy shrimp
- vernal pool tadpole shrimp

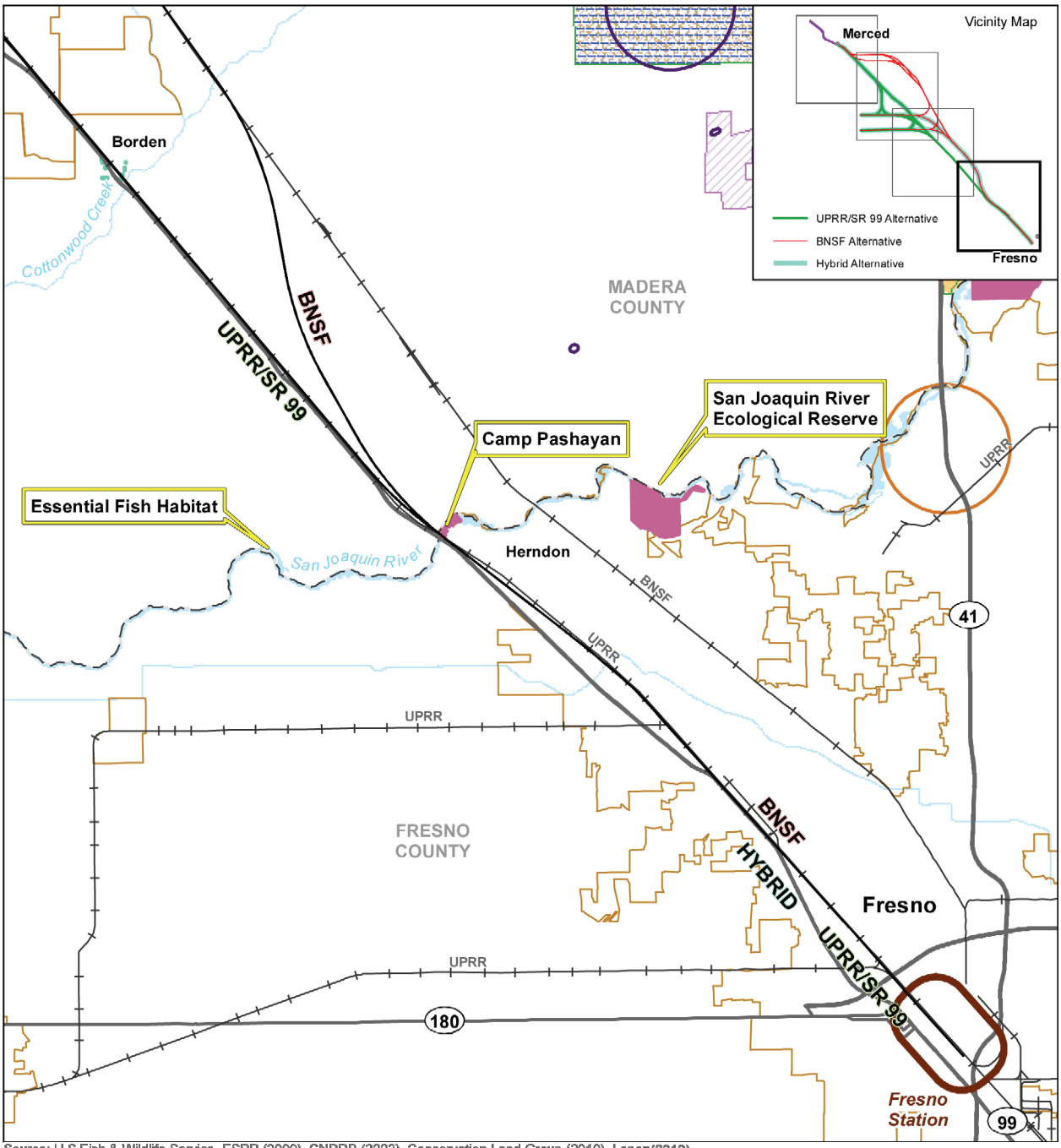
Caltrans Observed Data
- vernal pool

Mitigation Banks/Reserves
- San Joaquin River Ecological Reserve
- CDFG Le Grand Unit
- Great Valley Conservation Bank Boundary
- Grasslands Ecological Area

Special-Status Plant Communities
- Northern Claypan Vernal Pool
- Northern Hardpan Vernal Pool

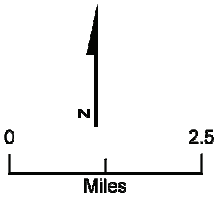
- HST Alignment
- Potential Heavy Maintenance Facility
- Station Study Area
- City Limit
- County Boundary
- Railroad

Figure 8.3-3
Regional Habitats of Concern (Madera Area)



Source: U.S Fish & Wildlife Service, ESRP (2009), CNDDB (2003), Conservation Land Group (2010), Lopez(2010).

MF_EIS_BIO_26-29_d Jul 20, 2011



Critical Habitat
- Hoover's spurge
- San Joaquin Valley Orcutt grass
- hairy Orcutt grass
- succulent owl's-clover
- Greene's tuctoria
- Colusa grass
- Conservancy fairy shrimp
- vernal pool fairy shrimp
- vernal pool tadpole shrimp

Caltrans Observed Data
- vernal pool

Mitigation Banks/Reserves
- San Joaquin River Ecological Reserve
- CDFG Le Grand Unit
- Great Valley Conservation Bank Boundary
- Grasslands Ecological Area

Special-Status Plant Communities
- Northern Claypan Vernal Pool
- Northern Hardpan Vernal Pool

- HST Alignment
- Potential Heavy Maintenance Facility
- Station Study Area
- City Limit
- County Boundary
- Railroad

Figure 8.3-4
Regional Habitats of Concern (Fresno Area)

8.3.2 Environmental Impacts on Local Community Resources and Receptors

A short summary describing the relative differences in environmental impacts on local community resources and receptors follows for each category of local resource. Taking into account all local resource categories, the UPRR/SR 99 Alternative would result in the highest level of environmental impacts to local resources, and the Hybrid Alternative would result in the least. Consistent with the aquatic ecosystem and non-aquatic biological resources sections above, the main text below contains a detailed discussion of the best case and worst case impacts based on alternative and design option. Attachment 8 contains the summary information regarding the best case and worst case environmental impacts on local resources and receptors for each Alternative and design option. Attachment 8 allows the reader to discern and compare the potential project period impacts that would occur with each Alternative and design option combination.

8.3.2.1 Quick Overview

To set the stage for the more detailed sections that follows, Table 8.3-3 below provides an aggregated summary of the environmental impacts to local resources and receptors that would be caused by each build alternative.

Table 8.3-3
Environmental Impacts on Local Community Resources and Receptors by Alternative

Resource Categories	Range of Potential Impacts by HST Alternative[a]			Explanation of Measured Impact
	UPRR/ SR 99 Alternative	Hybrid Alternative	BNSF Alternative	
Operational Environmental Impacts to Community Resources				
Noise	776-875	408-447	419-461	Number of Residences Affected by Severe Noise Impacts – Ballast and Tie
Noise	1211-1354	779-794	757-1102	Number of Residences Affected by Severe Noise Impacts – Slab
Noise	7 to 9	4	4	Number of Non-residential Facilities Affected by Severe Noise Impacts –Ballast and Tie
Noise	15-17	6	6	Number of Non-residential Facilities Affected by Severe Noise Impacts –Slab
Transportation	10 to 29	18 to 36	14 to 41	Number of Permanent Road Closures
State Facilities	0	0	0 to 1	Conflicts with Correctional Facilities
Community Resources	17.4 to 19.2	12 to 15.6	12 to 15.5	Linear Miles within Urban Limits, which are directly proportional to greater construction period impacts, including construction air quality, noise, vibration, traffic and transport impacts.
Agricultural Lands	262 to 314	283 to 299	317 to 469	Prime Farmlands Affected (acres)
Agricultural Lands	1027-1149	1285-1433	1417-1483	Important Farmlands[c] Affected (acres)

Resource Categories	Range of Potential Impacts by HST Alternative[a]			Explanation of Measured Impact
	UPRR/ SR 99 Alternative	Hybrid Alternative	BNSF Alternative	
Section 4(f)	8	4	4	Number of Uses
Visual/Aesthetic Resources	2 to 3	1 to 2	4 to 5	Number of Landscape Units with Decreased Visual Quality.
Visual/Aesthetic Resources	32 to 41	15 to 17	21 to 24	Miles of Elevated Track
Construction Environmental Impacts to Community Resources				
Air Quality	Highest	Lowest	Mid-range	Construction-related Pollutant Emissions

Notes:

Substantially higher impact
Average impact
Substantially lower impact

[a] When a single value is presented for the range of impacts, there is no appreciable difference between the project component combinations for the alternative.

[b] This criterion evaluates how the HST alternative would impede future transportation facility planning. For instance, elevated guideways may impede future overcrossings. This measure is not quantitative.

[c] Important Farmlands includes Farmland of Statewide Importance, Unique Farmland, and Farmland of Local Importance.

All HST alternatives would have **noise impacts.** Table 8.3-3 above provides noise impact numbers for two possible types of track: slab track and ballast and tie track. HST track was assumed to have two construction alternatives. Noise and vibration impact was assessed assuming ballast and tie with continuous welded rail, consistent with the assumptions in the FRA guidance manual (FRA 2005) throughout the corridor. Additionally, noise and vibration impact was assessed assuming slab track throughout the corridor. Slab track was assumed to be 3 dB louder than ballast and tie track. The highest number of receptors subjected to moderate and severe noise impacts would be associated with the UPRR/SR 99 Alternative. The number of severe noise impacts under the BNSF and Hybrid alternatives would be substantially fewer than the number associated with the UPRR/SR 99 Alternative. The BNSF and Hybrid alternatives would have nearly the same number of affected sensitive receptors.

All HST alternatives would result in **transportation impacts**. The BNSF and Hybrid alternatives both would provide a benefit to Madera Acres by providing a grade-separated roadway crossing over the existing BNSF railroad; the new crossing would be shared by the roadway and HST guideway and would improve circulation for this portion of the community. The UPRR/SR 99 Alternative would be elevated in Madera as the only prudent profile to avoid conflicts with major arterials and existing freeway structures at either end of the city. However, this elevated design proposal would not alleviate existing transportation conflicts between the UPRR railroad track and local circulation. Due to the proximity of the UPRR/SR 99 Alternative, future grade separations would not be possible for the City of Madera without the high cost of trenching under both the UPRR railroad and the HST Project. An elevated crossing would not be able to cross the UPRR railroad and clear the proposed UPRR/SR 99 Alternative elevated HST guideway without substantial damage to the community and a high cost. Because the BNSF and Hybrid alternatives would avoid urban areas that require grade separation over multiple roadways to minimize

impacts, these alternatives would require fewer modifications to the state highway system than the UPRR/SR 99 Alternative would. The Hybrid Alternative would require more local road closures than the UPRR/SR 99 Alternative, but could have more or fewer than the BNSF Alternative depending on the design option and wye. The road closures would mostly affect rural areas where there are other roadway options available to meet circulation demands and where there would be a smaller possibility of congestion issues. The UPRR/SR 99 Alternative road closures, although fewer in number, include more roadways in the urbanized areas, which may result in higher community effects.

The alternatives would have differing levels of impact on **agriculture**. The BNSF Alternative would require crossing and potentially severing more farmlands and dairies than the other HST alternatives because it traverses large areas that do not parallel transportation corridors. It also would have the highest impact on Important farmlands (1417 to 1483 acres), whereas the other two alternatives would have similar levels of impact (1027 to 1149 acres for the UPRR/SR 99 Alternative and 1285-1433 acres for the Hybrid Alternative). The UPRR/SR 99 Alternative with the West Chowchilla design option would reduce the modifications to the SR 99 infrastructure, and it represents the lower range of agricultural land conversion for the UPRR/SR 99 Alternative. Alternatives that do not follow an existing transportation corridor would sever more farmlands than alternatives that closely follow existing transportation corridors.

Visual resources such as viewsheds and aesthetic corridors cross over both urban and rural landscapes. The Hybrid Alternative would result in the least impact on visual quality of aesthetic features and corridors. Additionally, as proposed, the Hybrid Alternative would have the least elevated guideway, and thus would disrupt the visual terrain less than either the UPRR/SR 99 Alternative or the BNSF Alternative. While the UPRR/SR 99 Alternative has the most elevated guideway, the BNSF Alternative actually would degrade the visual quality in more sensitive view corridors than the UPRR/SR 99 and the Hybrid alternatives.

All HST alternatives would affect **park resources**. The BNSF Alternative and the Hybrid Alternative would result in the use of up to four Section 4(f) resources, including one park and recreation resource and three historic resources. This is preferable to the UPRR/SR 99 Alternative, which would affect the same resources as well as others found in Madera, for a use of up to eight Section 4(f) resources, including four park and recreation resources and four cultural resources.

While **construction** is typically considered to be a temporary effect, the HST Project construction period would endure for approximately 7 years of heavy construction and another 2 years of track testing. This duration would perhaps intensify impacts on community resources more than impacts on natural resources. Construction effects on natural resources can be minimized by implementing best management practices (BMPs) to avoid affecting water quality and to limit work during sensitive periods. In addition, relocation of species and other forms of mitigation can be performed before construction commences, further minimizing effects on related species. Construction effects on community resources include dust, noise, closing access to parks, re-routing of circulation and diversion of traffic that can lead to reduced business activity, and air quality effects. These effects can concern businesses, result in health concerns for school children and others suffering respiratory illnesses, result in frustration, and lower the community quality during this construction period. Simply, the related noise, dust, and economic effects on the communities are directly proportionate to the miles of construction through these urbanized areas.

8.3.3 Noise[2]

Each of the alternatives would create noise impacts. In accordance with FTA and FRA noise protocols, noise impacts were categorized as no impact, moderate impact (noticeable but may not be sufficient to

[2] The text in this section is based on using ballast and tie track. Noise impacts would be greater with slab track by approximately 3 dBA but this would not affect the relative differences in impacts between the alternatives.

cause to generate strong, adverse reactions), or severe impact (significant percentage of people would be highly annoyed).

8.3.3.1 Residential Receptors

The highest number of moderate and severe noise impacts would be associated with the UPRR/SR 99 Alternative. The best case design option numbers for the UPRR/SR 99 Alternative are 1,254 receptors moderately impacted (West Chowchilla with Ave 24 Wye) and 776 receptors severely impacted (East Chowchilla with Ave 21 Wye); worst-case numbers are 1,335 receptors moderately impacted (East Chowchilla with Ave 21 Wye) and 875 receptors severely impacted (West Chowchilla with Ave 24 Wye).

In general, the Hybrid Alternative would result in the lowest overall number of moderately and severely impacted receptors.[3] The best case design option for moderate noise impacts with the Hybrid Alternative (West Chowchilla with Ave 24 Wye) results in 804 receptors with moderate impacts. The worst case design option (East Chowchilla with Ave 21 Wye) would result in 923 receptors with moderately impacts. In terms of severe impacts, the Hybrid Alternative, West Chowilla with the Ave 24 Wye (worst case), would result in 447 receptors with severe impacts; 408 receptors would have severe impacts from the Hybrid alternative with the East Chowchilla Ave 21 Wye (best case).

Depending on the design options selected, the BNSF Alternative would have moderate noise impacts similar either to the UPRR/SR 99 Alternative or the Hybrid Alternative. Design options going east of Le Grand generally result in similar impacts to the Hybrid Alternative, whereas the Le Grand design options have impacts that are more similar to the UPRR/SR 99 Alternative. For example, the best case design option impacts for the BNSF Alternative yield 789 receptors with moderate impacts (Mariposa Way, East of Le Grand, with Ave 21 Wye) and a worst-case design option of 1,260 receptors with moderate impacts (Mariposa Way, Le Grand, with Ave 24 Wye). In terms of severe noise impacts, the BNSF Alternative and Hybrid Alternatives are fairly similar.

Overall, the UPRR/SR 99 results in significantly more receptors effected in terms of both moderate and severe impacts than either of the other alternatives For severe impacts, the Hybrid Alternative and the BNSF Alternative have nearly the same number of receptor impacts (approximately 408-461 receptors) but the UPRR/SR 99 has nearly double the amount of severely receptor impacts, 776-875 receptors. For moderate impacts, depending on which design options are chosen, the BNSF Alternative is similar either to the UPRR/SR 99 Alternative, which would have from 1,254 to 1,335 receptor impacts, or to the Hybrid Alternative, which would have from 804 to 923 moderate receptors impacts.

8.3.3.2 Non-Residential Receptors

Although the total number of impacted non-residential receptors would be relatively low for all the build alternatives, the UPRR/SR 99 Alternative would impact twice as many receptors as the other two build alternatives (9 severely impacted non-residential receptors versus 4 severely impacted non-residential receptors with the Hybrid and BNSF Alternatives). One receptor that would have severe impacts under the UPRR/SR 99 Alternative is an outdoor movie theater, which would be particularly sensitive to the high noise levels caused by the Proposed Project.

With sound barriers as mitigation, the number of significant noise impacts could be reduced as the barriers would shield HST noise. With full implementation of the guidelines, most significant noise impacts would be eliminated. Severe noise effects would remain for some receptors because they are located outside of the area where the barrier is fully effective or the sound barrier does not fully mitigate the effect (i.e., noise is reduced by 5 dB but not below the severe threshold); see Table 8.3-4 below.

[3] The Hybrid Alternative with the Ave 21 Wye design option may have a higher number of moderately impacted receptors than the BNSF Alternative depending on which BNSF design options are selected. Under any scenario, the UPRR/SR 99 still results in the highest number of impacted receptors.

Furthermore, severe noise effects would remain for receptors mitigated only with indoor sound insulation or when covered by noise easements.

Table 8.3-4
Total Post-Mitigation Severe Effects Remaining at Locations with and without Sound Barriers

Alternative	Number of Severe Effects Remaining with Ballast & Tie Track	Number of Severe Effects Remaining with Slab Track
UPRR/SR 99 Alternative	151 to 185	113 to 198
BNSF Alternative	261 to 301	222 to 298
Hybrid Alternative	228 to 265	195 to 263
Note: Ranges reflect variation due to design options.		

While the Hybrid Alternative would have more receptors that would remain impacted after mitigation, the intensity of the noise impacts with the UPRR Alternative and the BNSF Alternative would still be greater based on the magnitude of the initial impacts. At the current stage of project development, soundwalls are proposed but their inclusion as part of the Proposed Project has not been finally determined. It is possible that during final design the community could reject the construction of the soundwalls, especially given the walls' adverse visual impacts. It is also possible that during final design there could be changes in the design that would render the soundwalls not reasonable and feasible.

8.3.4 Cultural Resources

As discussed in greater detail in Sections 6.2, 6.3, and 7.4 of this document and shown in Attachment 8, the UPRR/SR 99 Alternative would have the greatest impacts to archaeological and built-environment cultural resources; the impacts of the Hybrid Alternative and the BNSF Alternative would be similar to one another but less than the UPRR/SR 99 Alternative. Without consideration of the wyes, the UPRR/SR 99 Alternative would impact a minimum of 10 archaeological sites with just the north-south alignment; with the wyes this number increases to 11 sites. With both the Hybrid Alternative and the BNSF Alternative, the maximum number of archaeological sites impacted including the wye is 8-9 sites. The same holds true for the built-environment cultural resources—the UPRR/SR 99 Alternative impacts thirteen resources with just its north-south alignment and up to fifteen resources if one of the wyes is included. The maximum number of built-environment resources impacted by the Hybrid Alternative and the BNSF Alternative is thirteen, including the wye connection.

Physical impacts such as material or structural alteration, especially demolition of an NRHP-listed or eligible historic property, would be an impact with substantial intensity under NEPA. These direct impacts would be significant because the impacts could directly alter the physical integrity, use, or setting. As a result, the historic property may no longer be able to convey its significance through its physical characteristics and, therefore, may no longer be eligible for the NRHP.

Introduction of new visual elements or alteration of the visual setting when it is part of the property's integrity would result in an impact with moderate intensity under NEPA because the historic property may no longer be able to convey its significance and, therefore, may no longer be eligible for the NRHP.

Construction or operational noise that impacts historic properties that have an inherent quiet nature that is part of their identification as well as their significance would cause impacts with moderate intensity under NEPA because they would permanently degrade the elements that make the historic property eligible for the NRHP.

To the extent that visual effects and vibration could degrade the elements that make the resource eligible, these long-term effects would be adverse impacts with moderate intensity.

As discussed in Section 3.17.3.4 of the EIR/EIS, although actions determined to have an adverse impact under NEPA may be mitigated and have a lesser effect, for Section 106, the effect determination remains adverse even when mitigated.

8.3.5 Parks, Recreation, and Open Space

As discussed in greater detail in Section 6.2, 6.3, and 7.4 of this document, the UPRR/SR 99 Alternative would impact the most parks, recreational and open space areas. Both during construction and permanently, the UPRR/ SR 99 Alternative would impact 4 recreation areas: Sharon Avenue Linear Park (only during construction), Riverside Park, County Road 27¾ Linear Park and Camp Pashayan. Both the Hybrid and BNSF Alternatives regardless of the design options chosen would impact 1 recreation area, Camp Pashayan.

According to the NEPA assessment of the UPRR/SR 99 Alternative, three park resources would incur project impacts with substantial intensity because of permanent property acquisitions: Riverside Park, County Road 27¾ Linear Park, and Camp Pashayan; therefore, the impacts on these three parks would be impacts with substantial intensity. Mitigation would reduce the direct and indirect project impacts related to the UPRR/SR 99 Alternative to moderate intensity at Sharon Avenue Linear Park; therefore, the impacts on this park would not have substantial intensity.

HST operations would increase noise levels along the eastern portion of Roeding Park to severe levels. The impact on the park function and the park as a historic resource because of the increased noise levels would be substantial; this impact on Roeding Park would be an impact of substantial intensity. Discussions with the City of Fresno are underway to determine to what extent the noise would affect park uses. Mitigation could include construction of an aesthetically treated sound barrier, which would reduce the intensity of the effect related to noise from substantial to moderate.

NEPA impacts from the BNSF and Hybrid alternatives would be the same at Camp Pashayan and Roeding Park, because in Fresno, the alignment is identical for the three alternatives.

8.3.6 Section 4(f) Uses

49 U.S.C. § 303 (Section 4(f) of the Department of Transportation Act) affords a similar level of protection to publicly owned public parks, recreation areas, wildlife and waterfowl refuges, and to significant historic resources as wetlands are afforded under the Clean Water Act and Executive Order 11990. The UPRR/ SR 99 Alternative would result in the greatest harm to Section 4(f) resources. All alternatives would use Camp Pashayan, Robertson Tree Row, Belmont Avenue Subway and Traffic Circle in Fresno, and the Weber Avenue Bridge.

As shown in Table 8.3-5 below, the UPRR/SR Alternative would result in the use of 4 additional Section 4(f) resources. The Sharon Avenue Linear Park consists of a paved pathway, benches and landscaping and is frequented by pedestrians and bicyclists. The UPRR/SR 99 Alternative would result in the closure of the park during the entire 7 year construction period, which constitutes a Section 4(f) use. The second additional use is the County Road 27 ¾ Linear Park, which also consists of a paved pathway and landscaping. The UPRR/SR 99 Alternative would permanently use 1 acre of the park, which represents 70% of the park's total acreage. The third additional Section 4(f) use is to Riverside Park. The park follows the north side of the Fresno River and is popular with pedestrians and cyclists. The UPRR/SR 99 Alternative would permanently use 0.4 acres of the park for column placement and would also have temporary use of the park during construction. The final additional Section 4(f) use is the Southern Pacific Railroad Station in Madera. The significant historic resource would be demolished by the UPRR/SR 99 Alternative as it is sited directly in path of the north-south alignment and avoidance is not feasible.

Table 8.3-5
Section 4(f) Uses by Alternative

Section 4(f) Uses by Alternative (X signifies use)			
	UPRR/ SR 99 Alternative	**Hybrid Alternative**	**BNSF Alternative**
Camp Pashayan	X	X	X
Sharon Avenue Linear Park	X		
County Road 27 ¾ Linear Park	X		
Riverside Park	X		
Robertson Blvd Tree Row	X	X	X
Belmont Avenue Subway and Traffic Circle in Fresno	X	X	X
Weber Avenue Bridge	X	X	X
SPRR Station in Madera	X		

8.3.7 Transportation

All of the alternatives would result in transportation impacts (see Table 8.3-6). The BNSF and the Hybrid alternatives both would provide a benefit to Madera Acres by providing a grade-separated roadway crossing over the existing BNSF railroad; the new crossing would be shared by roadway and HST guideway and would improve circulation for this portion of the community. The UPRR/SR 99 Alternative would be elevated in Madera as the only prudent profile to avoid conflicts with major arterials and existing freeway structures at either end of the city. However, this elevated design proposal would not alleviate existing transportation conflicts between the UPRR railroad track and local circulation. Due to the proximity of the UPRR/SR 99 Alternative, future grade separations would not be possible for the City of Madera without the high cost of trenching under both the UPRR railroad and the HST project. An elevated crossing would not be able to cross the UPRR railroad and clear the proposed UPRR/SR 99 elevated HST guideway without substantial damage to the community and at a high cost.

The BNSF and Hybrid alternatives would require fewer modifications to the state highway system than the UPRR/SR 99 Alternative. The Hybrid Alternative would require more local road closures than the UPRR/SR 99 Alternative but could have more or fewer than the BNSF Alternative depending on the design option and wye. The road closures would mostly affect rural areas where there are other roadway options available to meet circulation demands and where there would be a smaller possibility of congestion issues. The UPRR/SR 99 Alternative road closures, although fewer in number, include more roadways in the urbanized areas and therefore may result in higher community effects.

Table 8.3-6
Transportation Impacts by Alternative

Alternative:	UPRR/SR 99 Alternative					BNSF Alternative							
						Mariposa Way				Mission Ave			
Design Features:	East Chow-chilla		West Chow-chilla	Hybrid Alternative		Le Grand Design Option		East of Le Grand Design Option		Le Grand Design Option		East of Le Grand Design Option	
Wye:	Ave 24	Ave 21	Ave 24	Ave 24	Ave 21	Ave 24	Ave 21	Ave 24	Ave 21	Ave 24	Ave 21	Ave 24	Ave 21
Number of Railroad Crossings	9	9	7	6	4	6	6	10	10	6	6	10	10
Approximate Number of Roadway Closures [b]	23	26	32	49	37	74	59	80	65	71	56	77	62
Number of Roadway Overcrossings	29	26	28	48	45	53	45	53	45	53	45	53	45

[a] 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.

[b] Includes public and private road closures.

Impacts of substantial intensity are identified in Section 3.2.5 of the EIR/EIS, Environmental Consequences. Many of the anticipated impacts are similar among the project alternatives as they would occur in association with the SR 99 relocation and the Merced and Fresno stations sites, which are common elements to the project alternatives. Impacts with substantial intensity are anticipated for freeway operations and intersections due to the SR 99 relocation. Impacts with substantial intensity are also anticipated in the vicinity of the Merced and Fresno stations. Intersection impacts with substantial intensity have also been identified for each of the HMF sites. All of these impacts would have substantial intensity because one or more of the analysis locations (e.g., intersections or roadway segments) would be affected by project-related traffic either due to the addition of station-generated traffic and/or due to the diverted traffic near proposed road closures based on the threshold criteria identified in Section 3.2.3.4. Applying the mitigation measures discussed in the previous sections, the project impacts would be considered impacts with moderate intensity under NEPA.

Impacts with moderate intensity under NEPA during construction are anticipated on circulation in the vicinity of the Merced and Fresno stations and HMF sites, adjacent to the freeway mainline along SR 99, and the proposed SR 99 realignment between Clinton and Ashlan Avenues.

Additional impacts are anticipated in conjunction with local road closures necessary as part of each project alternative. All of the road closures are expected to result in impacts with moderate intensity since the roads proposed for closure have very low traffic volumes and necessary traffic diversions can be accomplished without causing impacts with substantial intensity on travelers.

8.3.8 Agriculture

The alternatives would have differing levels of impact on agriculture. For purposes of this analysis, farmland impacts have been broken into the following categories:

- Important Farmland—an aggregate total that includes prime, unique, farmlands of statewide importance and farmlands of local importance
- Prime Farmland

The BNSF Alternative would require crossing and potentially severing more farmlands and dairies than the other HST alternatives. Under the best case design option (Mariposa Way with Le Grand and Ave 21 Wye), the BNSF Alternative would impact 1,417 acres of Important Farmland. Under the worst case design option (Mission Ave with Le Grand with Ave 24 Wye), the BNSF Alternative would impact 1,483 acres of Important Farmland. Looking solely at Prime Farmland, the best case design option with the BNSF Alternative (Mission Ave with Le Grand and with Ave 24 Wye) would be 317 acres impacted; the worst case would be 469 impacted (Mariposa Way with East of Le Grand with Ave 21 Wye).

The Hybrid Alternative would be the next most impactful to farmlands. Under the best case design option (East Chowchilla with Ave 21 Wye), the Hybrid Alternative would impact 1,285 acres of Important Farmland; the worst case design option (West Chowchilla with Ave 24 Wye) would impact 1,433 acres of Important Farmland. Looking solely at Prime Farmland, the best case design option (West Chowchilla with Ave 24 Wye) would impact 283 acres of Prime Farmland; 299 acres of Prime Farmland would be impacted by the East Chowchilla with Ave 21 Wye routing.

Although the UPRR/SR 99 Alternative would impact the least amount of Important Farmland, its farmland impacts are still substantial. Under the best case design option (East Chowchilla with Ave 24 Wye), the UPRR/SR 99 Alternative would impact 1,027 acres of Important Farmland; 1,149 acres would be impacted by the worst case design option (East Chowchilla with Ave 21 Wye). The least impacts to Prime Farmland with the UPRR/SR 99 Alternative would occur with the West Chowchilla with Ave 24 Wye, 262 acres. The East Chowchilla with Ave 21 Wye routing would impact the most Prime Farmland, 314 acres.

When viewed in the aggregated category of Important Farmlands, the BNSF Alternative would be the most impactful, followed by the Hybrid Alternative and then the UPRR/SR 99 Alternative. For Prime Farmland, the BNSF Alternative would again be the most impactful, then depending on the routing option, either the UPRR/SR 99 or the Hybrid would be next.

Each of the HST alternatives would have direct adverse effects with substantial intensity on Important Farmland. FMMP Land Evaluation and Site Assessment scores are above 160 throughout Madera County, and along the BNSF Alternatives with the Mariposa Way design option. Impacts with substantial severity would remain after mitigation.

8.3.9 Visual Resources

Visual resources, such as vistas and aesthetic corridors, exist in both urban and rural landscapes. Impacts to vistas and aesthetic corridors are primarily expected to result from the vertical elements of the HST alternatives, particularly when elevated, because those vertical segments will block views of visual resources and change the landscape character.

The Hybrid Alternative would result in the least impact on visual quality of aesthetic features and corridors; it would decrease the visual quality in 2 landscape units. The UPRR/SR 99 Alternative would decrease the visual quality in 3 landscape units. The BNSF Alternative would have the greatest degree of visual impact, decreasing visual quality in 5 landscape units.

Additionally, as proposed, the Hybrid Alternative would have the least elevated track, and thus would disrupt the visual terrain less than either the UPRR/SR 99 or the BNSF alternatives. While the UPRR/SR 99 Alternative has the most elevated guideway, the BNSF actually would degrade the visual quality in more sensitive view corridors than both the UPRR/SR 99 and the Hybrid alternatives.

8.4 Overall Comparison Summary

Table 8.4-1 at the end of this section provides a summary of the relative ranking of the alternatives based on the discussions and data discussed previously in this section as well as other portions of Sections 6 and 7. The alternative that would be the best for an individual category in the table was given a ranking of "1"; a ranking of "3" indicates that the alternative is the least favorable for that category. The summary table provides a visual picture of the relative merits of the alternatives with respect to key elements of the LEDPA analysis: Aquatic Ecosystem Impacts, Other Significant Adverse Environmental Consequences, and Practicability. The following text summarizes the analysis of those factors in accordance with the 404(b)(1) Guidelines set forth in this document.

8.4.1 Aquatic Ecosystem Impacts

8.4.1.1 Quantity of Jurisdictional Waters Impacted

The BNSF Alternative would result in the greatest impacts to jurisdictional waters. The Hybrid Alternative would result in greater impacts to jurisdictional waters than the UPRR/SR 99 Alternative. However, both the Hybrid and the UPRR/SR9 9 Alternatives would affect only a small percentage of the existing jurisdictional waters within two of the three watersheds encompassing the alternative construction footprints. More specifically, the UPRR/SR 99 Alternative would result in total permanent and temporary, direct and indirect impacts to approximately 8 percent of existing vernal pool acreage within the three watersheds, and the Hybrid Alternative would permanently and temporarily, directly and indirectly impact approximately 10 percent of existing vernal pool acreage within the three watersheds. Evaluation of these predicted impacts in this watershed context indicates that quantity of impacts to jurisdictional waters by the UPRR/SR99 and Hybrid Alternatives are within a similar range, and significant avoidance of impacts to the bulk of jurisdictional waters is achieved by both the Hybrid and UPRR/SR99 Alternatives.

Further, as described previously, the bulk of the difference between the UPRR/SR 99 Alternative's impacts to jurisdictional waters and the Hybrid Alternative's impacts to jurisdictional waters consists of indirect impacts. These indirect impacts would occur outside of the construction footprint of the alternatives, within the 250-foot impact area adjacent to the construction footprint conservatively identified by the Authority and FRA for purposes of assuring that all potential indirect impacts are fully assessed, pending further site specific analysis (which is not feasible at this stage of the MF HST Project). Realistically, when site-specific conditions can be considered, indirect impacts are expected to be minimal or non-existent, and project design features and mitigation measures would fully manage and minimize potential indirect impacts. As a result, when site specific context is considered in evaluating predicted indirect impacts to jurisdictional waters, the indirect impacts to jurisdictional waters associated with the Hybrid and UPRR/SR-99 Alternatives are considered to be relatively equivalent, despite the estimated differences in indirect impact acreage between those two alternatives, and all indirect impacts are expected to be fully minimized and mitigated.

The differences in acreage of jurisdictional waters that would be directly and permanently lost between the UPRR/SR 99 and Hybrid Alternatives is relatively small, particularly in the watershed context, and because the level of indirect impacts associated with each Alternative are expected to be fully mitigated, negligible and substantially the same as between the UPRR/SR 99 and Hybrid Alternatives, particularly when site-specific context can be fully evaluated.

8.4.1.2 Quality of Jurisdictional Waters Impacted

The average CRAM rating for jurisdictional waters impacted by each alternative provides important information to consider in comparing the quality of resources impacted by the alternatives. The CRAM scores for waters impacted by all alternatives are low, with the mean CRAM scores for jurisdictional waters impacted by each of the three alternatives range from 42 to 55—well below the State-wide average of about 74 and generally at the high end of poor/ low end of fair even for the region. Although jurisdictional waters impacted by the three alternatives are generally low, the BNSF Alternative would impact the highest quality riverine and non-riverine jurisdictional waters.

Although the UPRR/SR 99 Alternative impacts jurisdictional waters with somewhat lower CRAM Scores (3 to 8 points lower) than those of the Hybrid Alternative, impacts resulting from both alternatives affect only low to low/fair quality jurisdictional waters as measured by those scores. Further, from a statistical perspective, the quality of resources impacted by the Hybrid Alternative are likely to be similar in quality to resources impacted by the UPRR Alternative because, based on statistical analysis, total CRAM scores need to be at least 10 points from each other to conclude the resources scored are materially different in character or quality. Based on a comparison of CRAM scores for jurisdictional waters impacted by the Hybrid Alternative (i.e., the Proposed Project) as compared to the UPRR/SR 99 Alternative, the two alternatives would have relatively comparable impacts on jurisdictional waters, and the quality of the resources impacted is generally quite low as compared to waters of the state and the region.

8.4.1.3 Overall Comparison of Impacts to Jurisdictional Waters Impacted

The USACE cannot issue a permit if there is a practicable alternative to the proposed discharge that would have less adverse impact on the aquatic ecosystem and would not have other significant adverse environmental consequences (40 CFR § 230.10(a). The quantitative differences between impacts to jurisdictional waters associated with the Hybrid Alternative and the UPRR/SR 99 Alternative are relatively insubstantial when considered in the site-specific and watershed contexts. Further, based on a comparison of CRAM scores for jurisdictional waters impacted by the Hybrid Alternative (i.e., the Preferred Alternative) and the UPRR/SR 99 Alternative, the two alternatives would have relatively comparable impacts on jurisdictional waters in terms of quality of resources impacted, and would generally affect quite low quality waters as compared to waters of the state and the region. Therefore, the Hybrid Alternative cannot be dismissed from consideration as the Preferred Alternative or the LEDPA. Instead, it is appropriate to consider and compare the relative practicability of each of the alternatives (in terms of construction costs, logistics and constructability), and the other adverse environmental impacts and consequences of the alternatives.

8.4.1.4 Comparison of Impacts to Riparian Habitat and Other Habitats of Concern

BNSF would have the greatest encroachment into critical habitat; UPRR/SR 99 and Hybrid Alternatives would not impact designated critical habitat,

The best-case design option for the BNSF Alternative, would have the least impact on riparian habitat of design options for any alternatives; however, the best-case design option for each of the alternatives results in relatively equivalent total riparian impacts at approximately 28 acres under BNSF Alternative, 29 acres under the UPRR/SR 99 Alternative, and a little less than 30 acres under the Hybrid Alternative. With respect to the worst case impact scenarios for the UPRR/SR 99 and Hybrid Alternatives, the Hybrid Alternative results in about 5 acres less impact to riparian habitats than the UPRR/SR 99 Alternative. The Hybrid Alternative is therefore preferable from the standpoint of riparian habitat impacts.

8.4.2 Other Significant Adverse Environmental Consequences

Both the Hybrid and UPRR/SR 99 Alternatives would result in other significant adverse environmental consequences. While the UPRR/SR 99 Alternative would result in a lower quantity of impacts to many biological resources (with the exception of certain special status wildlife species and riparian habitat), the

UPRR/SR 99 Alternative would result in the most severe environmental impacts to community resources and receptors For example, the UPRR/SR99 Alternative is expected to result in the greatest number of noise impacts with moderate to severe intensity to sensitive receptors, the greatest impacts to cultural resources sites protected by Section 106 of the National Historic Preservation Act, the most substantial visual and aesthetic impacts, the greatest construction air quality impacts based on extended construction period and additional construction equipment needed for its elevated guideways, and adverse impacts to twice as many Section 4(f) resources as the other build alternatives. In many instances, the adverse environmental impacts to community resources associated with the UPRR/SR 99 Alternative are nearly twice as great as the other build alternatives.

The adverse impacts of Section 4(f) resources are particularly problematic because Section 4(f) resources are protected to the same extent as wetlands and other jurisdictional waters; meaning there are substantive regulatory requirements to avoid and minimize impacts to those resources and to select the alternative that results in the least overall harm to such resources.

Only the agricultural impacts of the two alternatives are similar. The UPRR/SR 99 Alternative would result in fewer acres of important farmland impacted than the Hybrid Alternative, although its impacts to prime farmlands would be roughly equivalent to the Hybrid Alternative's.

Overall, while the impacts to jurisdictional waters associated with the UPRR/SR 99 Alternative and the Hybrid Alternative are relatively comparable when considered in terms of quality, quantity and the site-specific and watershed-level context, the UPRR/SR 99 Alternative would result in other more significant adverse environmental consequences than the Hybrid Alternative, which also must be considered in the 404(b)(1) analysis. Because the Hybrid Alternative would result in the least environmental impacts to local community resources and receptors, the technical information and analysis supports identification of the Hybrid Alternative as the LEDPA.

8.4.3 Impracticability

8.4.3.1 Cost

Practicable alternatives are project alternatives that are available and capable of being implemented after taking into account considerations of cost, existing technology and logistics, in light of overall purpose and need of the project (40 CFR § 230.3(q)).

The purpose of the statewide HST System is to provide a reliable high-speed electric-powered train system that links the major metropolitan areas of the state, and that delivers predictable and consistent travel times. The purpose of the MF HST Project is to implement the Merced to Fresno Section of the California HST System to provide the public with electric-powered high-speed rail service that provides predictable and consistent travel times between major urban centers and connectivity to airports, mass transit systems, and the highway network in the south San Joaquin Valley, and to connect the northern and southern portions of the system.

The HST System must meet California's need for reliable, high speed, lower emissions transit in a manner that is consistent with provisions of Proposition 1A, the Safe, Reliable, High-Speed Passenger Train Bond Act, adopted by California voters in November 2008 (Streets & Highways Code § 2704, et seq.). That initiative states, in part: "[i]n order to reduce impacts on communities and the environment, the alignment for the high-speed train system shall follow existing transportation or utility corridors to the extent feasible and shall be financially viable, as determined by the authority." Streets & Highways Code § 2704.09(g).

Detailed and reasonably reliable construction and capital cost estimates cost estimates have been prepared for each Alternative and design option combination for the MF HST Project as set forth in the Capital Cost Estimate Report. As determined by the Capital Cost Estimate Report, and described in above and in Section 6.2.2 of the Summary Report titled Practicability of UPRR/SR 99 Alternative, the UPRR/SR

99 Alternative would cost an estimated $6.7 billion with the Ave 24 wye design option and an estimated $5.9 billion for the Ave 21 wye design option. The Hybrid Alternative would cost between $3.8 billion for the Ave 24 Wye design option and $4.8 billion for the Ave 24 Wye design option. Thus, the UPRR/SR 99 Alternative would cost the public between $1.1 to $2.9 billion more to construct than the Hybrid Alternative with the equivalent wye design option. While the BNSF Alternative is less costly than the UPRR/SR 99 Alterative, the BNSF Alternative is still estimated to cost at least $500 million more to implement than the Hybrid Alternative with an equivalent wye connection. Further, the UPRR Alternative's potential total cost of $6.7 billion would consume over 51 percent of the total currently available funding for the entire HST program solely to build the Merced to Fresno HST Project, which is a relatively small segment of the proposed 800-mile HST System. Accordingly, the Hybrid Alternative is the most cost-effective alternative and the UPRR/SR 99 Alternative, costing up to $2.9 billion more to implement than the Hybrid Alternative, would be cost-prohibitive to construct.

Taking into account that tax revenues and public monies are the primary source of funding for the MF HST Project, and in light of the legal mandate that the HST System (including the MF HST Project) must be "financially viable," the implementation of the UPRR Alternative in a manner consistent with the purpose and need for the MF HST Project is precluded because that Alternative would cost between $5.2 to $6.7 billion, and between 135 and 145 percent more than the preferred Hybrid Alternative, and would consume an inordinate percentage of the total HST System budget that is not commensurate with the portion of the HST System project completed by the alternative. As a result, prohibitive cost of the UPRR/SR 99 Alternative alone supports the conclusion that the UPRR/SR 99 Alternative is not a practicable alternative, nor can it meet the applicable legal requirements regarding financial viability set forth in Streets and Highways Code § 2704.09(g) or the project purpose and need.

8.4.3.2 Logistics and Constructability

The Hybrid Alternative would be the best alternative and the UPRR/SR 99 Alternative would be the least favorable in terms of constructability. It is shorter in length, has less fewer elevated structures, and fewer linear miles of urban and elevated guideway. As a result, planning and design complexities are fewer, construction processes are less complex, less concrete and construction materials and equipment are needed to implement the alternative, and the construction period for the alternative will be shorter. Consequently, construction phase impacts, including impacts on air quality, noise, transportation and transport, and parks are less significant for the Hybrid Alternative than for the UPRR/SR99 Alternative.

The Hybrid Alternative would also be the best alternative and the UPRR/SR 99 Alternative would be the least favorable in terms of constructability based on required elevated guideway and overcrossing construction. The UPRR/SR 99 Alternative would require the greatest amount of elevated structures and guideways, the largest number of roadway and railroad overcrossings, and some of the most costly, intrusive and complex overcrossings. The UPRR/SR99 requires 1.5 to 2 times the number of overcrossings and elevated guideways required by the Hybrid Alternative, and is the only alternative that would require construction of a 70-foot high overcrossing in the community core of Madera. The number and complexity of overcrossing required by the UPRR/SR 99 Alternative not only increase construction complexity, related logistics and constructability issues, as well as construction impacts associated with the alternative, but the overcrossings, and particularly those that are super-elevated, also increase permanent impacts to local community visual and aesthetic resources.

The increased construction complexity, logistics and constructability issues, and construction impacts associated with the UPRR/SR 99 Alternative render the alternative impracticable.

8.4.3.3 Displacement Impacts

Construction delays and construction cost increases tend to rise in direct proportion to the number of residential and nonresidential property owners that must be displaced to implement an infrastructure project. As a result, increased displacement impacts tend to result in greater construction delay impacts

(including increased construction period air quality, noise, park closure and traffic impacts associated with a longer construction periods as described above), as well as increased constructability issues and higher construction costs. While the number of residential units displaced would be similar among the three alternatives, the relatively high number of nonresidential displacements associated with the UPRR/SR 99 Alternative would result in substantially greater construction costs, greater construction delay impacts (including associated increases in construction period noise, air quality, traffic and park closure impacts), and greater constructability issues for this alternative.

The increased construction complexity, logistics and constructability issues, and construction impacts associated with the high displacement impacts resulting from the UPRR/SR 99 Alternative render the alternative impracticable.

8.5 Impractability Conclusions of the Authority and FRA for USACE and EPA Consideration

As set forth in the Table 8.4-1, while the impacts to jurisdictional waters associated with the UPRR/SR 99 Alternative and the Hybrid Alternative are relatively comparable when considered in terms of quality, quantity and the site-specific and watershed-level context, the evidence, technical information and analysis supports selection of the preferred Hybrid Alternative as the LEDPA because:

- The UPRR/SR 99 Alternative would result in several other substantially more severe significant adverse environmental consequences, including more substantial adverse noise, impacts to cultural resources, Section 4(f), visual and aesthetic, air quality, and construction traffic impacts;
- The UPRR/SR 99 Alternative is not practicable and cannot meet project purpose and need due to extremely high comparative construction costs; and
- The UPRR/SR99 Alternative is not practicable to substantial property displacement, construction complexity and constructability issues, and related increased construction impacts on local community resources and receptors.

For the same reasons, the evidence, technical information and analysis does not support selection the UPRR/SR 99 Alternative as the LEDPA.

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Table 8.4-1
Summary of Relative Rankings of Potential Impacts

Summary of Relative Rankings of Potential Impacts				
	UPRR/SR 99 Alternative	**Hybrid Alternative**	**BNSF Alternative**	**Notes**
Aquatic Ecosystem Impacts				
Jurisdictional Waters Direct (acres)	1	2	3	UPRR = 32.5 to 37.43 acres Hybrid = 38.97-41.44 acres BNSF = 41.38-51.48 acres
Condition of Jurisdictional Waters (mean CRAM score)	1	2	3	UPRR= 51riverine; 42 non-riverine Hybrid = 54 riverine; 50 non-riverine BNSF = 55 riverine; 51 non-riverine
Riparian Habitat	Equivalent but more than BNSF		1	Best case routing options for all three alternatives are equivalent (about 30 acres); worst case Hybrid and UPRR would impact about 10 acres and 15 acres more, respectively, than BNSF. Worst case UPRR impacts about 5 more acres than Hybrid.
Practicability				
Cost	3	1	2	UPRR/SR 99 is up to $2.9 billion more than the Hybrid ($6.7 billion v. $3.8 billion), and is cost prohibitive and therefore impracticable and inconsistent with project purposes and need.
Logistics	3	1	2	UPRR/SR 99 has the greatest construction complexity, logistics and constructability issues, and construction impacts associated with the UPRR/SR 99 Alternative render the alternative impracticable.
Displacements (total units)	3	1	2	While UPRR/SR 99 would have slightly fewer residential displacements, it has roughly 100 more non-residential displacement than the other alternatives. Resulting construction complexity,

Summary of Relative Rankings of Potential Impacts				
	UPRR/SR 99 Alternative	**Hybrid Alternative**	**BNSF Alternative**	**Notes**
				logistics and constructability issues, and construction impacts associated with the high displacements caused by UPRR/SR 99 Alternative render the alternative impracticable.
Other Significant Environmental Consequences				
Non-Aquatic Biological Resources				
Special Status Plants	1	2	3	BNSF generally would impact 8-10 times the acreages of potentially suitable habitat for special status plants as the UPRR; Hybrid would impact more potentially suitable habitat than UPRR but less than BNSF.
Special Status Wildlife	1	2	3	BNSF would impact the most potentially suitable habitat for special status wildlife species; Hybrid impacts to potentially suitable habitat are greater than, but generally within the range of those associated with the UPRR, and Hybrid would have least impact to potentially suitable habitat for VELB.
Other Habitat of Concern	Equivalent but better than BNSF		3	BNSF would have the greatest encroachment into critical habitat; UPRR and Hybrid would not impact designated critical habitat. The best-case design option for each of the alternatives results in relatively equivalent total riparian impacts at approximately 28 acres under BNSF Alternative, 29 acres under the UPRR/SR 99 Alternative, and a little less than 30 acres under the Hybrid Alternative. With respect to the worst case impact scenarios for the UPRR/SR 99 and Hybrid Alternatives, the Hybrid Alternative results in about 5 acres less impact to riparian habitats than the UPRR/SR 99 Alternative, and the Hybrid Alternative is therefore preferable from the standpoint of riparian habitat impacts.

Summary of Relative Rankings of Potential Impacts				
	UPRR/SR 99 Alternative	**Hybrid Alternative**	**BNSF Alternative**	**Notes**
Environmental Impacts to Local Community Resources and Receptors				
Noise Impacts (total receptors impacted)	3	Equivalent but ½ the number as UPRR		UPRR would moderately impact as many as 1,335 and up to 875 receptors would be severely impacted; equivalent numbers for the Hybrid would be 923 (moderate) and 447 (severe)
Cultural Resources (# of resources impacted)	3	Equivalent but less than UPRR		UPRR/SR 99 impacts 11 archaeological sites; 15 historic sites Hybrid/BNSF impact 9 archaeological sites; 13 sites
Parks, Recreation, and Open-Space (# impacted)	3	Equivalent but less than UPRR		UPRR/SR 99 would impact 1 additional park
Section 4(f) Resources (# uses)	3	Equivalent but ½ the number as UPRR		UPRR/SR 99 would have twice as many Section 4(f) uses (8).
Transportation (effect on system)	3	2	1	UPRR/SR 99 has the greatest number and greatest complexity of overcrossings with SR 99 and existing rail facilities.
Prime Farmland (total acres)	Equivalent but better than BNSF		3	UPRR/SR 99 and the Hybrid impacts to prime farmland are roughly equivalent; Hybrid impacts to important farmland are greater; but BNSF has far greater farmland impacts to both important and prime farmland than the other two alternatives.

9.0 Summary of Impacts Not Reduced to a Level Of Insignificance

9.1 Aquatic Impacts

The following potentially significant impacts to aquatic resources would occur with implementation of the Hybrid Alternative. The impact analysis takes into account design features and the implementation of regulatory requirements, both of which would reduce impacts from implementing the project prior to application of mitigation measures. Tables 9-1 show the impacts of the Hybrid Alternative.

Table 9-1
Table title

TYPE OF IMPACT (in acres)	East Chowchilla Ave 21	West Chowchilla Ave 24
Direct Permanent Impacts		
impacts to wetlands	9.24	8.90
impacts to other waters	6.54	9.43
impacts to constructed waters	23.19	23.11
TOTAL impacts to all waters and wetlands	**38.97**	**41.44**
Direct Temporary Impacts		
impacts to wetlands	1.64	1.50
impacts to other waters	6.02	6.00
impacts to constructed waters	4.33	4.04
TOTAL impacts to all waters and wetlands	**11.99**	**11.54**
Indirect Permanent Impacts		
impacts to wetlands	16.38	11.75
impacts to other waters	27.96	31.19
impacts to constructed waters	42.86	51.60
TOTAL impacts to all waters and wetlands	**87.20**	**94.54**

The implementation of the Preferred Project will directly and permanently impact between 39 and 41 acres of waters and wetlands. Of those totals, approximately 16 acres to 18 acres of impacts are to wetlands and natural water features. Construction-related indirect impacts on these habitats would include: erosion, siltation, and runoff into natural and constructed watercourses; soil and water contamination from construction equipment leaks; construction-related dust reducing photosynthetic capability (especially during flowering periods); and an increased risk of fire (e.g., construction equipment use and smoking by construction workers) in adjacent open spaces. Wildlife use of adjacent habitats would also be subjected to noise, dust, and motion and startle disturbances. During the project period, these wetland areas are anticipated to be directly disturbed after construction for maintenance and the introduction of other hardscape, fencing and landscape features. The resource values that exist would be permanently removed during site preparation and continue to be during the life of the Project.

Mitigation for impacts to wetlands will be accomplished by one or more of the following:

- Purchase of credits from an agency-approved mitigation bank.
- Fee-title-acquisition of natural resource agency-related property.
- Purchase or establishment of a conservation easement with an endowment for long-term management of the property-specific conservation values.
- In-lieu fee contribution determined through negotiation and consultation with the various natural resource regulatory agencies.
- Base compensation for permanent impacts on the following ratios (acres of mitigation to acres of impact), pending agency confirmation:
- Vernal pools and other seasonal wetlands: 2:1 Preservation and 1:1 Creation.
- Coastal and Valley Freshwater Marsh: 1:1.
- Other Wetlands: Between 1.1:1 and 1.5:1 (1:1 onsite and 0.1 to 0.5:1 offsite), based on function and values temporarily lost.

After considering mitigation for the impact of approximately 39 acres to 41 acres of waters and wetlands, this effect is considered an impact with moderate intensity under NEPA and significant under CEQA.

9.2 Non-Aquatic Impacts

The following potentially significant impacts would occur with implementation of the Hybrid Alternative. The impact analysis takes into account design features and the implementation of regulatory requirements, both of which would reduce impacts from implementing the project prior to application of mitigation measures. Attachment 8 shows the impacts of all alternatives for these resource areas.

- **Air Quality:** The Hybrid Alternative construction emissions would be the lowest of the three alternatives, however project construction for the Hybrid Alternative would conflict with attainment plans in substantial emissions of volatile organic compounds (VOCs) and nitrogen oxides (NO_x), particulate matter (particles) between 2.5 and 10 micrometers known as PM_{10}, particulate matter less than 2.5 micrometers known as $PM_{2.5}$, and carbon monoxide (CO). Construction also could expose sensitive receptors to substantial pollutant concentrations. The Hybrid would generate the lowest levels of greenhouse gases during construction (see Table 3.3-10 in the EIR/EIS) Mitigation of construction-period impacts would include standard best management practices (BMPs) during construction; reducing fugitive dust, reducing criteria exhaust emissions from equipment; reducing VOC emissions from paint; offsetting project construction emissions through the San Joaquin Valley Air Pollution Control Board Voluntary Emission Reduction Agreements; and reducing the potential impact of toxics, stationary sources, and concrete batch plants. After mitigation, air quality construction-period impacts would remain impacts with substantial intensity under NEPA and significant under CEQA. Hauling materials needed for track construction could also violate air quality standards for NO_x in some air basins. This would be mitigated by reducing emissions from on-road construction equipment and purchasing emissions offsets if necessary, but in some air basins, this impact could remain an impact with substantial intensity under NEPA and significant under CEQA.

  Project operations for the Hybrid Alternative would result in a net benefit to air quality because the HST Project would result in lower mobile source air toxics (MSATs), greenhousegases (GHG), VOC, NO_x, CO, PM_{10}, and $PM_{2.5}$ emissions compared to the No Project Alternative.

  Noise and Vibration: The Hybrid Alternative would create noise and vibration impacts during operation. Slab track was assumed to be 3 decibels louder than ballast and tie track; therefore, it would have a greater impact. The Hybrid would have between 371 and 429 fewer impacts than the UPRR/SR99 Alternative and about the same number of impacts as the BNSF Alternative before mitigation. Mitigation for operational noise and vibration include installation of sound barriers,

implementation of noise and vibration mitigation guidelines, vehicle noise specification, special trackwork at crossovers and turnouts, and additional noise analysis during final design. Operational noise impacts would remain impacts with substantial intensity under NEPA and significant under CEQA in some locations, but would be impacts with negligible intensity under NEPA and less than significant under CEQA where fully mitigated. Installation of sound mitigation will be coordinated with property owners and local jurisdictions. Operational vibration impacts could remain of substantial intensity under NEPA and significant under CEQA where mitigation is not feasible because property owners or local governments decline sound mitigation.

- **Biological Resources:** Construction of the Hybrid Alternative would disturb existing plant communities and land cover types habitat with potential to support special-status species, and critical habitat. Construction would also have indirect impacts Camp Pashayan and would act as a barrier to free-ranging mammal movement within wildlife movement corridors. Mitigation of construction-period impacts would include construction crew training, mapping of special-status species and environmentally sensitive locations, flagging and fencing the construction limits and other BMPs, implementing a biological resources management plan, installing protection measures for special status species, restoring temporarily impacted areas, and limiting construction along wildlife movement corridors. After mitigation, disruption to suitable habitat for special-status plant species, vernal pool branchiopods, and burrowing owls; critical habitat; Camp Pashayan; and essential connectivity and modeled wildlife corridors would remain impacts with moderate intensity under NEPA and significant under CEQA.

  Operation of the project would permanently convert existing plant communities and land cover types, habitat with potential to support special-status species, and critical habitat. Operation of the project would also permanently affect Camp Pashayan and wildlife movement corridors. Mitigation for impacts during operations would include preparing and implementing a weed control plan; post-construction compliance reports and a mitigation and monitoring plan; compensating for impacts on special-status plant species, protected trees, and wildlife species and their habitats; construction of wildlife corridor artificial dens; monitoring and reporting of wildlife corridor undercrossings; and installation of noise barriers. After mitigation, operational project impacts would be reduced to impacts with negligible intensity under NEPA and less than significant under CEQA, except for permanent conversion of Great Valley mixed riparian forest; permanent conversion of habitat that has the potential to support special-status plant species and vernal pool branchiopods; impacts on Camp Pashayan; and reduction of the functionality of wildlife movement corridors, which would remain of moderate intensity under NEPA and significant under CEQA.

- **Agricultural Lands:** Construction and operation of the Hybrid Alternative would result in permanent conversion of agricultural land to nonagricultural use. Mitigation of this impact includes preservation of Prime Farmland, Farmland of Statewide Importance, Farmland of Local Importance, and Unique Farmland and creation of a farmland consolidation program to sell non-economic remnant parcels to neighboring landowners. With mitigation, this impact would remain an impact with substantial intensity under NEPA and significant under CEQA.

- **Parks, Recreation, and Open Space:** At Roeding Park, the Hybrid Alternative would have severe operation noise impacts on the eastern portions of the park without noise mitigation; the impact would be an impact with substantial intensity under NEPA and significant under CEQA. The Authority will work with the City of Fresno as the park owner to address noise impacts. This impact could be mitigated to less than significant by addressing noise at Roeding Park, unless the City of Fresno declines sound mitigation, in which case the impact would remain one of substantial intensity and unavoidable under CEQA.

- **Visual and Aesthetic Resources:** The Hybrid Alternative would permanently lower visual quality west of SR 99. The alternative would use sound barriers for noise mitigation in urban areas, which would block views, and all alternatives would have traction power supply stations (TPSSs) that would block or alter views. After mitigation, impacts associated with lowering visual quality and sound

barriers could remain impacts with substantial intensity under NEPA and significant under CEQA, depending on location, type and extent of visual treatment, and viewer sensitivity.

- **Cultural and Paleontological Resources:** The Hybrid Alternative has the potential to affect historical resources during construction. Mitigation for impacts on historical resources would include vibration avoidance measures; protection and stabilization measures; relocation of historic structures; noise attenuation measures; preparation and submission of National Register of Historic Places (NRHP) and California Register of Historical Resources (CRHR) nominations; preparation of a Historic American Building Survey (HABS), Historic American Engineering Record (HAER), and Historic American Landscape Survey (HALS); preparation of historic structure reports; preparation of interpretive exhibits; and repairing of inadvertent damage. After mitigation, construction noise and vibration impacts would remain impacts with substantial intensity under NEPA and significant under CEQA. During operation, all HST alternatives have the potential to affect resources listed or eligible for the NRHP (Section 106). This impact could be mitigated (see Parks, Recreation, and Open Space above) to less than significant.

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