

Summary

S.1 Introduction and Background

The California High-Speed Rail Authority (Authority), a state governing board formed in 1996, has responsibility for planning, designing, constructing, and operating the California High-Speed Train (HST). Its mandate is to develop a high-speed rail system coordinating with the state's existing transportation network, which includes intercity rail and bus lines, regional commuter rail lines, urban rail and bus transit lines, highways, and airports.

High-Speed Train System

The system that includes the HST guideways, structures, stations, traction-powered substations, and maintenance facilities.

The California HST System will provide intercity, high-speed service on more than 800 miles of guideway throughout California, connecting the major population centers of Sacramento, the San Francisco Bay Area, the Central Valley, Los Angeles, the Inland Empire, Orange County, and San Diego. Figure S-1 shows this system. It will use state-of-the-art, electrically powered, high-speed, steel-wheel-on-steel-rail technology, including contemporary safety, signaling, and automated train-control systems, with trains capable of operating up to 220 miles per hour (mph) over a fully grade-separated, dedicated guideway alignment.

The Authority plans two phases. Phase 1¹ will connect San Francisco to Los Angeles/Anaheim via the Pacheco Pass and the Central Valley with a mandated express travel time of 2 hours and 40 minutes or less. Phase 2 will connect the Central Valley to the state's capital, Sacramento, and will extend the system from Los Angeles to San Diego.

The Merced to Fresno HST Section, shown in Figure S-2, is a critical Phase 1 link connecting the Bay Area HST Section to the Fresno to Bakersfield, Bakersfield to Palmdale, and Palmdale to Los Angeles HST sections. The Merced to Fresno Section includes HST stations in the cities of Merced and Fresno. These stations are this section's beginning and ending points, or project termini. If the Castle Commerce Center, located north of Merced, were selected from the five alternative sites for the heavy maintenance facility (HMF), the project's northern boundary would be north of Merced, at that HMF.

S.2 Tiered Environmental Review: Final Statewide Program EIR/EIS and Merced to Fresno Section Project EIR/EIS

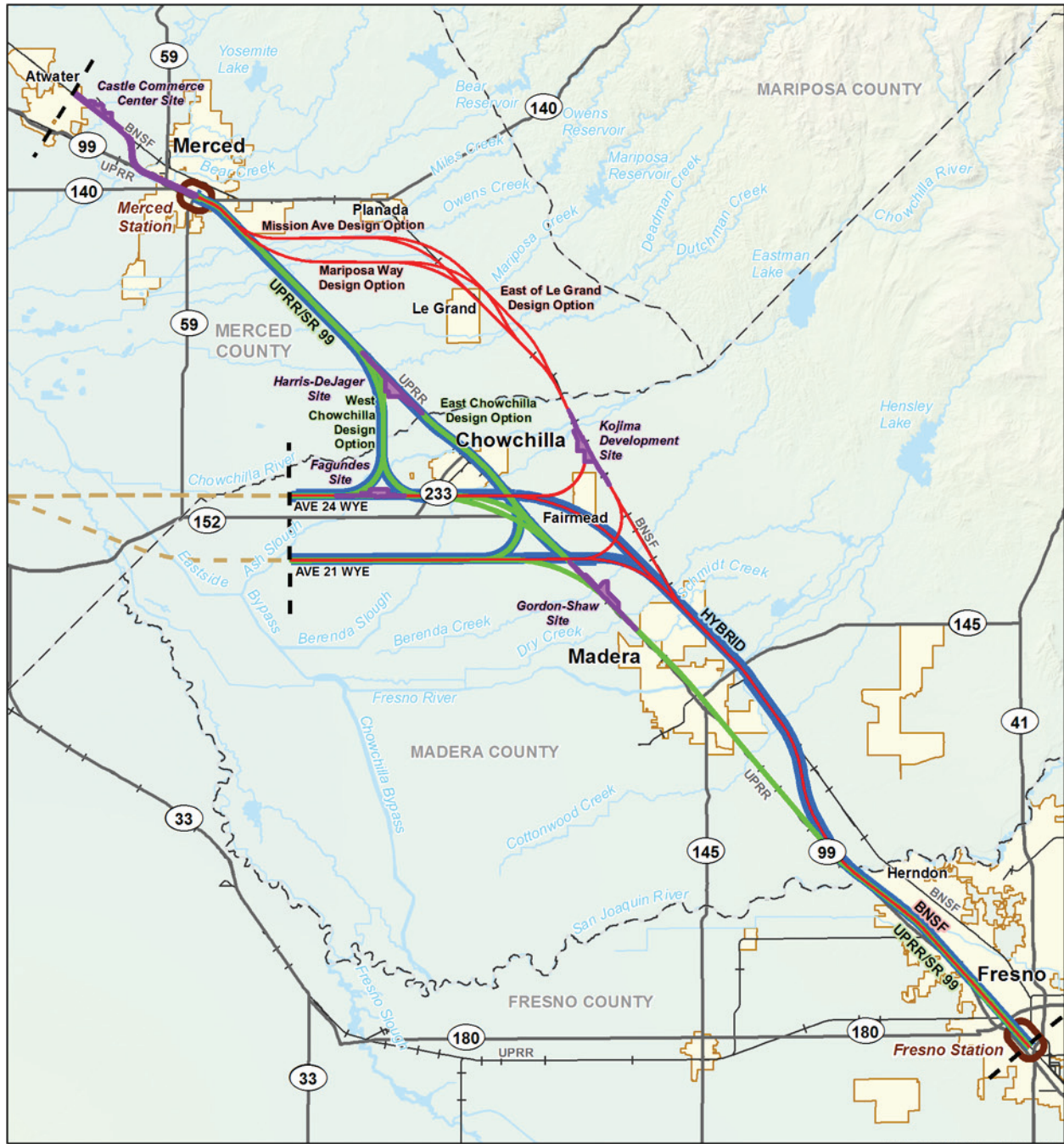
The Council on Environmental Quality provides for National Environmental Policy Act (NEPA) decision-making through a phased process. This process is referred to as *tiered* decision-making. This phased decision-making process provides for a broad level programmatic decision to inform more specific decisions using a tiered approach. A first tier programmatic environmental impact statement (EIS) addresses one large project with one overall purpose and need that would be too extensive to analyze in a traditional project EIS. The California Environmental Quality Act (CEQA) also encourages tiering and also provides for first-tier and second-tier EIRs.

The Merced to Fresno Section Project Environmental Impact Report/ Environmental Impact Statement (EIR/EIS) is a second-tier EIR/EIS that builds upon and further refines work completed earlier as part of the two first-tier program EIR/EIS documents. The 2005 *Final Program EIR/EIS for the Proposed California High-Speed Train System* (Statewide Program EIR/EIS) provided a first-tier analysis of the general effects of implementing the HST System across two-thirds of the state. The 2008 *Bay Area to Central Valley HST Final Program EIR/EIS* (Bay Area to Central Valley Program EIR/EIS) and the Authority's 2010 *Revised Final Program EIR for the Bay Area to Central Valley HST* (Authority and FRA 2010a) were also first-tier and programmatic documents but focused on the Bay

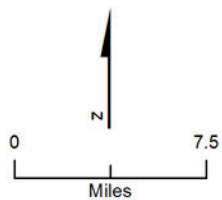
¹ Phase 1 would be built in stages dependent on funding availability.



Figure S-1
 California HST System Initial Study Corridors



MF_EIS_ES_01 Jul 18, 2011



- BNSF Alternative
- UPRR/SR 99 Alternative
- Hybrid Alternative
- Project Limit
- Connection to Other Section
- Station Study Area
- Potential Heavy Maintenance Facility
- City Limit
- County Boundary
- Railroad
- State / US Highway

Figure S-2
 Merced to Fresno Section Alternatives
 and Design Options

Area to Central Valley region. These first-tier EIR/EIS documents provided the FRA and the Authority with the environmental analysis necessary for evaluation of the overall HST System and for making broad decisions about general HST alignments and station locations for further study in second-tier EIR/EISs. These documents are available on the Authority's website: www.cahighspeedrail.ca.gov. The Merced to Fresno Section Project EIR/EIS analyzes the environmental impacts and benefits of implementing the HST in the more geographically limited area between Merced and Fresno and is based on more detailed project planning and engineering. The analysis therefore incorporates the earlier decisions and program EIR/EISs, and it provides more site-specific and detailed analysis.

S.3 Issues Raised During the Scoping Process

The Authority held three public scoping meetings between March 18 and March 26, 2009, in the Merced to Fresno Section project corridor, with 270 people attending the three meetings. Scoping helps determine the focus and content of an EIR/EIS. The Authority and FRA received a total of 144 comments from individuals and organizations, as well as comments from 31 agencies, on the proposed project. The following list includes major issues identified during the scoping process:

- Location of stations
- Location of the HST alignment
- Location of the proposed HMF
- The benefits of the HST, including those related to air quality, congestion relief, and economic development
- Connections to local transit
- General support for the project
- Fast-tracking of the project
- Agricultural impacts
- Natural resource impacts
- Noise impacts
- Rail consolidation
- Power source and requirements of the system
- Economic growth issues
- Use of U.S. labor and U.S. products for HST construction
- Employment opportunities
- Ridership estimates
- Property acquisition
- Displacement of people
- Potential devaluation of property
- Benefits/impacts on local businesses
- Questions about cost and financing

S.4 Purpose of and Need for the HST System and the Merced to Fresno HST Section

S.4.1 Purpose of the HST System

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. A further objective is to provide an interface with commercial airports, mass transit, and the highway network and to relieve capacity constraints of the existing transportation system as increases in intercity travel demand in California occur, in a manner sensitive to and protective of California's unique natural resources.

S.4.2 Purpose of the Merced to Fresno Section

The purpose of the Merced to Fresno Section is to implement the Merced to Fresno Section of the 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 southern San Joaquin Valley, and to connect the northern and southern portions of the system.

S.4.3 Objectives and Policies for the HST System in California and within the Central Part of the San Joaquin Valley Region

The Authority has responded to its mandate to plan, build, and operate an HST system that is coordinated with California's existing transportation network 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 (O&M) 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 Merced to Fresno Section is an essential part of the statewide HST System. The Merced to Fresno Section is the location of the connection between the Bay Area and Sacramento branches of the HST System; it will provide Merced and Fresno access to a new transportation mode and will contribute to increased mobility throughout California. This section will connect the central San Joaquin Valley region to the remainder of the HST System via Merced County, Madera County, and the northern part of the city of Fresno (refer to Figure S-1).

S.4.4 Need for the HST System Statewide and within the Central San Joaquin Valley Region

The need for an 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. Without the proposed project, 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 increases in population, economic activity, and tourism within the state, including those 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.

Geographically, the Merced to Fresno Section is located in the center of California. This region significantly contributes to the statewide need for a new intercity transportation service that would connect it with the major population and economic centers and to other regions of the state. The major population, economic, and political centers are located on the coasts of Northern and Southern California and in the Sacramento Valley.

S.5 Alternatives

This section summarizes the alternatives evaluated in the Merced to Fresno Section Project EIR/EIS. The Statewide Program EIR/EIS (Authority and FRA 2005), the Bay Area to Central Valley Program EIR/EIS (Authority and FRA 2008), public and agency input from the scoping process, extensive local and agency involvement during Technical Working Group (TWG) meetings, and other stakeholder meetings provided input to the Authority in developing these alternatives. Meetings included city and county staff and other local-level agency staff.

All components of the alternatives have been evaluated during an alternatives analysis screening process, which considered the effects of the alternatives on the social, natural, and built environment. Some portions of the Merced to Fresno Section overlap other HST sections; therefore, the analysts performed the screening in collaboration with teams for the adjacent San Jose to Merced, Fresno to Bakersfield, and Sacramento to Merced sections. In addition to the HST alternatives, a No Project Alternative and HMF alternatives were studied. The HMF will support the assembly, testing, commissioning, and acceptance of high-speed train vehicles (rolling stock) prior to the start-up of operations. After initial operations begin, the HMF will assume maintenance and major repair functions to sustain the regular system operation and assembly of new rolling stock.

S.5.1 No Project Alternative

The No Project Alternative is the basis for comparison of the project alternatives. The No Project Alternative represents the state's transportation system (highway, air, bus, conventional rail) as it is currently and as it would be after implementation of programs or projects that are currently projected in regional transportation plans (RTPs), have identified funds for implementation, and are expected to be in place by 2035, as well as any major planned land use changes. The entire San Joaquin Valley is projected to grow at a rate higher than any other region in California. The three counties—Merced, Madera, and Fresno—are projected to continue to grow at an average rate of 3% per year. By 2035, the population in the study area is projected to grow from 1,365,911 to 2,298,075, for a net increase of 932,164 people or 68%. Accommodating this new population will require land acquisition and the construction of new infrastructure, including roadways, electric power generation, water and wastewater facilities, schools, hospitals, and commercial and industrial facilities. To support this growth, development would consume

an estimated 93,000 acres (for comparison, the total acquisition area for the Merced to Fresno Section would be between 2,500 and 3,300 acres) because, according to current planning trends, these counties would develop at a density of approximately 10 persons per acre.

S.5.2 Merced to Fresno Section High-Speed Train Alternatives

This Project EIR/EIS evaluates three HST north-south alignment alternatives: the UPRR/SR 99 Alternative, the BNSF Alternative, and the Hybrid Alternative (the Hybrid Alternative is a combination of the UPRR/SR 99 Alternative and the BNSF Alternative). Figure S-2 shows the three north-south alignment alternatives carried forward in this Project EIR/EIS. They would extend between and include the proposed Downtown Merced Station and the Downtown Fresno Station, with an estimated trip time of 25 minutes between Merced and Fresno. The Merced and Fresno stations would see a mix of stopping trains and through trains; the number of trains would peak for the full system, when both Phase 1 and Phase 2 are in operation. Scenarios were developed to take into account various levels of ridership that could occur. In 2035 for the high ridership scenario, the full system would see four trains per hour stop at Fresno in each direction at the peak, and six trains run through the city without stopping. At the off-peak, the same number of stops would be made, but the through trains would decrease to three per hour. At Merced, three trains would stop each hour per direction at the peak, with two running through. At the off-peak, both of the hourly trains would stop at Merced.

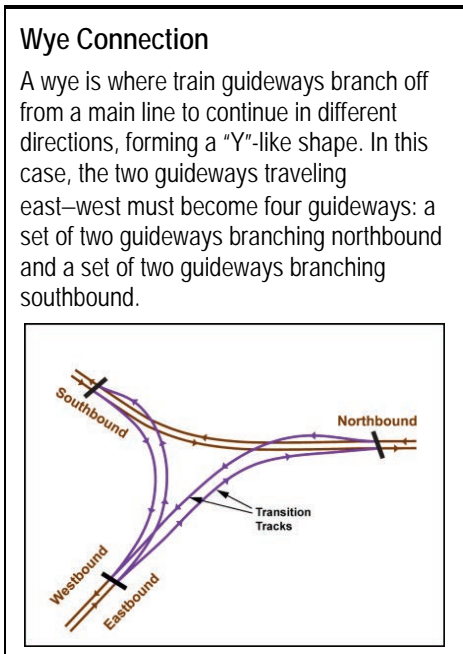
The HST alternatives are identical in the Merced and Fresno vicinities. The main difference between the initial UPRR/SR 99 and BNSF alternatives is that the UPRR/SR 99 Alternative generally follows the UPRR and SR 99 transportation corridor, which connects the cities of Merced, Chowchilla, Madera, and Fresno. The BNSF Alternative follows the BNSF corridor, which travels east from Merced through Planada, Le Grand, and Madera Acres, and then veers back west to reconnect with the UPRR/SR 99 Alternative again before entering the city of Fresno. Supplemental alternatives analyses resulted in the development and evaluation of Hybrid alternatives, which would use portions of the UPRR/SR 99 and BNSF alternatives and their design options (Authority and FRA 2010b). The hybrid alternatives follow the UPRR/SR 99 Alternative alignment near Merced and the BNSF Alternative alignment near Madera Acres.

All three north-south alignment alternatives include design options in some areas to avoid or minimize impacts and alternative HST wye connections and three east-west alignments (along Avenue 24, Avenue 21, and SR 152) that would connect this section with the San Jose to Merced Section. The western boundary for these east-west alignments and wyes is approximately Road 8, west of Chowchilla.

The Authority developed the SR 152 Wye with connections to all three north-south alignment alternatives, as shown in Figure S-3, to a conceptual-level alignment to be consistent with Caltrans planning, the SR-152 Freeway Agreement, and HST engineering criteria. The three wye configurations are evaluated and compared in the *SR 152 Alternatives Analysis* (available on the Authority's website at www.cahighspeedrail.ca.gov).

The SR-152 Freeway Agreement, signed by Madera County and Caltrans, identifies six locations for future interchanges with intermediate roads either separated with underpasses or closed. The HST alignment was offset approximately 400 feet from the freeway south right-of-way to the HST northern right-of-way line to accommodate the future planned improvements to SR 152.

The Avenue 21 and Avenue 24 east-west alignments and wyes have been studied in detail in this Project EIR/EIS (Figure S-2). Based on input from regulatory agencies, the SR 152 east-west alignment and related wyes (Figure S-3) have been determined to merit detailed study as well, which will be done in the San Jose to Merced Project EIR/EIS. The Merced to Fresno



Section Project EIR/EIS will be used for the Authority and FRA to make decisions about the north-south alignment. All three east-west connections and wyes will be carried forward for additional study, consideration, and decision-making as part of the San Jose to Merced Section Project EIR/EIS process.

S.5.3 Station Area Development

The presence of an HST station would provide tremendous opportunities to revitalize the downtowns of Merced and Fresno through urban design; diversity of higher density mixed use development; and improved access to transit, bike, and pedestrian connectivity. The higher densities in the station areas would result in higher levels of transit and the stations could become major transit hubs. The presence of the stations would also attract office development to the downtowns because of the improved access to the larger markets of Los Angeles and the Bay Area, and the stations could become 24-hour destinations as more commercial businesses are attracted to the area. In addition, residential growth would be expected because of increases in retail, nightlife, and improved multimodal connectivity, rather than residents wanting to commute to Los Angeles or the Bay Area (Authority and FRA 2008).

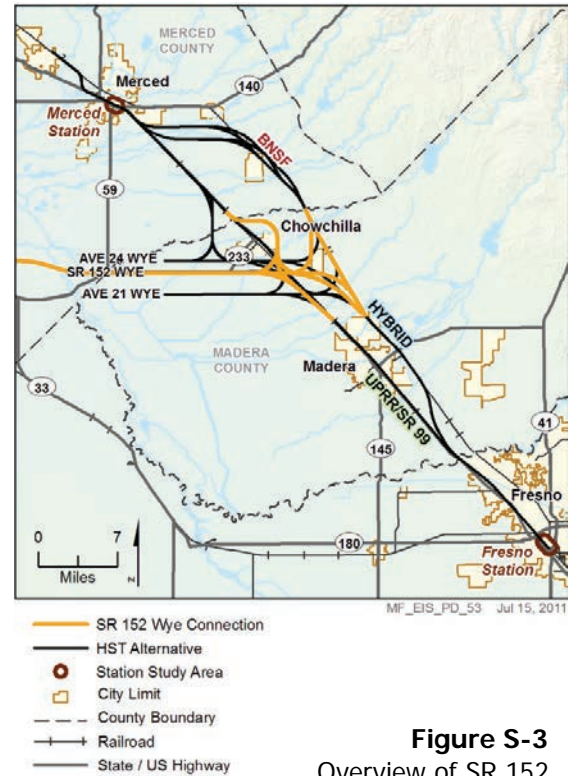


Figure S-3
 Overview of SR 152
 Wye

The cities of Merced and Fresno are updating their general plans to reflect the addition of an HST station in their downtown areas. Both downtowns are poised to become strong activity centers with the addition of the HST. The projected growth for this region is nearly an additional 1 million persons by 2035, with comparable growth in employment even before adding the HST to the Central Valley. The project is estimated to bring 2,600 and 8,400 daily passengers to Merced and Fresno, respectively, and, when combined with the projected growth for the valley, would result in an abundance of people in the downtown areas. The HST would be a catalyst which would concentrate the investment created by population growth at the urban centers that provide interregional connectivity with other metropolitan centers. The HST stations would be compatible with local zoning for higher density development and would build upon existing activity centers. The station areas and the surrounding regions would realize beneficial effects, including increased employment, recreation, and community cohesion. No incompatible changes in land use patterns or intensities are anticipated in downtown urbanized areas.

S.5.4 Heavy Maintenance Facility

The Merced to Fresno Section may include an HMF centrally located on the main north-south line of the HST System to support delivery, testing, and commissioning on the HST System's first completed section. The HMF concept plan indicates that the site should encompass approximately 150 acres to accommodate guideways, maintenance shops, parking, administrative offices, roadways, a power substation, and storage areas.

The HMF would perform the following functions:

- Trainset assembly
- Testing and commissioning
- Train storage
- Inspection

- Maintenance
- Retrofitting
- Overhaul

This Project EIR/EIS evaluates five HMF site alternatives

- Castle Commerce Center – Located in Atwater at the Castle Commerce Center (previously Castle Air Force Base) north of the Downtown Merced Station.
- Harris-DeJager – Located north of the Chowchilla city limits with access from SR 99.
- Fagundes – Located west of the Chowchilla city limits with access from SR 152.
- Gordon-Shaw – Located north of the Madera city limits with access from SR 99.
- Kojima Development – Located south of Le Grand and north of Madera Acres with access from Santa Fe Avenue.

HST Heavy Maintenance Facility

The California HST HMF will support the assembly, testing, commissioning, and acceptance of high-speed rolling stock prior to the start-up of operations. After initial operations begin, the HMF will assume maintenance and major repair functions to sustain the regular operation of the system and activation of new rolling stock as it is delivered.

S.6 Measures to Avoid and Minimize Impacts

The HST project includes alternatives and design features to avoid and minimize impacts. Project design incorporates the following measures:

- Follows existing transportation corridors to the extent feasible
- Uses shared right-of-way when feasible
- Uses narrowed footprint with elevated or retained cut profile
- Spans water crossings where practical
- Includes passages for wildlife movement
- Avoids sensitive environmental resources to the extent practical

S.7 No Project Alternative Impacts

Projected growth and conversion of land to urbanized uses associated with the No Project Alternative are anticipated to have a much greater environmental effect than the HST project in the study area over the 2010 to 2035 planning period.

The U.S. Census Bureau (2000) reported that Merced, Madera, and Fresno counties recorded an average of 3.25 persons per dwelling unit and 8, 4.7, and 8 residential units per acre, respectively. It would take approximately 40,200 acres of land to accommodate anticipated housing demand. However, this land consumption estimate does not take into account related commercial, transportation, and supporting infrastructure such as parks, water and wastewater treatment facilities, and medical facilities. With necessary supporting infrastructure, including commercial, office, transportation, parks, and schools, a typical population density for an area similar to the San Joaquin Valley would be 8 to 10 people per acre of land development² (Colorado Department of Transportation [CDOT] 2006). Under this scenario, the total three-county growth projections are for approximately 93,000 acres of land development. Additionally, this development is anticipated to follow current patterns dispersed along the edges of city growth boundaries and into unincorporated areas along highways.

An increase in population and employment results in an increasing need to travel between destinations. Even with approved state plans to improve and widen SR 99, Caltrans anticipates that urban areas along

² In Denver, the Colorado Department of Transportation studied land use density as part of the preparation for the US 36 Project Alternative Analysis/EIS (2006). The study included a geographic information system (GIS) analysis of 50 years of land use trends based on historic aerial photos digitized, followed by measurement of actual census data to determine that the gross use of an acre of land supported an average of 10 persons.

SR 99 will not meet acceptable operating standards in 2035. The regional measure for growth in travel is the amount of vehicle miles traveled (VMT) during a given year. Between 2010 and 2035, VMT is projected to increase 80%, 90%, and 20% in Merced, Madera, and Fresno counties, respectively. According to a statewide transportation projection conducted by Cambridge Systematics (2007), the annual VMT for the three-county region is projected to increase from 35 million to almost 50 million by 2035. This increase would require the use of an estimated 1 billion gallons of petroleum in the Merced to Fresno region alone (Bureau of Transportation Statistics 2010).³

Vehicle Miles Traveled (VMT)

A transportation planning term that measures the extent of motor vehicle operation. Specifically, it measures the total number of miles traveled by a vehicle in a specific area over a given period of time.

The conversion of vacant and agricultural land for development will affect and change the character of many of the environmental resources in the study area.

Increasingly stringent federal and state emission control requirements and the replacement of older, higher-polluting vehicles with newer, less-polluting ones would reduce basin-wide air pollution emissions under the No Project Alternative and air quality would improve. Noise would stay at a similar level because local general plans and noise and vibration ordinances are in place to ensure that standards are met.

Future conditions from increased development would likely result in additional use of electricity and radio frequency communications that would increase the generation of electromagnetic fields (EMFs) and Electromagnetic interference (EMI) in the area. Demand for energy would also increase at a level commensurate with population growth under the No Project Alternative, which would require additional generation and transmission capacity. Daily VMT in Merced, Madera, and Fresno counties would increase, requiring additional demand for petroleum.

Existing trends affecting biological resources are expected to continue or worsen, including habitat loss from development, mortality from vehicle strikes, habitat degradation from pollution (e.g., polluted runoff from stormwater, inadvertent spills of hazardous materials), and noise and dust from development. Effects of the current built environment on hydrology and water resources would continue, including effects from continued operation of existing highways, airports, and railways.

A consequence of the No Project Alternative would be that the project vicinity would not include the higher-density, transit-oriented development (TOD) planned around proposed HST stations, and the continuation of low-density development might be more likely. This development pattern would increase impervious ground area and an associated increase in stormwater runoff in the urban fringe. Additionally, increases in traffic would degrade water quality because of increased pollutants in stormwater from vehicles on roadways. Infrastructure and development projects could cause water or wind erosion, loss of valuable topsoil, and constraints on the potential for oil and gas resource development.

Transit-Oriented Development

A transit-oriented development (TOD) is a pattern of dense, diverse, pedestrian-friendly land uses located near transit nodes that, under the right conditions, translates into higher transit patronage (Transit Cooperative Research Program 2004).

Current trends for accidental spills or releases of hazardous materials and wastes would continue with operation of commercial and industrial facilities or during transport of these goods, which would create new contaminated sites. Under the No Project Alternative, safety and security in the study area would follow current trends. Increased vehicular traffic volumes over the next 25 years would be expected to result in increased traffic accidents; however, with planned roadway improvements, it is expected that existing accident trends in the study area would continue into the future. Counties and cities have the financial mechanisms in place to meet service level goals for emergency responders with the population growth planned for the study area. For these reasons, no adverse or significant impact on accident prevention or emergency response is anticipated.

³ Based on the 2007 national average fuel economy for passenger and other two-axle, four-tire vehicles.

The No Project Alternative would not have the community benefits associated with the HST project: reduction of traffic congestion on highways and major roadways and improved mobility and access to jobs, educational opportunities, and recreational resources. To the extent the net increase in housing units and industrial space in the region occurs in incorporated cities, it would be consistent with adopted general plans and policies, which aim to strengthen socioeconomic conditions in existing communities and improve neighborhood amenities, potentially benefiting community cohesion. Emergency response times and access would likely be enhanced from transportation improvements but challenged by dispersed development. The planned projects comprising the No Project Alternative would require acquisition of land and may result in displacement of residences and/or businesses, resulting in some economic benefits as well as potential fiscal and employment losses as a result of relocations. Planned transportation improvements would be made to rail, highway, airport, and transit systems, and commercial and residential development projects would occur throughout the region, which as a whole has substantial numbers of communities of concern. As a result, these planned projects may disproportionately affect minority and/or low-income populations.

As described above, the No Project Alternative would result in 93,000 acres of land for future housing and necessary supporting infrastructure. While some infill development could occur without the HST to act as a catalyst, little TOD is likely to be attracted to the downtown areas of Merced and Fresno with the No Project Alternative. As an example, newly planned residential development proposed in the four counties would primarily be located on currently undeveloped land. Isolated development and roadway transportation projects would not provide the same opportunities for redevelopment within the downtown areas of Merced and Fresno as would the development of HST stations. Overall, the No Project Alternative would not be as strong a catalyst in supporting the development envisioned in these general plans and other planning documents as would the HST alternatives.

Growth would occur on agricultural lands under the No Project Alternative. The eight San Joaquin Valley counties that participated in the San Joaquin Valley Blueprint planning process developed a forecast of farmland conversion to nonagricultural uses by 2050 based on current development patterns. Given continuation of these patterns, 327,000 acres of farmland would be converted by 2050 (San Joaquin Valley Blueprint 2009). Because of the extent and quality of farmland in these counties, most of this growth is likely to occur on Important Farmlands, which includes Prime Farmland, Farmland of Statewide Importance, Unique Farmland, and Farmland of Local Importance, as described in the Farmland Mapping and Monitoring Program. Most development in the southern San Joaquin Valley that is currently being planned or permitted is located in the vicinity of urban centers and/or along SR 99. Most of this development would take place on currently unincorporated county land that is largely classified as Prime Farmland, which is land with the best combination of physical and chemical features to sustain long-term agricultural crop production. Given continuation of these patterns, 327,000 acres of farmland would be converted by 2050.

The No Project Alternative would not cause or accelerate substantial physical deterioration of parks. Continuing the pattern of converting farmland to development, the No Project Alternative would increase the loss of rural views while resulting in limited improvement to the visual quality in proposed redevelopment areas.

Under the No Project Alternative, cultural resources will continue to be affected in the Central Valley urban areas through the development of land because of growth. Changes in land use and ground disturbance associated with other transportation infrastructure improvements will occur with the expansion of existing highways to accommodate the state's growing population. Adverse effects on eligible resources could result in the neglect, abandonment, or removal of historic properties.

Merced and Fresno land use plans encourage infill and higher-density development in urban areas and concentration of uses around transit corridors to provide more modal choices for residents and workers. Many of the land use scenarios in local plans include HST as a critical element in meeting land use goals, and the No Project Alternative would not support these plans. Under the No Project Alternative, cities would have a more difficult time reducing low-density sprawl and encouraging higher-density development, and fewer modal choices would be available.

Construction of planned development and transportation projects, including the expansion of SR 99, would generate short-term construction employment in the region and a small number of long-term permanent jobs to maintain new and expanded facilities. Under the No Project Alternative, fewer business and employment opportunities would exist in comparison to the HST alternatives. Employment growth would continue to follow existing patterns and would attract fewer of the higher-wage jobs in the financial, insurance, and real estate sectors than would occur under the HST alternatives.

S.8 HST Alternatives Evaluation

Table S-1 provides a high-level comparison of key design features associated with each of the three HST alternatives carried forward. This section then presents discussions of the impacts that differentiate the alternatives (and proposed mitigation measures) and the HMF alternatives (and proposed mitigation measures), as well as cost estimates for each alternative. This section provides an overview of effects potentially resulting from implementing project alternatives, including (1) benefits common to all HST alternatives and resources that do not require mitigation measures (see Section S.8.1), (3) impacts common to all project alternatives and their mitigation measures (see Section S.8.2), and (4) comparison of project alternative impacts and their mitigation measures (see Section S.8.3). Section S.8.4 provides a cost comparison of the alternatives. Following these descriptions are tables that show a comparison among the alternatives. Table S-4 is a quantitative comparison of significant impacts that are different among alignment alternatives, showing impacts associated with the north-south portion of the alignments (and their design options) separately from the impacts associated with the wye options. Table S-5 summarizes all significant impacts for the alignment alternatives (UPRR/SR 99, Hybrid, and BNSF), along with mitigation measures proposed to reduce the impacts. Table S-6 lists impacts that differ among the five HMF alternatives, along with mitigation measures proposed to reduce the impacts.

Table S-1
 Design Features of Alternatives Carried Forward

Alternative:	UPRR/SR 99 Alternative				BNSF Alternative								
	East Chow-chilla		West Chow-chilla	Hybrid Alternative		Mariposa Way				Mission Ave			
	Design Features:					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 fill)	41	37	32	15	17	23	21	24	22	23	21	24	22
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

Alternative:	UPRR/SR 99 Alternative			BNSF Alternative									
			West Chow-chilla	Hybrid Alternative		Mariposa Way				Mission Ave			
	East Chow-chilla					Le Grand Design Option		East of Le Grand Design Option		Le Grand Design Option		East of Le Grand Design Option	
Design Features:	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
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 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
<p>^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.</p> <p>^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.</p> <p>^c Includes public and private road closures.</p>													

S.8.1 HST Benefits

Of the 2,600 daily riders who would board the HST at the Downtown Merced Station in 2035, approximately 84% would have otherwise taken an automobile trip to their destination. Overall, the HST project would reduce daily VMT by 7.7% in Merced County, 2.7% in Madera County, and 7.9% in Fresno County⁴, resulting in the benefits of decreased fuel consumption, decreased congestion, improved travel time, and reductions in air pollution emissions. The HST also would reduce the demand and substitute for commercial air travel within California.

Although the HST project would increase electricity consumption compared to the No Project Alternative, the HST project would reduce vehicle and air travel miles with corresponding reductions in fuel consumption and air emissions, for a substantial net reduction in emissions. In addition, the State of California requires that an increasing fraction (33% by 2020) of the electricity generated for the state's power portfolio come from renewable energy sources. As such, the emissions generated for powering the HST System are expected to be lower in the future than the emission estimates included in this Project EIR/EIS. The Authority has also adopted a policy goal to use up to 100% renewable energy sources for the HST System, which would result in a greater overall reduction in emissions from the HST project.

The HST stations would have the benefit of encouraging high-density transit-oriented development in Merced and Fresno and would attract development away from the edges of urban boundaries (also called sprawl). The HST project could improve water quality compared to the No Project Alternative because of decreased VMT and the encouragement of transit-oriented development, which in turn would reduce non-point source pollutants through trip reduction and increased density. The HST project could induce slight population and employment growth throughout the region, including in the communities that would not have an HST station. Indirect impacts would increase employment opportunities and economic vitality

⁴ Based on implementation of Phase 1 of the project.

throughout the region, a result not likely under the No Project Alternative. Under current city and county general plans in the region, communities in the region have adopted urban growth boundaries to accommodate growth beyond planned growth by 2035, including any growth induced by the HST project. HST-induced growth would, therefore, not require farmland conversion beyond what is currently planned. Generally, low-income and minority populations reside throughout the Merced-to-Fresno corridor; therefore, benefits such as improved mobility, air quality, and employment would accrue to these low-income and minority populations because they represent such a large percentage in the region.

Analysis of the HST alternatives has determined that by applying required federal and state regulations and engineering standards, the construction and operation of the project would not have substantial effects on hydrology and water resources; geology, soils, and seismicity; station planning, land use, and development; and regional growth.

S.8.2 Adverse Effects Common to All HST Alternatives

The following potentially significant impacts would occur with all HST alternatives, and do not differentiate between alternatives. 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.

Impacts that are different among the alternatives are listed in Tables S-4 and S-5, along with the associated mitigation measures for these impacts. Section S.8.3, Comparison of Alternatives, describes these.

- Transportation:** All alternatives would result in intersection and roadway impacts in the Fresno area between Herndon Avenue and Shaw Avenue, which would be mitigated to negligible under NEPA and less than significant under CEQA by modifying signal phasing and timing, adding signals in some locations, widening approaches to some intersections, and adding lanes or grade separating in some locations. The project would require relocation of SR 99 and would result in station area intersection impacts during operation. Mitigation measures for these impacts would reduce them to negligible under NEPA and less than significant under CEQA, including the addition of a southbound auxiliary lane to SR 99, roadway widening, additional turn lanes, restriping, and traffic signal improvements.
- Air Quality:** Project construction for all HST alternatives 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 PM₁₀, carbon monoxide (CO), and PM_{2.5}. Hauling materials needed for track construction could 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 substantial under NEPA and significant under CEQA. Construction also could expose sensitive receptors to substantial pollutant concentrations. Mitigation of construction-period impacts would include standard best management practices (BMPs) during construction, reducing fugitive dust by watering during material hauling, reducing criteria exhaust emissions from construction and on-road equipment, reducing VOC emissions from paint, and reducing the potential impact of concrete batch plants. After mitigation, air quality construction-period impacts would remain substantial under NEPA and significant under CEQA.

Project operations for all HST alternatives would result in a net benefit to air quality because the HST project would result in lower mobile source air toxics (MSATs), greenhouse gases (GHG), VOC, NO_x, CO, PM₁₀, and PM_{2.5} emissions compared to the No Project Alternative. Operation of the HMF could expose sensitive receptors to substantial toxic air contaminant concentrations, PM_{2.5} and PM₁₀. Mitigation of these operations impacts would include locating emission sources within the HMF property away from possible sensitive receivers and using BMPs or alternative equipment that

Air Quality Sensitive Receptors

Sensitive receptors are people who have an increased sensitivity to air pollution or environmental contaminants. Sensitive receptor locations include schools, parks and playgrounds, day care centers, nursing homes, hospitals, and residences.

reduce emissions. With this mitigation, operations impacts related to toxic air contaminants at the HMF would be reduced to negligible under NEPA and less than significant under CEQA, impacts related to PM₁₀ would be reduced to negligible under NEPA but would remain significant under CEQA, and impacts related to PM_{2.5} would remain substantial under NEPA and significant under CEQA.

- **Noise and Vibration:** All HST alternatives would create noise and vibration impacts during construction. Mitigation of construction noise impacts would include noise monitoring during construction and requiring the contractor to implement one or more noise control measures to meet noise limits. Building damage from construction vibration is anticipated only from impact pile driving very closely to buildings. Damage from construction vibration is not anticipated if piling takes place more than 25 to 50 feet from buildings, or if alternative methods such as push piling or auger piling can be used. Mitigation would include preconstruction surveys to document the existing condition of buildings located within 50 feet of piling. After mitigation, construction noise and vibration impacts would be negligible under NEPA and less than significant under CEQA.
- **EMF/EMI:** Under all HST alternatives, workers with implanted medical devices could be affected by work at electrical facilities, which would be mitigated by implementing a safety program to preclude workers with implanted devices from entering any facility with electrical equipment that could endanger them. With this mitigation measure, EMF/EMI impacts would be negligible under NEPA and less than significant under CEQA.
- **Public Utilities and Energy:** The BNSF and Hybrid Alternatives, and the UPRR/SR 99 Alternative only with the Avenue 21 wye would conflict with existing substations. This impact would be substantial under NEPA and significant under CEQA. With mitigation that would include redesigning project features to avoid the substation, or moving the substation, the impact would be reduced to negligible under NEPA and less than significant under CEQA.
- **Biological Resources:** Construction of all HST alternatives would introduce noxious weeds and would disturb existing plant communities and land cover types habitat with potential to support special-status species, and critical habitat. Construction of the HST alternatives would also have indirect impacts on jurisdictional waters and Camp Pashayan and would act as a barrier to free-ranging mammal movement within wildlife movement corridors. Mitigation of construction-period impacts would include weed control, construction crew training, mapping of special-status species locations, flagging and fencing the construction limits and other BMPs, implementing a biological resources management plan, installing protection measures for special status species, restoring temporary impacts, and limiting construction along wildlife movement corridors. After mitigation, construction-period impacts would be reduced to negligible under NEPA and less than significant under CEQA except for 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, which would remain moderate 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 convert jurisdictional waters, affect Camp Pashayan, and would permanently impact 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; delineating and compensating for permanent impacts to jurisdictional waters and state streambeds; compensating for impacts on special-status plant and wildlife species and their habitats; construction of wildlife corridor artificial dens and monitoring and reporting of wildlife corridor undercrossings; and installation of noise barriers. After mitigation, operational project impacts would be reduced to negligible 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, vernal pool branchiopods, and burrowing owls; permanent conversion of jurisdictional waters; impacts on critical habitat for vernal pool species; affect camp Pashayan; and permanently reduce the functionality of wildlife movement corridors, which would remain moderate under NEPA and significant under CEQA.

- Hazardous Materials and Waste:** During project construction, handling of extremely hazardous materials within 0.25 mile of a school would be avoided by requiring that contractors not use extremely hazardous substances or mixture in a quantity equal to or greater than the state threshold quantity (Health and Safety Code Section 25532) within 0.25 mile of a school. With this mitigation, the impact would be negligible under NEPA and less than significant under CEQA.
- Safety and Security:** All HST alternatives could increase demand for local emergency responders around the stations due to station activity and associated redevelopment and economic activity. This could increase response times and require new or physically altered government facilities that might impact the environment. This is a potentially moderate impact under NEPA and a significant impact under CEQA. As mitigation, emergency response to station and HMF incidents would be monitored, and if it is determined that the HST project does result in increased demand, a fair share impact fee to local service providers would be negotiated, reducing effects to negligible under NEPA and less than significant under CEQA.
- Socioeconomics, Communities, and Environmental Justice:** All of the HST alternatives would result in the acquisition of a homeless shelter in the City of Merced. This impact would be mitigated by replacing community facilities and continuing outreach to disproportionately and negatively affected environmental justice communities of concern. A construction plan would be developed and implemented to address communications, community impacts, visual protection, air quality, safety controls, noise controls, and traffic controls to minimize impacts on low-income households and minority populations and to maintain access to local businesses, residences, and emergency services. With implementation of mitigation, this impact would be reduced to negligible under NEPA and less than significant under CEQA.
- Agricultural Lands:** Construction and operation of all alternatives and the HMF 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 substantial under NEPA and significant under CEQA.
- Parks, Recreation, and Open Space:** All HST alternatives would have construction and operations impacts on Camp Pashayan in Fresno. Construction-period impacts would be mitigated to negligible under NEPA and less than significant under CEQA by compensating for staging in park property during construction. Project operation would result in partial acquisition of Camp Pashayan, which is a substantial impact under NEPA and a significant impact under CEQA. At Roeding Park, all three HST alternatives would have severe noise impacts on the eastern portions of the park without noise mitigation; the impact would be substantial 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 significant and unavoidable under CEQA.
- Visual and Aesthetic Resources:** All HST alternatives would cause temporary visual disturbance during construction, including new sources of light and glare, and visual nuisance in urban areas adjacent to residential and historical resources. All HST alternatives would permanently lower visual quality west of SR 99. All alternatives 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. Mitigation measures to reduce impacts would include minimizing visual disruption from construction, providing landscape treatments along overcrossings and retained fill elements, providing sound barrier treatments, and screening TPSSs. With mitigation, visual disruption from construction and TPSS impacts would be reduced to negligible under NEPA and less than significant under CEQA, but impacts associated with lowering visual quality and sound barriers would remain substantial under NEPA and significant under CEQA.

- **Cultural and Paleontological Resources:** All HST alternatives have the potential to affect archaeological and paleontological resources during construction. Mitigation for these impacts would include conducting archaeological training, halting work in the event of an archaeological discovery, and conducting monitoring in sensitive areas, engaging a paleontological resources specialist to direct monitoring during construction, implementing a paleontological resources monitoring and mitigation plan and halting construction if paleontological resources are found. After mitigation, impacts on archaeological and paleontological resources are expected to be negligible under NEPA and less than significant under CEQA. All alternatives could affect one historically significant built-environment resource during construction. Mitigation for this impact would include 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, Historic American Engineering Record, and Historic American Landscape Survey, and preparation of interpretive exhibits. After mitigation, this impact would remain substantial under NEPA and significant under CEQA. During operation, all HST alternatives have the potential to affect one resource listed or eligible for the NRHP (Section 106). This impact could be mitigated (see Parks, Recreation, and Open Space above) to less than significant.

S.8.3 Comparison of HST Alternatives

Tables S-4 and S-5 compare each of the three alignment alternatives. Subsections S.8.3.1 through S.8.3.3 below summarize the main differences among the alternatives. Section S.8.3.4 discusses stations, and Table S-6 and Section S.8.3.5 summarize the main differences among the HMF alternatives. Many regulations require implementing measures that reduce impacts. The Authority will comply with these regulations and, therefore, these measures are not listed here. In addition, the Authority will strive to avoid and minimize impacts as design progresses. The following comparisons of the Avenue 22 and Avenue 21 wyes with the SR 152 wye is based on conceptual engineering developed for the *Supplemental Alternatives Analysis for the San Jose to Merced Section*. Additional alignment refinements are anticipated for the SR 152 wye.

S.8.3.1 UPRR/SR 99 Alternative

The UPRR/SR 99 Alternative would have more guideway adjacent to existing transportation corridors than the other alternatives (BNSF and Hybrid alternatives) and would provide the shortest potential guideway length (West Chowchilla design option) and fastest travel (Ave 21 Wye) as part of the Phase 1 San Francisco to Los Angeles travel time requirements. The UPRR/SR 99 Alternative would extend through Chowchilla and Madera, where stations are not proposed. As shown in Figure S-4, this alternative would require several crossings of UPRR and SR 99, some of which would require modification of SR 99 interchanges.

Generally, the UPRR/SR 99 Alternative would have more elevated structures crossing the UPRR and SR 99 than the other alternatives. Because this alignment closely parallels UPRR and SR 99, a series of straddle bents would support several difficult and lengthy UPRR and SR 99 crossings. The UPRR/SR 99 Alternative would be the most expensive to build as a result. The West Chowchilla design option would reduce the number of elevated structures compared to the other option within the UPRR/SR 99 Alternative. The West Chowchilla design option would also reduce the cost of the UPRR/SR 99 Alternative because of the substantially shorter length of at-grade guideway and elevated guideway. The UPRR/SR 99 Alternative would have fewer road closures than the BNSF Alternative or the Hybrid Alternative because of its extensive elevation adjacent to UPRR and SR 99.

Construction of the UPRR/SR 99 Alternative would have the most severe air quality impact because of the number of roadway interchanges that would be reconstructed and the greater amount of elevated guideway. This would require more construction equipment which would result in higher emissions. More severe operational noise impacts on residences and institutions would occur under this alternative than under the BNSF or Hybrid alternatives. The UPRR/SR 99 Alternative would have a substantial effect on waters under jurisdiction of the U.S. Army Corps of Engineers (USACE) and the California Department of Fish and Game (e.g., wetlands, lakes, streams), Camp Pashayan (an ecological reserve), and wildlife movement within the Berenda Slough riparian corridor, and the Eastman Lake-Bear Creek Essential Connectivity Area (ECA).

This alternative would affect the fewest acres of Important Farmland and Williamson Act land, but would affect the most acres of Farmland Security Zone land. The UPRR/SR Alternative would cause the least severance of farmlands of all of the alternatives. Park impacts would be greater for the UPRR/SR 99 Alternative than for the BNSF and Hybrid alternatives, including closure or use of three parks during construction and partial acquisition of two parks. The UPRR/SR 99 Alternative would have the most frequent nighttime lighting impacts during construction. The UPRR/SR 99 Alternative would affect the greatest number of archaeological resources, but the least effect on paleontological resources. The preliminary least harm analysis indicates that the UPRR/SR99 Alternative would have the greatest harm with respect to 4(f) resources of all of the alternatives.

The wye connections to the UPRR/SR 99 Alternative differ in level of impacts. Some of the differences include impacts on riparian habitat, water bodies crossed, agricultural lands, and communities. The Ave 24 Wye connection would impact more riparian habitat and cross more water bodies than the Ave 21 Wye connection. The Ave 21 Wye connection would impact more important farmlands and Williamson Act lands than the Ave 24 Wye connection. Either wye connection with the East Chowchilla Design Option would pass through the east portion of Chowchilla, while the Ave 24 Wye connection with the West Chowchilla design option would avoid Chowchilla.

The SR 152 Wye connection to the UPRR/SR 99 Alternative is not evaluated in this Project EIR/EIS, but preliminary impacts evaluation indicates that this wye connection may avoid the impacts to the community of Fairmead that would occur under the Ave 24 and Ave 21 Wye connection and would result in more impacts on agricultural lands than the Ave 24 and Ave 21 Wye connections. The SR 152 Wye would pass along the east side of Chowchilla, somewhat similarly to the other wye connections with the East Chowchilla design option, while the Ave 24 Wye with the West Chowchilla design option would avoid Chowchilla.

S.8.3.2 BNSF Alternative

The BNSF Alternative would be adjacent to existing transportation corridors (BNSF railroad tracks) for a portion of its alignment; however, as shown on Figure S-5, it would deviate from the BNSF railway

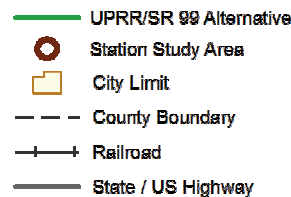
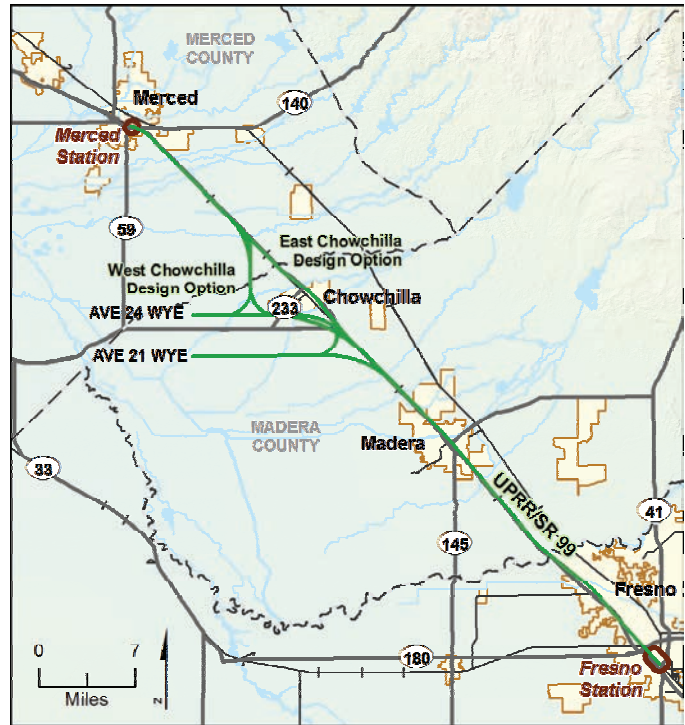


Figure S-4
 Overview of
 UPRR/SR 99 Alternative
 and Design Options

between Merced and Le Grand and then again south of Madera Acres to rejoin the UPRR/SR 99 Alternative. Generally following the BNSF railway from Merced to Madera, where the alternative diverges from the UPRR/SR 99 Alternative, this alternative would travel in an alignment ranging from 2 to 5 miles west of SR 99. This would be approximately 2 to 9 miles longer than the UPRR/SR 99 Alternative (with the East Chowchilla design option, depending on the wye connection associated with each alternative), and result in a longer travel time. In addition, the HST alternatives would require much larger radius curves than the existing BNSF railway. As a result, near BNSF railway curves, the HST guideway would veer away from the BNSF tracks to allow for larger curvatures before rejoining the BNSF corridor. The BNSF Alternative would pass through rural areas and, therefore, would require fewer modifications to major roads, interchanges, or city businesses and industries in Chowchilla and Madera than the UPRR/SR 99 Alternative.

The BNSF Alternative would be mostly at-grade, with 21 to 24 miles of elevated structures. The BNSF Alternative also would have several railroad crossings, particularly when associated with East of Le Grand design options. The BNSF Alternative would pass through rural areas where local roads cross the BNSF railroad at-grade. As a result, the BNSF Alternative would result in more road closures than the other alternatives, but new grade-separated overcrossings would be provided at least every 2 miles after mitigation.

The BNSF Alternative could result in vibration impacts on one residence near Le Grand. The BNSF Alternative would have a substantial effect on special-status plant communities, jurisdictional waters, Camp Pashayan, and wildlife movement in the Eastman Lake-Bear Creek ECA and Berenda Slough. It is the only alternative that would affect the Great Valley Conservation Bank (a mitigation bank), and federally designated critical habitat for five vernal pool associated species. Most of the BNSF Alternative's design options would have greater effects on waters under U.S. Army Corps of Engineers jurisdiction than the UPRR/SR99 Alternative or the Hybrid Alternative and would impact more than twice as many acres of vernal pools and other seasonal wetland than the Hybrid Alternative would, and more than five times as many as the UPRR/SR Alternative. The BNSF Alternative would also cross the Eastman Lake-Bear Creek ECA for a longer distance (see Table S-4). The BNSF Alternative would potentially affect suitable habitat for special-status wildlife species, riparian communities and vernal pools and other seasonal wetlands more than the Hybrid or the UPRR/SR 99 alternatives.

The BNSF Alternative would result in security impacts on a state prison, but with mitigation, these impacts would be less than significant. The BNSF Alternative would affect the most acres of Important Farmland and Williamson Act Land but would affect the fewest acres of Farmland Security Zone land. This alternative would cause the greatest severance of farmlands of all of the alternatives because more of the guideway would diverge from existing major transportation corridors. The BNSF alternative would lower visual quality in the greatest number of landscape units. The BNSF Alternative would result in visual impacts on the community of Le Grand where the elevated guideway would extend along the BNSF

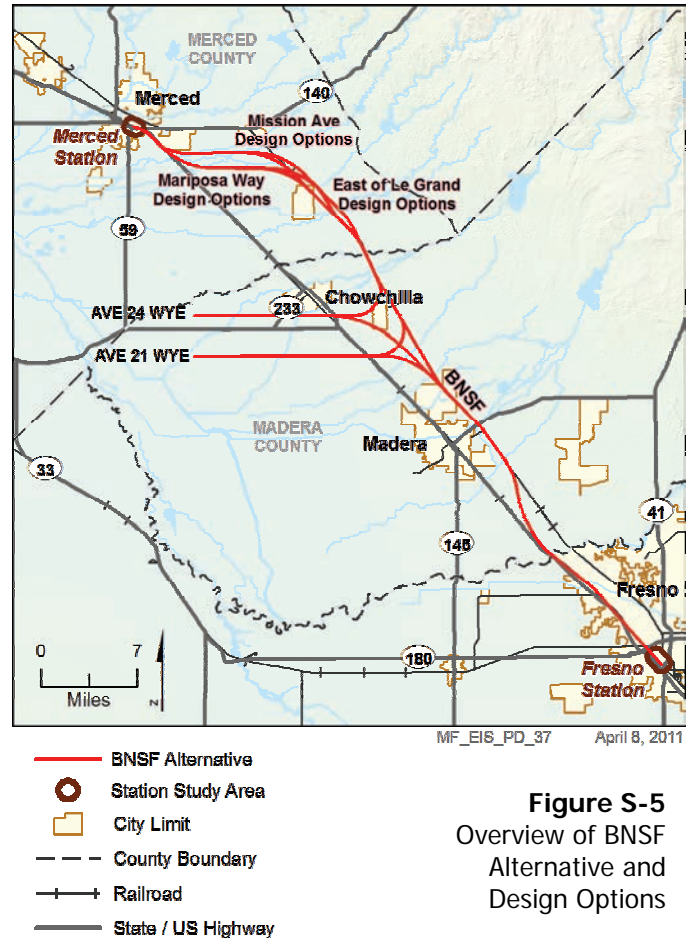


Figure S-5
 Overview of BNSF
 Alternative and
 Design Options

through the town. This effect could not be fully mitigated, thus causing a lasting effect on an environmental justice population. This alternative would result in the highest number of visual impacts within the study area. The BNSF Alternative would affect the same number of archaeological and historical resources during construction as the Hybrid Alternative would, and fewer than the UPRR/SR 99 Alternative. The BNSF Alternative would have the greatest potential to affect paleontological resources during construction. The preliminary least harm analysis indicates that the BNSF Alternative would fall between the UPRR/SR 99 Alternative and the Hybrid Alternative with respect to 4(f) resources of all of the alternatives.

The wye connections to the BNSF Alternative differ in level of impacts. Some of the differences include impacts on riparian habitat and agricultural lands. The Ave 24 Wye connection would impact more riparian habitat than the Ave 21 Wye connection. The Ave 21 Wye connection would impact more important farmlands and Williamson Act lands than the Ave 24 Wye connection and would result in more diagonal bifurcation of farmlands because of a longer southbound wye leg than would occur with the Ave 24 Wye connection.

The SR 152 Wye connection to the BNSF Alternative is not evaluated in this Project EIR/EIS, but preliminary impacts evaluation indicates that this wye connection would impact the community of Fairmead, which would be avoided under the Ave 24 and Ave 21 Wye connections, and would result in more impacts on agricultural lands than the Ave 24 and Ave 21 Wye connections.

S.8.3.3 Hybrid Alternative

The Hybrid Alternative, like the BNSF Alternative, would be adjacent to existing transportation corridors for a portion of its alignment, but would deviate from these corridors between Chowchilla and Madera Acres and then again south of Madera Acres, as shown on Figure S-6. Because it would follow the legs of the Ave 24 Wye (if that wye option were selected) and would follow the portion of the BNSF corridor closest to the UPRR corridor under both the Ave 24 and Ave 21 wye connections, the Hybrid Alternative would be shorter than all other alternatives except the UPRR/SR 99 Alternative with the West Chowchilla design option. The Hybrid Alternative would avoid impacts on the community of Le Grand, and Downtown Madera.

The Hybrid Alternative, similar to the BNSF Alternative, would pass through more rural areas. 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. New grade-separated overcrossings would occur at intervals of approximately 2 miles. This alternative would have the least severe air quality impacts during construction because it would have the smallest quantity of elevated structure, which would require less construction equipment which would result in lower emissions.

The Hybrid Alternative would have a substantial effect on special-status plant

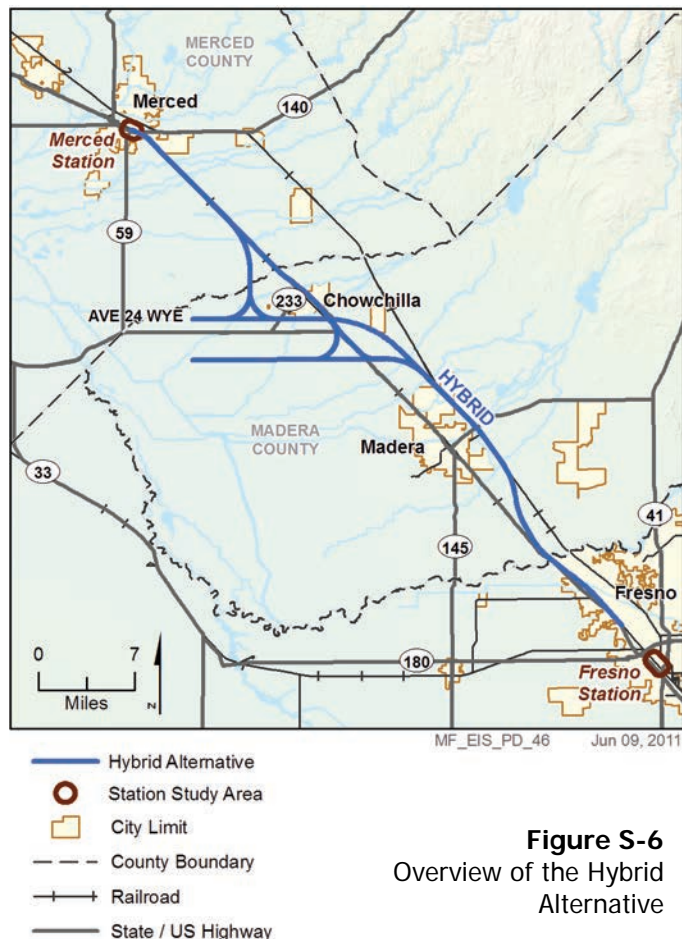


Figure S-6
 Overview of the Hybrid Alternative

communities, jurisdictional waters, Camp Pashayan, and wildlife movement within the Berenda Slough riparian corridor and within the Eastman Lake-Bear Creek ECA. The extent of the impact would be generally lower than for the BNSF Alternative and either greater than or similar to impacts associated with the UPRR/SR 99 Alternative. The Hybrid Alternative would have the fewest visual impacts of any of the alternatives. The Hybrid Alternative would have the lowest impact on paleontological resources during construction. The Hybrid Alternative would affect the same number of archaeological and historical resources during construction as the BNSF Alternative would and fewer than the UPRR/SR 99 Alternative. The preliminary least harm analysis indicates that the Hybrid Alternative would have the least harm with respect to 4(f) resources.

The wye connections to the Hybrid Alternative differ in level of impacts. Some of the differences include impacts on riparian habitat, water bodies crossed, agricultural lands, communities, high-risk utilities, and noise impacts. The Ave 24 Wye connection would impact more riparian habitat and cross more water bodies than the Ave 21 Wye connection. The Ave 21 Wye connection would impact more important farmlands and Williamson Act lands than the Ave 24 Wye connection. The Ave 21 Wye connection would pass through the east portion of Chowchilla, while the Ave 24 Wye connection would avoid Chowchilla. The Ave 21 Wye connection would impact more high-risk utilities and would have almost twice as many severe noise impacts on residences as the Ave 24 Wye connection.

The SR 152 Wye connection to the Hybrid Alternative is not evaluated in this Project EIR/EIS, but preliminary impacts evaluation indicates that this wye connection would impact the community of Fairmead, which would be avoided under the Ave 24 Wye connection, and would result in more impacts on agricultural lands than the Ave 24 and Ave 21 Wye connections would. The SR 152 Wye would pass along the east side of Chowchilla, somewhat similarly to the Ave 21 Wye connection, while the Ave 24 Wye would avoid Chowchilla.

S.8.3.4 HST Stations

The stations analyzed in this Project EIR/EIS include one station in the City of Merced and two station alternatives in the City of Fresno. Because the stations would be identical regardless of the HST alignment alternative, there are no differentiating impacts among the alignments related to the HST stations.

S.8.3.5 Heavy Maintenance Facility

Table S-6 compares each of the HMF alternatives based on the potentially significant impacts that differ among the alternatives. Selection of an HMF location will be related to the HST alignment alternative chosen and the potential impacts associated with the location as well as other factors.

All HMF alternatives would contribute to a potential exceedance of PM_{10} and $PM_{2.5}$ thresholds resulting from existing exceedances in the area, which would be mitigated by reducing the potential impact of stationary sources, but which would remain substantial under NEPA and significant under CEQA.

The Castle Commerce Center HMF site would result in the highest number of affected intersections in comparison to the other HMF options. Operation of this HMF could expose sensitive receptors to substantial toxic air contaminant (TAC) pollutant concentrations. This HMF alternative would result in the division of a mobile home community and would displace three community facilities. Castle Commerce Center HMF would require the acquisition of the entire Joe Stefani Elementary School property (14.5 acres) for project construction. Of all HMF alternatives, this HMF site would impact the fewest acres of Important Farmlands. The Castle Commerce Center HMF site would potentially affect two archaeological resources.

The Harris-DeJager HMF site would result in the fewest intersection impacts. This site would permanently affect the Eastman Lake-Bear Creek ECA. Along with the Gordon-Shaw HMF site, this site would impact the most acres of Important Farmland of all of the HMF sites.

The Fagundes HMF site would impact an intermediate number of intersection compared to the other HMF sites. This site that would affect fewer acres of Important Farmland than three of the other sites.

The Gordon-Shaw HMF site could expose sensitive receptors to substantial TAC pollutant concentrations during operations. The Gordon-Shaw HMF site, along with the Harris-DeJager site, would impact the most acres of Important Farmland of all the HMF sites.

The Kojima Development HMF site could expose sensitive receptors to substantial TAC pollutant concentrations during operations. This site would permanently affect the Berenda Slough riparian corridor and would affect one potential archaeological resource. The Fagundes and Gordon-Shaw HMF sites would have low impacts compared to the other HMF sites.

S.8.4 Capital Cost

Table S-2 reflects the highest cost range (in 2010 dollars) estimated for each alternative; each alternative has been estimated separately for each wye design option. The BNSF and Hybrid alternatives would have fewer miles of costly elevated guideway and fewer modifications to the state highway system than the UPRR/SR 99 Alternative because they would avoid urban areas that require grade separation over multiple roadways to minimize impacts. Both alternatives would be less expensive than the UPRR/SR 99 Alternative as a result. Because the BNSF and Hybrid alternatives would require less elevated guideway and fewer modifications to the state highway system than the UPRR/SR 99 Alternative with the West Chowchilla design option, they would cost substantially less.

All the HMF sites would contain the same facilities to provide maintenance services for the HST System. An HMF at the Harris-DeJager, Fagundes, Gordon-Shaw, or Kojima Development sites would cost approximately \$660.8 million for full build out based on conceptual site and functional layouts for the facilities. An HMF at the Castle Commerce Center site would cost approximately \$1.067 billion because it would require an access guideway from the Downtown Merced Station.

Table S-2
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 Ave 24 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 Communications & 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 Categories 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

S.8.5 Section 4(f) Resources

Section 4(f) properties are publicly owned parks, recreation areas, or wildlife and waterfowl refuges or properties of a historical site of national, state, or local significance as determined by the federal, state, regional, or local officials having jurisdiction over the resource. Section 4(f) is defined in 49 United States Code (U.S.C.) 303 and stipulates that an operating agency of the U.S. Department of Transportation may not approve a project that uses properties protected under this section of the law unless there are no prudent or feasible alternatives and the project includes all possible planning to minimize harm to such properties.

As shown in Table S-3, the UPRR/SR 99 Alternative would result in the use of up to eight Section 4(f) resources, including four park and recreation resources and four cultural resources. The BNSF and Hybrid alternatives would each result in the use of up to four Section 4(f) resources, including one park and recreation resource and three cultural resources. Construction of the Castle Commerce Center HMF site access tracks would result in a use of Joe Stefani Elementary School, as the entire property would need to be acquired. There may be a prudent avoidance alternative to the use of land from the Joe Stefani Elementary School and other HMF alternatives are available that do not use Section 4(f) properties.

Table S-3
 Potential Uses of Section 4(f) Resources Differentiating Among HST Alternatives

North-South Alignment Isolated and with Wye Design Option	HST Alternatives and Design Options							
	UPRR/SR 99 Alternative		Hybrid Alternative		BNSF Alternative			
	East Chowchilla Design Option	West Chowchilla Design Option	East Chowchilla Design Option	West Chowchilla Design Option	Mariposa Way Design Options		Mission Ave Design Options	
					Le Grand	East of Le Grand	Le Grand	East of Le Grand
Number of Section 4(f) Uses – Park/Recreation Resources								
North-South Alignment	4	4	1	1	1	1	1	1
With Ave 24 Wye	4	4	NA	1	1	1	1	1
With Ave 21 Wye	4	NA	1	NA	1	1	1	1
Number of Section 4(f) Uses – Cultural Resources								
North-South Alignment	4	4	3	3	3	3	3	3
With Ave 24 Wye	4	4	NA	3	3	3	3	3
With Ave 21 Wye	4	NA	3	NA	3	3	3	3

It has been preliminarily determined that the Section 4(f) uses of Riverside Park (associated with the UPRR/SR 99 Alternative) and Camp Pashayan (associated with all HST alternatives) would not adversely affect the features, attributes, or activities of these areas, according to 49 USC Section 303(d). Measures to minimize harm, such as avoidance, minimization, mitigation, and enhancement measures, will be incorporated into the project. FRA will continue to coordinate with the agencies of jurisdiction regarding its *de minimis* determinations after publication of the Draft Project EIR/EIS and review of public comments.

The alternatives evaluation process conducted as part of the HST project for the Merced to Fresno Section concluded that there was no feasible and prudent HST alternative within the study area that would address the project purpose and need without using Section 4(f) property. The reason for this finding is that all HST alternatives were designed to follow existing railroad corridors (to the extent allowed by design speeds). Locating the HST alignment along these corridors is an objective of the project intended to minimize impacts on the natural and human environment. Any alternative that did not follow these or other transportation corridors would substantially increase the number of displacements, overall community disruption, adverse impacts to natural environment resources, and adverse social and economic impacts, and could compromise the project in light of the project's purpose and need; therefore, such an alternative would be considered not to be prudent because such an alternative would involve multiple impact factors that cumulatively cause unique problems or impacts of extraordinary magnitude.

The preliminary least harm analysis indicates that the Hybrid Alternative would have the least harm and that the UPRR/SR 99 Alternative would have the greatest harm when considering seven evaluation factors. The project includes all possible planning to minimize harm to Section 4(f) properties resulting from use, as required by 49 USC Section 303(c)(2).

S.8.6 Section 6(f) Resource

The HST project would not convert any parkland from a Section 6(f)-protected resource.

S.9 Areas of Controversy

According to the scoping meetings and public outreach efforts throughout the environmental review process, the following are known areas of controversy:

- Selection of the preferred HST alternative.
- Impacts on wildlife habitat preserves along the BNSF corridor.
- Impacts on corridor communities (including noise, visual quality impacts, loss of community character and cohesion, and right-of-way acquisition).
- Impacts on farmlands (including severance of farmlands, loss of productive farmland, and loss of agricultural enterprises).
- Trade-offs between corridor communities and agricultural lands.
- Community impacts of elevated HST guideway through Chowchilla and Madera along the UPRR/SR 99 corridor.
- Impacts on Camp Pashayan in Fresno, which is protected under Title 14 of the California Code of Regulations.

S.10 Next Steps in the Environmental Process

The Authority and FRA are circulating the Merced to Fresno Section Draft Project EIR/EIS to affected local jurisdictions, state and federal agencies, tribes, community organizations, other interest groups, interested individuals and the public. The document also is available at the Authority offices, public libraries in the study area, and on the Authority's website. The following discussion outlines the next steps in the environmental process, from public and agency comment on the Draft Project EIR/EIS to construction and operation.

S.10.1 Public and Agency Comment

The Draft Project EIR/EIS will be circulated for a 45-day comment period, which will include public hearings. Information about the schedule of public hearings is available on the Authority's website at www.cahighspeedrail.ca.gov.

S.10.2 Identification of Preferred Alternative

After considering public and agency comments, the Authority and FRA will identify a preferred north-south alignment alternative, a site for each station, and a preferred HMF facility alternative. The Authority and FRA will prepare a Merced to Fresno Section Final Project EIR/EIS that will include responses to comments and a description of the preferred alternative and proposed mitigation. In identifying the preferred alternative, all three east-west alignments and wyes will be further considered in the San Jose to Merced Section Project EIR/EIS.

S.10.2.1 FRA Decision-making

Upon completion of the environmental process with publication of the Merced to Fresno Section Final Project EIR/EIS, the FRA expects to issue a Record of Decision (ROD) for compliance with NEPA. The ROD will describe the project and alternatives considered, describe the selected alternative; make environmental findings and determinations with regard to air quality conformity, Endangered Species Act, Section 106, Section 4(f), and environmental justice; and require project mitigation measures. Issuance of the ROD is a prerequisite for any federal construction funding or approvals.

S.10.2.2 California High-Speed Rail Authority Decision-making

After completion of the environmental process, the Authority will consider whether to certify the Final Project EIR/EIS for compliance with CEQA. Once the Authority certifies the Final Project EIR/EIS, it can approve the project and make related CEQA decisions (findings, mitigation plan, and potential statement of overriding considerations). The required CEQA findings prepared for each significant effect will be one of the following:

- Changes or alternations have been required or incorporated into the project that avoid or substantially lessen the significant environmental effect as identified in the Final EIR.
- Changes or alternations are within the responsibility and jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by such other agency or can and should be adopted by such other agency.
- Specific economic, legal, social, technological, or other considerations, including provision of employment opportunities for highly trained workers, make infeasible the mitigation measures or HST alternatives identified in the Final EIR.

If the Authority proceeds with approval of the project, the Authority would file a Notice of Determination (NOD) that describes the project and whether the project will have a significant effect on the environment. If the Authority approves a project that will result in the occurrence of significant effects identified in the Final EIR but not avoided or substantially lessened, CEQA requires the preparation of a

Statement of Overriding Considerations which provides specific reasons to support the project, including economic, legal, social, technological, or other benefits of the proposed project that outweigh unavoidable adverse environmental effects. If such a statement is prepared, the Authority's NOD will reference the statement.

For purposes of this Merced to Fresno Section Project EIR/EIS, project approval would include selection of a north-south alignment alternative and selection of station locations. The Authority will carry forward all east-west alignment alternatives and wyes for further study and consideration as part of the San Jose to Merced Section Project EIR/EIS. A decision on the east-west alignments and wyes would be made in the future, at the conclusion of the San Jose to Merced Section Project EIR/EIS process.

The Authority anticipates identifying a preferred HMF facility from among the HMF alternatives examined in this document. The Authority is also considering HMF facility alternatives as part of the Fresno to Bakersfield Section Project EIR/EIS and anticipates identifying a preferred HMF facility from among the alternatives in that Project EIR/EIS. A final decision on the HMF facility is anticipated to occur at a date later than the decisions on the north-south alignments and HST stations and based on the Authority's consideration of the preferred HMF alternatives from both the Merced to Fresno and Fresno to Bakersfield sections.

S.10.2.3 U.S. Army Corps of Engineers Decision-making

The Merced to Fresno Section of the HST System will require a permit from the USACE under Section 404 of the Clean Water Act and Section 14 of the Rivers and Harbors Act (33 U.S.C. 408). The USACE is using the Merced to Fresno Section Project EIR/EIS to integrate the procedural and substantive requirements of NEPA and its permitting responsibilities (including the U.S. Environmental Project Agency's 404(b)(1) Guidelines) to provide a single document that streamlines and enables informed decision-making by the USACE, including but not limited to, adoption of the EIS, issuance of necessary RODs, Section 404 permit decisions, and Section 408 permit decisions (as applicable) for alteration/modification of completed federal flood risk management facilities and any associated operation and maintenance, and real estate permissions or instruments (as applicable).

S.10.2.4 Project Implementation

After the issuance of the FRA's ROD and the Authority's NOD, the Authority would complete final design, obtain construction permits, and acquire property prior to construction, as shown in Figure S-7.

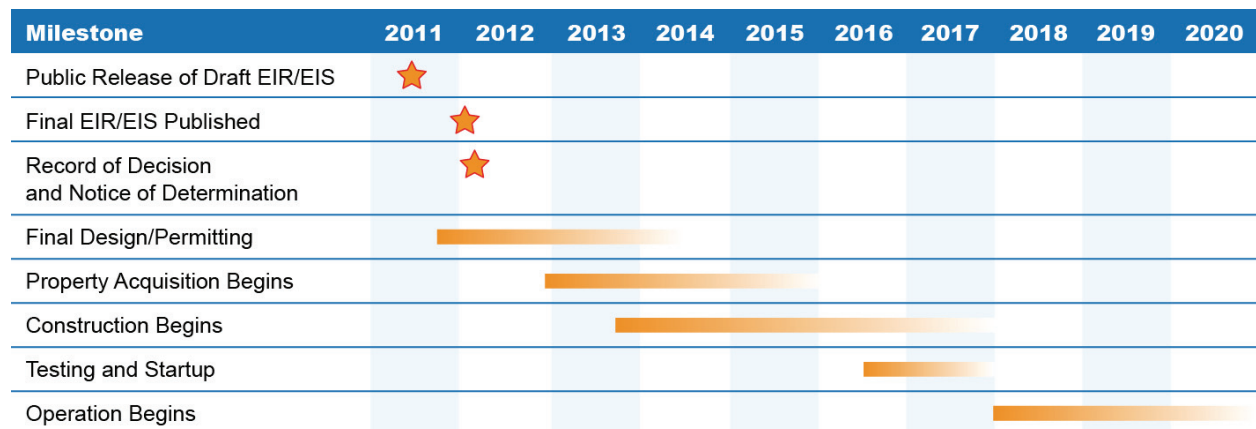


Figure S-7
 Next Steps Schedule

Table S-4
Significant 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					BNSF Alternative				
	East Chowchilla Design Option	West Chowchilla Design Option	East Chowchilla Design Option	West Chowchilla Design Option	Hybrid Alternative	Le Grand	East of Le Grand	Mariposa Way Design Options	Mission Ave Design Options	East of Le Grand
TRANSPORTATION										
Construction-Period Impacts – No differentiating significant construction-period impacts between alternatives										
Project Impacts										
Permanent Road Closures										
North-South Alignment	10	19	18	31	24	15	19	14		
With Ave 24 Wye	20	25	NA	37	42	33	37	32		
With Ave 21 Wye	22	NA	30	NA	37	28	32	27		
AIR QUALITY AND GLOBAL CLIMATE CHANGE										
Construction-Period Impacts										
Construction-related Pollutant Emissions										
North-South Alignment	Greatest amount of construction-related pollutants					Smallest amount of construction-related pollutants				
With Ave 24 Wye						Construction-related pollutants between UPRR and Hybrid				
With Ave 21 Wye										

Table S-4, Continued
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			
	East Chowchilla Design Option	West Chowchilla Design Option	East Chowchilla Design Option	West Chowchilla Design Option	West Chowchilla Design Option	Le Grand	East of Le Grand	Mission Ave Design Options	Le Grand	East of Le Grand
Project Impacts – No differentiating significant operations impacts between alternatives										
NOISE AND VIBRATION										
Construction-Period Impacts – No differentiating significant construction-period impacts between alternatives										
Project Impacts										
Number of Residences Affected by Severe Noise Impacts										
North-South Alignment	762	874	367	239	362	370	364	373		
With Ave 24 Wye	839	884	NA	220	456	464	458	467		
With Ave 21 Wye	810	NA	419	NA	421	429	423	432		
Number of Institutional Facilities Affected by Severe Noise Impacts										
North-South Alignment	3	4	1	1	1	1	1	1		
With Ave 24 Wye	3	4	NA	1	1	1	1	1		
With Ave 21 Wye	3	NA	1	NA	1	1	1	1		

Table S-4, Continued
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			
	East Chowchilla Design Option	West Chowchilla Design Option	West Chowchilla Design Option	East Chowchilla Design Option	West Chowchilla Design Option	Le Grand	Mariposa Way Design Options	Le Grand	Mission Ave Design Options	East of Le Grand
Number of Locations with Vibration Effects										
North-South Alignment	0	0	0	0	0	0	1	0	0	1
With Ave 24 Wye	0	0	NA	NA	0	0	1	0	0	1
With Ave 21 Wye	0	NA	NA	0	NA	0	1	0	0	1
ELECTROMAGNETIC FIELDS AND ELECTROMAGNETIC INTERFERENCE – NO SIGNIFICANT IMPACTS										
PUBLIC UTILITIES AND ENERGY										
Construction-Period Impacts – No significant construction-period impacts										
Project Impacts										
Conflicts with Existing Substation										
North-South Alignment	0	0	1	1	1	1	1	1	1	1
With Ave 24	0	0	NA	NA	1	1	1	1	1	1
With Ave 21	1	NA	2	2	NA	2	2	2	2	2

Table S-4, Continued
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			
	East Chowchilla Design Option	West Chowchilla Design Option	West Chowchilla Design Option	East Chowchilla Design Option	West Chowchilla Design Option	Le Grand	East of Le Grand	Mariposa Way Design Options	Mission Ave Design Options	East of Le Grand
BIOLOGICAL RESOURCES AND WETLANDS^a										
Construction-Period Impacts										
Temporary Disturbance of Habitat with Potential to Support Special-status Plant Species (acres)										
North-South Alignment	65	60	76	54	210	186	187	188		
With Ave 24	67	61	NA	55	218	194	195	195		
With Ave 21	72	NA	81	NA	213	190	191	191		
Temporary Disturbance of Habitat with Potential to Support Special-status Wildlife Species (acres)										
North-South Alignment	334	326	365	288	243	222	209	222		
With Ave 24	440	368	NA	359	447	426	413	427		
With Ave 21	395	NA	442	NA	314	294	280	294		
Temporary Disturbance of Vernal Pools and Other Seasonal Wetlands (acres)										
North-South Alignment	1	1	1	<0.5	2	1	1	1		
With Ave 24	1	1	NA	<0.5	2	1	1	1		
With Ave 21	1	NA	1	NA	2	1	1	1		

Table S-4, Continued
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			
	East Chowchilla Design Option	West Chowchilla Design Option	West Chowchilla Design Option	East Chowchilla Design Option	West Chowchilla Design Option	Le Grand	East of Le Grand	Mariposa Way Design Options	Mission Ave Design Options	East of Le Grand
Temporary Disturbance of Great Valley Mixed Riparian and other Riparian Communities (acres)										
North-South Alignment	3	2	3	2	2	2	3	2	2	2
With Ave 24	3	2	NA	2	2	3	3	2	2	2
With Ave 21	2	NA	4	NA	NA	2	3	2	2	2
Project Impacts										
Permanent Conversion of Habitat with Potential to Support Special-status Plant Species (acres)										
North-South Alignment	169	189	265	284	365	322	409	362		
With Ave 24	198	207	NA	303	410	366	453	406		
With Ave 21	221	NA	301	NA	399	355	443	395		
Permanent Conversion of Habitat with Potential to Support Special-status Wildlife Species (acres)										
North-South Alignment	1,288	1,600	1,586	1,967	1,718	1,720	1,777	1,746		
With Ave 24	1,879	1,929	NA	2,291	2,437	2,438	2,496	2,465		
With Ave 21	1,999	NA	2,147	NA	2,339	2,341	2,399	2,367		
Impacts on Waters of the US (aquatic communities) (acres)										
North-South Alignment	15	23	21	27	26	28	32	36		

Table S-4, Continued
 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			
	East Chowchilla Design Option	West Chowchilla Design Option	West Chowchilla Design Option	East Chowchilla Design Option	West Chowchilla Design Option	Le Grand	East of Le Grand	Mariposa Way Design Options	Mission Ave Design Options	East of Le Grand
With Ave 24	28	33	NA	37	37	37	38	38	43	46
With Ave 21	31	NA	35	NA	35	35	36	36	41	44
Impacts on Vernal Pools and Other Seasonal Wetlands (acres)										
North-South Alignment	1	1	5	5	11	11	9	9	13	13
With Ave 24	1	1	NA	5	12	12	9	9	14	13
With Ave 21	2	NA	5	NA	12	12	9	9	14	13
Impacts on Great Valley Mixed Riparian and other Riparian Communities (acres)										
North-South Alignment	4	8	4	6	6	6	7	7	5	4
With Ave 24	11	16	NA	13	9	9	11	11	8	8
With Ave 21	5	NA	5	NA	7	7	8	8	5	5
Number of Conservation Areas Affected (Camp Pashayan, Great Valley Mitigation Bank)										
North-South Alignment	1	1	1	1	2	2	2	2	2	2
With Ave 24	1	1	NA	1	2	2	2	2	2	2
With Ave 21	1	NA	1	NA	2	2	2	2	2	2

Table S-4, Continued
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			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	Le Grand	East of Le Grand	Grand
Miles of Wildlife Crossings Traversed within Eastman Lake-Bear Creek ECA and Modeled Wildlife Corridors (Including Berenda Slough)										
North-South Alignment	4.1	3.6	4.1	3.6	6.8	6.1	6.8	6.1	6.8	6.4
With Ave 24	4.1	3.6	NA	3.6	6.8	6.1	6.8	6.1	6.8	6.4
With Ave 21	4.1	NA	4.1	NA	6.8	6.1	6.8	6.1	6.8	6.4
HYDROLOGY AND WATER RESOURCES – NO SIGNIFICANT IMPACTS										
GEOLOGY, SOILS, AND SEISMICITY – NO SIGNIFICANT IMPACTS										
HAZARDOUS MATERIALS AND WASTES – NO DIFFERENTIATING SIGNIFICANT IMPACTS										
SAFETY AND SECURITY										
Construction-Period Impacts – No differentiating significant construction-period impacts between alternatives										
Project Impacts										
Conflicts with correctional facilities										
North-South Alignment	0	0	0	0	0	0	0	0	0	0
With Ave 24	0	0	NA	0	1	1	1	1	1	1
With Ave 21	0	NA	0	NA	0	0	0	0	0	0
SOCIOECONOMICS, COMMUNITIES, AND ENVIRONMENTAL JUSTICE – NO DIFFERENTIATING SIGNIFICANT IMPACTS										
STATION PLANNING, LAND USE, AND DEVELOPMENT – NO SIGNIFICANT IMPACTS										

Table S-4, Continued
 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			
	East Chowchilla Design Option	West Chowchilla Design Option	West Chowchilla Design Option	East Chowchilla Design Option	West Chowchilla Design Option	Le Grand	East of Le Grand	Mariposa Way Design Options	Mission Ave Design Options	East of Le Grand
AGRICULTURAL LANDS										
Construction-Period Impacts – No differentiating significant construction-period impacts between alternatives										
Project Impacts										
Important Farmlands ^b Affected (acres)										
North-South Alignment	548	809	772	1116	835	900	880	866		
With Ave 24	1037	1116	NA	1420	1437	1502	1481	1467		
With Ave 21	1158	NA	1291	NA	1411	1476	1456	1442		
Williamson Act Land Affected (acres)										
North-South Alignment	77	111	158	216	214	282	182	206		
With Ave 24	130	171	NA	275	418	485	385	410		
With Ave 21	270	NA	320	NA	471	538	438	463		
Farmland Security Zone Land Affected (acres)										
North-South Alignment	10	65	10	68	8	8	8	8		
With Ave 24	50	91	NA	103	33	33	33	33		
With Ave 21	61	NA	33	NA	28	28	28	28		

Table S-4, Continued
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			
	East Chowchilla Design Option	West Chowchilla Design Option	West Chowchilla Design Option	East Chowchilla Design Option	West Chowchilla Design Option	Le Grand	Mariposa Way Design Options	Mission Ave Design Options	Le Grand	East of Le Grand
PARKS, RECREATION, AND OPEN SPACE										
Construction-Period Impacts										
Number of Parks Affected by Full or Partial Closure During Construction-Period										
North-South Alignment	3	3	3	1	1	1	1	1	1	1
With Ave 24	3	3	3	NA	1	1	1	1	1	1
With Ave 21	3	NA	NA	1	NA	1	1	1	1	1
Project Impacts										
Number of Parks Affected by Full or Partial Acquisition During Operations										
North-South Alignment	3	3	3	1	1	1	1	1	1	1
With Ave 24	3	3	3	NA	1	1	1	1	1	1
With Ave 21	3	NA	NA	1	NA	1	1	1	1	1

Table S-4, Continued
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				
	East Chowchilla Design Option	West Chowchilla Design Option	West Chowchilla Design Option	East Chowchilla Design Option	West Chowchilla Design Option	Le Grand	Le Grand	East of Le Grand	Mission Ave Design Options	Le Grand	East of Le Grand
VISUAL AND AESTHETIC RESOURCES											
Construction-Period Impacts – No differentiating significant construction-period impacts between alternatives											
Project Impacts											
Number of landscape units with decreased visual quality.											
North-South Alignment	2	2	1	1	1	4	4	4	4	4	4
With Ave 24	3	3	NA	NA	2	5	5	5	5	5	5
With Ave 21	3	NA	2	2	NA	5	5	5	5	5	5
CULTURAL AND PALEONTOLOGICAL RESOURCES											
Construction-Period Impacts											
Number of prehistoric and historic-era archaeological resources affected during construction-period											
North-South Alignment	9	7	5	5	5	5	5	5	5	5	5
With Ave 24	10	10	NA	NA	6	6	6	6	6	6	6
With Ave 21	10	NA	5	5	NA	6	6	6	6	6	6

Table S-4, Continued
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			
	East Chowchilla Design Option	West Chowchilla Design Option	West Chowchilla Design Option	East Chowchilla Design Option	West Chowchilla Design Option	Le Grand	East of Le Grand	Mariposa Way Design Options	Mission Ave Design Options	East of Le Grand
Project Impacts										
Number of Historically Significant Built-Environment Resources Affected During Construction-Period										
North-South Alignment	13	13	11	11	11	11	11	11	11	11
With Ave 24	15	15	NA	NA	13	13	13	13	13	13
With Ave 21	14	NA	12	12	NA	12	12	12	12	12
REGIONAL GROWTH – NO SIGNIFICANT IMPACTS										
<p>^a Important Farmlands includes Prime Farmland, Farmland of Statewide Importance, Unique Farmland, and Farmland of Local Importance</p> <p>^b Biological resources effects are based on habitat- level evaluation because surveys were only conducted on properties where access was permitted. Habitat-level evaluations are conservative because they present potentially suitable habitat.</p>										

Table S-5
 Comparison of Potential Adverse Effects of HST Alternatives

Impact	HST Alternatives			Mitigation Measure	CEQA Level of Significance after Mitigation
	UPRR/ SR 99	BNSF	Hybrid		
TRANSPORTATION					
Construction-Period Impacts – NONE					
Project Impacts					
TR#1: Permanent road closures.	20 to 29	27 to 42	30 to 37	TR-MM#1: Maintain access for property owners.	Less than significant
TR#2: Fresno Area between Herndon Avenue and Shaw Avenue intersection impacts.	X	X	X	TR-MM#3, TR-MM#4, TR-MM#5, TR-MM#6, TR-MM#7, TR-MM#8, TR-MM#10: These mitigation measures propose to improve intersections, traffic lights, and lane movement.	Less than significant
TR#3: Fresno Area between Herndon Avenue and Shaw Avenue roadway impacts.	X	X	X	TR-MM#11: Add lanes to the segment.	Less than significant
TR#4: SR 99 relocation freeway impacts.	X	X	X	TR-MM#2: Add southbound auxiliary lane to SR 99.	Less than significant
TR#5: SR 99 relocation intersection impacts.	X	X	X	TR-MM#4, TR-MM#5, TR-MM#7, TR-MM#8: These mitigation measures propose to add traffic lights improve intersections, and add exclusive turn lanes.	Less than significant
TR#6: HST Station area roadway impacts. Merced – 6 segments (Option A) 8 segments (Option B) Fresno – 2 segments	X	X	X	TR-MM#11: Add lanes to the segment.	Less than significant
TR#7: HST Station area intersection impacts.	X	X	X	TR-MM#11: Add lanes to the segment.	Less than significant

Table S-5, continued
 Comparison of Potential Adverse Effects of HST Alternatives

Impact	HST Alternatives			Mitigation Measure	CEQA Level of Significance after Mitigation
	UPRR/ SR 99	BNSF	Hybrid		
Construction-Period Impacts					
AQ#1: Construction of the HST alternatives would exceed the CEQA emissions thresholds for VOC and NO _x . Therefore, it could potentially cause violations of NO ₂ and O ₃ air quality standards or contribute substantially to NO ₂ and O ₃ existing or projected air quality violations.	X	X	X	AQ-MM#2: Reduce VOC emissions from paint. AQ-MM#4: Reduce criteria exhaust emissions from construction equipment. AQ-MM#5: Reduce criteria exhaust emissions from on-road construction equipment.	Significant for VOC and NO _x
AQ#2: Construction of the HST alternatives would exceed the CEQA emissions thresholds for PM ₁₀ and PM _{2.5} . Therefore, it could potentially cause violations of PM ₁₀ air quality standards or contribute substantially to existing or projected PM ₁₀ violations.	X	X	X	AQ-MM#1: Reduce fugitive dust by watering. AQ-MM#3: Reduce fugitive dust from material hauling. AQ-MM#4: Reduce criteria exhaust emissions from construction equipment. AQ-MM#5: Reduce criteria exhaust emissions from on-road construction equipment.	Significant for PM ₁₀ Significant for PM _{2.5} (only in 2013)
AQ#3: Material hauling outside the SJVAB would exceed CEQA emission thresholds for NO _x in the BAAQMD, East Kern APCD, Mojave Desert AQMD, and the SCAQMD for certain hauling scenarios. Therefore, it could potentially cause violations of NO ₂ and O ₃ air quality standards or contribute substantially to NO ₂ and O ₃ existing or projected air quality violations in those air districts.	X	X	X	AQ-MM#5: Reduce criteria exhaust emissions from on-road construction equipment AQ-MM#9: Purchase offsets for emissions associated with hauling ballast material in Mojave Desert AQMD and the SCAQMD.	Significant and unavoidable for NO _x in the East Kern APCD and the BAAQMD. Less than significant for NO _x in the Mojave Desert AQMD and the SCAQMD

Table S-5, continued
 Comparison of Potential Adverse Effects of HST Alternatives

Impact	HST Alternatives			Mitigation Measure	CEQA Level of Significance after Mitigation
	UPRR/ SR 99	BNSF	Hybrid		
AQ#4: Construction of the HST alternatives would exceed the CEQA emissions thresholds for VOC and NO _x . Therefore, it would conflict with the 1-hour Ozone Attainment Plan and the 8-hour Ozone Attainment Plan.	X	X	X	AQ-MM#2: Reduce VOC emissions from paint. AQ-MM#4: Reduce criteria exhaust emissions from construction equipment. AQ-MM#5: Reduce criteria exhaust emissions from on-road construction equipment.	Significant for VOC and NO _x
AQ#5: Construction of the HST alternatives would exceed the CEQA emissions thresholds for PM ₁₀ and PM _{2.5} . Therefore, it would conflict with the PM ₁₀ Maintenance Plan and the PM _{2.5} Attainment Plan.	X	X	X	AQ-MM#1: Reduce fugitive dust by watering. AQ-MM#3: Reduce fugitive dust from material hauling. AQ-MM#4: Reduce criteria exhaust emissions from construction equipment. AQ-MM#5: Reduce criteria exhaust emissions from on-road construction equipment.	Significant for PM ₁₀ and PM _{2.5}
AQ#6: Construction of the alignment may expose sensitive receptors to temporary substantial pollutant concentrations.	X	X	X	AQ-MM#4: Reduce criteria exhaust emissions from construction equipment. AQ-MM#8: Reduce the potential impact of concrete batch plants.	Less than significant
Project Impacts					
AQ#7: Operation of the HMF (Castle Commerce Center, Gordon-Shaw, and Kojima Development HMF sites) may expose sensitive receptors to substantial TAC pollutant concentrations. Significant for TAC.	X	X	X	AQ-MM#6: Reduce the potential impact of toxics. AQ-MM#7: Reduce the potential impact of stationary sources.	Less than significant
AQ#8: Operation of the HMF may cause the total PM ₁₀ and PM _{2.5} ambient concentrations to exceed CAAQS due to the existing	X	X	X	AQ-MM#7: Reduce the potential impact of stationary sources.	Significant

Table S-5, continued
 Comparison of Potential Adverse Effects of HST Alternatives

Impact	HST Alternatives			Mitigation Measure	CEQA Level of Significance after Mitigation
	UPRR/ SR 99	BNSF	Hybrid		
exceedances in the area. Significant for PM ₁₀ and PM _{2.5} .					
NOISE AND VIBRATION					
Construction-Period Impacts					
N&V#1: Construction noise.	X	X	X	N&V-MM#1: Construction noise mitigation measures.	Less than significant
N&V#2: Construction vibration.	X	X	X	N&V-MM#2: Construction vibration mitigation measures.	Less than significant
Project Impacts					
N&V#3: Severe operational noise impacts.	X	X	X	N&V-MM#3: Implement noise and vibration mitigation guidelines. N&V-MM#4: Vehicle noise specification. N&V-MM#5: Special trackwork at crossovers and turnouts. N&V-MM#6: Additional noise analysis following final design.	Significant in some locations as decided in coordination with local communities Less than significant where fully mitigated
N&V#4: Operational vibration impacts.	0	0 to 1 (East of Le Grand design option only)	0	N&V-MM#7: Implement noise and vibration mitigation guidelines.	Significant if mitigation is not feasible
ELECTROMAGNETIC FIELDS AND ELECTROMAGNETIC INTERFERENCE					
Construction-Period Impacts – NONE					
Project Impacts					
EMF/EMI#1: Effects on workers with implanted medical devices.	X	X	X	EMF/EMI-MM#1: Protect workers with implanted medical devices.	Less than significant
PUBLIC UTILITIES AND ENERGY					
Construction-Period Impacts – NONE					
Project Impacts					
PUE#1: Conflicts with	1 (Ave 21 Wye)	1 to 2	1 to 2	PUE-MM#1: Redesign project	Less than

Table S-5, continued
 Comparison of Potential Adverse Effects of HST Alternatives

Impact	HST Alternatives			Mitigation Measure	CEQA Level of Significance after Mitigation
	UPRR/ SR 99	BNSF	Hybrid		
existing substation.	only)			features to avoid substations. PUE-MM#2: Move existing substation.	significant
BIOLOGICAL RESOURCES AND WETLANDS					
Construction Impacts					
Plant Communities and Land Cover Types					
Bio#1: Construction of the HST alternatives would introduce noxious weeds.	X	X	X	Bio-MM#4: Prepare and implement a weed control plan. Bio-MM#5: Prepare and implement a biological resources management plan.	Less than significant
Bio#2: Construction of the HST alternatives would disturb Great Valley mixed riparian forest and other riparian habitat.	X	X	X	AQ-MM#1, AQ-MM#3, Bio-MM#4, Bio-MM#5, Bio-MM#6, Bio-MM#7, Bio-MM#8, Bio-MM#10, Bio-MM#15, WR-MM#1, WR-MM#2: These mitigation measures propose to reduce dust, prepare weed control and biological resources management plans, and restore temporary impacts.	Less than significant
Special-Status Plants					
Bio#3: Construction of the HST alternatives would disturb suitable habitat that has the potential to support special-status plant species.	X	X	X	AQ-MM#1: Reduce fugitive dust by watering. AQ-MM#3: Reduce fugitive dust from material hauling. Bio-MM#14: Develop post-construction compliance reports. Bio-MM#17: Conduct pre-construction surveys for special-status plant species. Bio-MM#18: Prepare and implement a plan for salvage, relocation, and/or propagation of special-status plant species. WR-MM#1: Construction stormwater pollution prevention plan.	Significant

Table S-5, continued
 Comparison of Potential Adverse Effects of HST Alternatives

Impact	HST Alternatives			Mitigation Measure	CEQA Level of Significance after Mitigation
	UPRR/ SR 99	BNSF	Hybrid		
Special-Status Wildlife – Invertebrates					
Bio#4: Construction of the HST alternatives would disturb suitable habitat that has the potential to support vernal pool branchiopods.	X	X	X	AQ-MM#1, AQ-MM#3, Bio-MM#4, Bio-MM#5, Bio-MM#6, Bio-MM#7, Bio-MM#8, Bio-MM#10, Bio-MM#12, Bio-MM#14, Bio-MM#19, Bio-MM#20, Bio-MM#21, WR-MM#1, WR-MM#2: These mitigation measures propose to reduce dust, prepare weed control and biological resources management plans, reduce impacts on vernal pools, and restore temporary impacts.	Significant
Bio#5: Construction of the HST alternatives would disturb suitable habitat that has the potential to support the valley elderberry longhorn beetle.	X	X	X	AQ-MM#1, AQ-MM#3, Bio-MM#3, Bio-MM#4, Bio-MM#5, Bio-MM#6, Bio-MM#7, Bio-MM#8, Bio-MM#10, Bio-MM#11, Bio-MM#12, Bio-MM#13, Bio-MM#14, Bio-MM#22, Bio-MM#23, Bio-MM#24, WR-MM#1: These mitigation measures propose to reduce dust, prepare weed control and biological resources management plans, reduce impacts on sensitive wildlife species, and restore temporary impacts.	Less than significant
Special-Status Wildlife – Amphibians					
Bio#6: Construction of the HST alternatives would disturb California tiger salamander habitat.	X	X	X	AQ-MM#1, AQ-MM#3, Bio-MM#3, Bio-MM#4, Bio-MM#5, Bio-MM#6, Bio-MM#7, Bio-MM#8, Bio-MM#9, Bio-MM#10, Bio-MM#11, Bio-MM#12, Bio-MM#13, Bio-MM#14, Bio-MM#15, Bio-MM#19, Bio-MM#20, Bio-MM#21, Bio-MM#23, Bio-MM#24, WR-MM#1, WR-MM#2: These mitigation measures propose to reduce dust, prepare weed control and biological resources management plans,	Less than significant

Table S-5, continued
 Comparison of Potential Adverse Effects of HST Alternatives

Impact	HST Alternatives			Mitigation Measure	CEQA Level of Significance after Mitigation
	UPRR/ SR 99	BNSF	Hybrid		
				reduce impacts on vernal pools, reduce impacts on sensitive wildlife species, and restore temporary impacts.	
Bio#7: Construction of the HST alternatives would disturb western spadefoot toad habitat.	X	X	X	AQ-MM#1, AQ-MM#3, Bio-MM#3, Bio-MM#4, Bio-MM#5, Bio-MM#6, Bio-MM#7, Bio-MM#8, Bio-MM#9, Bio-MM#10, Bio-MM#12, Bio-MM#13, Bio-MM#14, Bio-MM#15, Bio-MM#19, Bio-MM#20, Bio-MM#21, Bio-MM#24, WR-MM#1, WR-MM#2: These mitigation measures propose to reduce dust, prepare weed control and biological resources management plans, reduce impacts on vernal pools, reduce impacts on sensitive wildlife species, and restore temporary impacts.	Less than significant
Special-Status Wildlife – Reptiles					
Bio#8: Construction of the HST alternatives would disturb habitat that supports the western pond turtle.	X	X	X	Bio-MM#3, Bio-MM#4, Bio-MM#5, Bio-MM#6, Bio-MM#7, Bio-MM#8, Bio-MM#10, Bio-MM#12, Bio-MM#13, Bio-MM#14, Bio-MM#15, Bio-MM#22, Bio-MM#25, Bio-MM#26, Bio-MM#27, Bio-MM#43, Bio-MM#44, WR-MM#1, WR-MM#2: These mitigation measures propose to prepare weed control and biological resources management plans, reduce impacts on vernal pools, reduce impacts on sensitive wildlife species, and restore temporary impacts.	Less than significant
Special-Status Wildlife – Fish					
Bio#9: Construction of the HST alternatives would disturb special-status fish due to the potential for turbidity,	X	X	X	Bio-MM#3, Bio-MM#5, Bio-MM#7, Bio-MM#8, Bio-MM#10, Bio-MM#12, Bio-MM#14, Bio-MM#15, WR-MM#1, WR-MM#2:	Less than significant

Table S-5, continued
 Comparison of Potential Adverse Effects of HST Alternatives

Impact	HST Alternatives			Mitigation Measure	CEQA Level of Significance after Mitigation
	UPRR/ SR 99	BNSF	Hybrid		
sediment deposition, and noise exposure.				These mitigation measures propose to prepare a biological resources management plan and restore temporary impacts.	
Special-Status Wildlife – Birds and Raptors					
Bio#10: Construction of the HST alternatives would disturb nesting Swainson's hawk.	X	X	X	AQ-MM#1, AQ-MM#3, Bio-MM#3, Bio-MM#5, Bio-MM#7, Bio-MM#8, Bio-MM#10, Bio-MM#12, Bio-MM#13, Bio-MM#14, Bio-MM#28, Bio-MM#30, Bio-MM#31, Bio-MM#32, Bio-MM#33: These mitigation measures propose to reduce dust, prepare a biological resources management plan, require pre-construction surveys, and restore temporary impacts.	Less than significant
Bio#11: Construction of the HST alternatives would disturb breeding birds, including raptors.	X	X	X	AQ-MM#1, AQ-MM#3, Bio-MM#3, Bio-MM#5, Bio-MM#7, Bio-MM#8, Bio-MM#10, Bio-MM#12, Bio-MM#13, Bio-MM#13, Bio-MM#14, Bio-MM#28, Bio-MM#29, Bio-MM#30: These mitigation measures propose to reduce dust, prepare a biological resources management plan, and require pre-construction surveys.	Less than significant
Bio#12: Construction of the HST alternatives would disturb or cause the loss of burrowing owls and their habitat.	X	X	X	AQ-MM#1, AQ-MM#3, Bio-MM#3, Bio-MM#5, Bio-MM#7, Bio-MM#8, Bio-MM#10, Bio-MM#13, Bio-MM#14, Bio-MM#34, Bio-MM#35: These mitigation measures propose to reduce dust, prepare a biological resources management plan, and require protocol surveys for burrowing owls.	Significant

Table S-5, continued
 Comparison of Potential Adverse Effects of HST Alternatives

Impact	HST Alternatives			Mitigation Measure	CEQA Level of Significance after Mitigation
	UPRR/ SR 99	BNSF	Hybrid		
Special-Status Wildlife – Mammals					
Bio#13: Construction of the HST alternatives would disturb breeding or nonbreeding bats.	X	X	X	Bio-MM#5, Bio-MM#7, Bio-MM#8, Bio-MM#10, Bio-MM#12, Bio-MM#13, Bio-MM#14, Bio-MM#36, Bio-MM#37, Bio-MM#38: These mitigation measures propose to prepare a biological resources management plan, conduct pre-construction surveys, and reduce impacts on bat species.	Less than significant
Bio#14: Construction of the HST alternatives would disturb American badger dens.	X	X	X	Bio-MM#3, Bio-MM#5, Bio-MM#8, Bio-MM#10, Bio-MM#11, Bio-MM#12, Bio-MM#13, Bio-MM#39, Bio-MM#40, Bio-MM#43, Bio-MM#44: These mitigation measures propose to prepare a biological resources management plan, conduct pre-construction surveys, and reduce impacts on American badgers.	Less than significant
Bio#15: Construction of the HST alternatives would disturb San Joaquin kit fox dens.	X	X	X	Bio-MM#3, Bio-MM#5, Bio-MM#7, Bio-MM#8, Bio-MM#10, Bio-MM#11, Bio-MM#12, Bio-MM#13, Bio-MM#14, Bio-MM#41, Bio-MM#42, Bio-MM#43, Bio-MM#44: These mitigation measures propose to prepare a biological resources management plan, conduct pre-construction surveys, and reduce impacts on San Joaquin kit fox.	Less than significant

Table S-5, continued
 Comparison of Potential Adverse Effects of HST Alternatives

Impact	HST Alternatives			Mitigation Measure	CEQA Level of Significance after Mitigation
	UPRR/ SR 99	BNSF	Hybrid		
Special-Status Plant Communities					
Bio#16: Construction of the HST alternatives would temporarily convert special-status plant communities (e.g., Great Valley mixed riparian forest, coastal and valley freshwater marsh, vernal pools).	X	X	X	AQ-MM#1, AQ-MM#3, Bio-MM#4, Bio-MM#5, Bio-MM#6, Bio-MM#7, Bio-MM#8, Bio-MM#10, Bio-MM#15, Bio-MM#16, Bio-MM#19, Bio-MM#20, Bio-MM#21, WR-MM#1, WR-MM#2: These mitigation measures propose to reduce dust, prepare weed control and biological resources management plans, and conduct pre-construction surveys.	Less than significant
Jurisdictional Waters					
Bio#17: Construction of the HST alternatives would have indirect impacts on jurisdictional waters.	X	X	X	AQ-MM#1, AQ-MM#3, Bio-MM#3, Bio-MM#4, Bio-MM#5, Bio-MM#6, Bio-MM#7, Bio-MM#8, Bio-MM#10, Bio-MM#15, Bio-MM#19, Bio-MM#20, Bio-MM#21, Bio-MM#43, Bio-MM#44, WR-MM#1, WR-MM#2: These mitigation measures propose to reduce dust, prepare weed control and biological resources management plans, conduct pre-construction surveys, reduce impacts on vernal pools, and restore temporary impacts.	Less than significant
Critical Habitat					
Bio#18: Construction of the HST alternatives would disturb critical habitat.	X	X	X	AQ-MM#1, AQ-MM#3, Bio-MM#14, Bio-MM#15, Bio-MM#17, Bio-MM#18, Bio-MM#19, Bio-MM#20, Bio-MM#21, Bio-MM#43, Bio-MM#44, WR-MM#1, WR-MM#2: These mitigation measures propose to reduce dust, prepare a biological resources management plan, conduct pre-construction surveys, restore	Significant

Table S-5, continued
 Comparison of Potential Adverse Effects of HST Alternatives

Impact	HST Alternatives			Mitigation Measure	CEQA Level of Significance after Mitigation
	UPRR/ SR 99	BNSF	Hybrid		
				temporary impacts, and reduce impacts on vernal pools and jurisdictional waters.	
Essential Fish Habitat					
Bio#19: Construction of the HST alternatives would disturb Essential Fish Habitat.	X	X	X	AQ-MM#1, AQ-MM#3, Bio-MM#3, Bio-MM#5, Bio-MM#6, Bio-MM#7, Bio-MM#8, Bio-MM#10, Bio-MM#14, Bio-MM#15, WR-MM#1, WR-MM#2: These mitigation measures propose to reduce dust, prepare a biological resources management plan, conduct pre-construction surveys, and restore temporary impacts.	Less than significant
Mitigation Banks/Reserves					
Bio#20: Construction of the BNSF Alternative would disturb portions of the Great Valley Conservation Bank.		X		Bio-MM#15, Bio-MM#17, Bio-MM#18, Bio-MM#19, Bio-MM#20, Bio-MM#21, Bio-MM#43: These mitigation measures propose to conduct pre-construction surveys and restore temporary impacts.	Significant
Bio#21: Construction of the HST alternatives would disturb Camp Pashayan (San Joaquin River Ecological Reserve).	X	X	X	Bio-MM#15, Bio-MM#17, Bio-MM#18, Bio-MM#19, Bio-MM#20, Bio-MM#21, Bio-MM#43: These mitigation measures propose to conduct pre-construction surveys and restore temporary impacts.	Significant
Bio#22: Construction of the HST alternatives during the construction period would act as a barrier to free-ranging mammal movement within the ECA and modeled wildlife corridors.	X	X	X	Bio-MM#45: Implement wildlife corridor undercrossing. Bio-MM#46: Install wildlife fencing. Bio-MM#47: Construction in wildlife movement corridors.	Significant

Table S-5, continued
Comparison of Potential Adverse Effects of HST Alternatives

Impact	HST Alternatives			Mitigation Measure	CEQA Level of Significance after Mitigation
	UPRR/ SR 99	BNSF	Hybrid		
Project Impacts					
Plant Communities and Land Cover Types					
Bio#23: Project impacts from the HST alternatives would permanently convert Great Valley mixed riparian forest and other riparian habitat. (Coastal Valley Freshwater Marsh and vernal pools addressed in Bio#2.)	X	X	X	Bio-MM#4, Bio-MM#14, Bio-MM#48, Bio-MM#55, Bio-MM#56, Bio-MM#57: These mitigation measures propose to prepare a weed control plan, and a habitat mitigation and monitoring plan, and to compensate for permanent impacts.	Significant
Special-Status Plant Species					
Bio#24: Project impacts from the HST alternatives would permanently convert suitable habitat that has the potential to support special-status plant species.	X	X	X	Bio-MM#4, Bio-MM#14, Bio-MM#49, Bio-MM#50, Bio-MM#55, Bio-MM#56, Bio-MM#57: These mitigation measures propose to prepare a weed control plan and a habitat mitigation and monitoring plan, and to compensate for permanent impacts.	Significant
Special-Status Wildlife – Invertebrates					
Bio#25: Project impacts from the HST alternatives would permanently convert suitable habitat that has the potential to support vernal pool branchiopods.	X	X	X	Bio-MM#14, Bio-MM#55, Bio-MM#56, Bio-MM#57: These mitigation measures propose to prepare a habitat mitigation and monitoring plan and compensate for permanent impacts.	Significant
Bio#26: Project impacts from the HST alternatives would permanently convert suitable habitat that has the potential to support valley elderberry longhorn beetle.	X	X	X	Bio-MM#4, Bio-MM#14, Bio-MM#50: These mitigation measures propose to prepare a weed control plan, and a habitat mitigation and monitoring plan, and to compensate for permanent impacts	Less than significant

Table S-5, continued
 Comparison of Potential Adverse Effects of HST Alternatives

Impact	HST Alternatives			Mitigation Measure	CEQA Level of Significance after Mitigation
	UPRR/ SR 99	BNSF	Hybrid		
Special-Status Wildlife – Amphibians					
Bio#27: Project impacts from the HST alternatives would permanently convert suitable habitat that has the potential to support California tiger salamander.	X	X	X	Bio-MM#4, Bio-MM#14, Bio-MM#51, Bio-MM#55, Bio-MM#56, Bio-MM#57: These mitigation measures propose to prepare a weed control plan and a habitat mitigation and monitoring plan, and to compensate for permanent impacts.	Less than significant
Bio#28: Project impacts from the HST alternatives would permanently convert suitable habitat that has the potential to support western spadefoot toad.	X	X	X	Bio-MM#4, Bio-MM#14, Bio-MM#51, Bio-MM#55, Bio-MM#56, Bio-MM#57: These mitigation measures propose to prepare a weed control plan, and a habitat mitigation and monitoring plan, and to compensate for permanent impacts.	Less than significant
Special-Status Wildlife – Reptiles					
Bio#29: Project impacts from the HST alternatives would permanently convert suitable habitat that has the potential to support western pond turtle.	X	X	X	Bio-MM#4, Bio-MM#14, Bio-MM#48, Bio-MM#55, Bio-MM#56, Bio-MM#57: These mitigation measures propose to prepare a weed control plan and a habitat mitigation and monitoring plan, and to compensate for permanent impacts.	Less than significant
Special-Status Wildlife – Fish					
Bio#30: Project impacts from the HST alternatives would permanently convert suitable habitat that has the potential to support special-status fish.	X	X	X	Bio-MM#4, Bio-MM#14, Bio-MM#48, Bio-MM#55, Bio-MM#56, Bio-MM#57: These mitigation measures propose to prepare a weed control plan and a habitat mitigation and monitoring plan, and to compensate for permanent impacts.	Less than significant

Table S-5, continued
 Comparison of Potential Adverse Effects of HST Alternatives

Impact	HST Alternatives			Mitigation Measure	CEQA Level of Significance after Mitigation
	UPRR/ SR 99	BNSF	Hybrid		
Special-Status Wildlife – Birds and Raptors					
Bio#31: Project impacts from the HST alternatives would permanently convert suitable habitat that has the potential to support nesting Swainson’s hawk.	X	X	X	Bio-MM#4, Bio-MM#14, Bio-MM#48, Bio-MM#52, Bio-MM#55, Bio-MM#56, Bio-MM#57, Bio-MM#60: These mitigation measures propose to prepare a weed control plan and a habitat mitigation and monitoring plan, and to compensate for permanent impacts.	Less than significant
Bio#32: Project impacts from the HST alternatives would permanently convert suitable habitat that has the potential to support burrowing owls.	X	X	X	Bio-MM#53: Compensate for loss of burrowing owl foraging and breeding habitat.	Significant
Bio#33: Project impacts from the HST alternatives would permanently convert suitable habitat that has the potential to support breeding birds, including raptors and burrowing owls.	X	X	X	Bio-MM#4, Bio-MM#14, Bio-MM#48, Bio-MM#52, Bio-MM#53, Bio-MM#55, Bio-MM#56, Bio-MM#57, Bio-MM#60: These mitigation measures propose to prepare a weed control plan, and a habitat mitigation and monitoring plan, and to compensate for permanent impacts.	Less than significant
Special-Status Wildlife – Mammals					
Bio#34: Project impacts from the HST alternatives would permanently convert suitable habitat that has the potential to support special-status bats.	X	X	X	Bio-MM#4, Bio-MM#14, Bio-MM#48, Bio-MM#55, Bio-MM#56, Bio-MM#57: These mitigation measures propose to prepare a weed control plan and a habitat mitigation and monitoring plan, and to compensate for permanent impacts.	Less than significant

Table S-5, continued
 Comparison of Potential Adverse Effects of HST Alternatives

Impact	HST Alternatives			Mitigation Measure	CEQA Level of Significance after Mitigation
	UPRR/ SR 99	BNSF	Hybrid		
Bio#35: Project impacts from the HST alternatives would permanently convert suitable habitat that has the potential to support American badger dens.	X	X	X	Bio-MM#4: Prepare and implement a weed control plan. Bio-MM#58: Wildlife corridor artificial dens. Bio-MM#59: Monitor and report at wildlife corridor undercrossings. N&V-MM#3: Install noise barriers.	Less than significant
Bio#36: Project impacts from the HST alternatives would permanently convert suitable habitat that has the potential to support San Joaquin kit fox dens.	X	X	X	Bio-MM#4: Prepare and implement a weed control plan. Bio-MM#54: Compensate for destruction of natal dens. Bio-MM#58: Wildlife corridor artificial dens. Bio-MM#59: Monitor and report at wildlife corridor undercrossings. N&V-MM#3: Installation of noise barriers.	Less than significant
Special-Status Plant Communities					
Bio#37: Project impacts from the HST alternatives would permanently convert special-status plant communities. (Great Valley Mixed Riparian and other riparian addressed in Bio#22.)	X	X	X	Bio-MM#14, Bio-MM#48, Bio-MM#50, Bio-MM#55, Bio-MM#56, Bio-MM#57: These mitigation measures propose to prepare a habitat mitigation and monitoring plan and to compensate for permanent impacts.	Significant
Jurisdictional Waters					
Bio#38: Project impacts from the HST alternatives would permanently convert jurisdictional waters.	X	X	X	Bio-MM#14, Bio-MM#48, Bio-MM#55, Bio-MM#56, Bio-MM#57: These mitigation measures propose to prepare a habitat mitigation and monitoring plan and to compensate for permanent impacts.	Significant

Table S-5, continued
 Comparison of Potential Adverse Effects of HST Alternatives

Impact	HST Alternatives			Mitigation Measure	CEQA Level of Significance after Mitigation
	UPRR/ SR 99	BNSF	Hybrid		
Critical Habitat					
Bio#39: Project impacts from the HST alternatives would include critical habitat for vernal pool species.	X	X	X	Bio-MM#14, Bio-MM#48, Bio-MM#49, Bio-MM#55, Bio-MM#56, Bio-MM#57: These mitigation measures propose to prepare a habitat mitigation and monitoring plan and to compensate for permanent impacts.	Significant
Essential Fish Habitat					
Bio#40: Project impacts from the HST alternatives would require construction in Essential Fish Habitat.	X	X	X	Construction period mitigation measures address impacts associated with Essential Fish Habitat. There would be no impacts related to project impacts.	Less than significant
Mitigation Banks/Reserves					
Bio#41: All of the HST alternatives would affect Camp Pashayan (within the San Joaquin River Ecological Reserve).	X	X	X	PC-MM#1: Compensate for staging in park property for construction. PP-MM#1: Acquire park property.	Significant
Bio#42: Project impacts from the BNSF Alternative would affect portions of the Great Valley Conservation Bank.		X		Bio-MM#48, Bio-MM#49, Bio-MM#55, Bio-MM#56, Bio-MM#57, PC-MM#1, PP-MM#1: These mitigation measures propose to prepare a habitat mitigation and monitoring plan and compensate for permanent impacts.	Significant
Wildlife Movement Corridors					
Bio#43: Project impacts from the HST alternatives would permanently reduce the functionality of wildlife corridors such as Eastman Lake-Bear Creek ECA.	X	X	X	Bio-MM#4, Bio-MM#55, Bio-MM#56, Bio-MM#57, Bio-MM#58, Bio-MM#59, N&V-MM#3: These mitigation measures propose to prepare a weed control plan and a habitat mitigation and monitoring plan, and to compensate for permanent impacts, and install noise barriers.	Significant

Table S-5, continued
Comparison of Potential Adverse Effects of HST Alternatives

Impact	HST Alternatives			Mitigation Measure	CEQA Level of Significance after Mitigation
	UPRR/ SR 99	BNSF	Hybrid		
Bio#44: Project impacts from the HST alternatives would permanently impact modeled wildlife corridor linear features, including the Berenda Slough and other riparian corridors.	X	X	X	Bio-MM#4, Bio-MM#55, Bio-MM#56, Bio-MM#57, Bio-MM#58, Bio-MM#59, N&V-MM#3: These mitigation measures propose to prepare a weed control plan and a habitat mitigation and monitoring plan, and to compensate for permanent impacts, and install noise barriers.	Significant
HYDROLOGY AND WATER RESOURCES – NONE					
GEOLOGY, SOILS, AND SEISMICITY – NONE					
HAZARDOUS MATERIALS AND WASTES					
Construction-Period Impacts					
HMW#1: Potential for handling extremely hazardous materials within 0.25 mile of a school.	15 schools	12 to 13 schools	12 to 14 schools	HMW-MM#1: No use of extremely hazardous substances or a mixture thereof in a quantity equal to or greater than the state threshold quantity (Health and Safety Code Section 25532) within 0.25 mile of a school.	Less than significant
Project Impacts – NONE					
SAFETY AND SECURITY					
Construction-Period Impacts – NONE					
Project Impacts					
S&S#1: Ave 24 Wye connecting to the BNSF Alternative (Road 21 overpass) presents security risk to correctional facilities.		X (with Ave 24 Wye)		S&S-MM#1: Revise design to eliminate security risk.	Less than significant
S&S#2: Increased demand for fire, rescue, and emergency services at stations and HMFs.	X	X	X	S&S-MM#2: Negotiate fair-share impact fee, if necessary.	Less than significant

Table S-5, continued
 Comparison of Potential Adverse Effects of HST Alternatives

Impact	HST Alternatives			Mitigation Measure	CEQA Level of Significance after Mitigation
	UPRR/ SR 99	BNSF	Hybrid		
SOCIOECONOMICS, COMMUNITIES, AND ENVIRONMENTAL JUSTICE					
Construction-Period Impacts – NONE					
Project Impacts					
SO#1: Displacement of a community facility. All of the HST alternatives would result in the acquisition of a homeless shelter in the City of Merced.	X	X	X	SO-MM#4: Replace community facilities. SO-MM#5: Continue outreach to disproportionately and negatively affected environmental justice communities of concern.	Less than significant
STATION PLANNING, LAND USE, AND DEVELOPMENT – NONE					
AGRICULTURAL LANDS					
Construction-Period Impacts – NONE					
Project Impacts					
AG#1: Permanent conversion of agricultural land to nonagricultural use.	1,037 to 1,158 acres	1,411 to 1,481 acres	1,291 to 1,420 acres	Ag-MM#1: Preserve the total amount of prime farmland, farmland of statewide importance, farmland of local importance, and unique farmland.	Significant
Ag#2: Permanent conversion of agricultural land from parcel splits.	Least	Most	Between UPRR/SR 99 and BNSF	Ag-MM#2: Consolidate non-economic remnants and create a farmland consolidation program.	Significant
PARKS, RECREATION, AND OPEN SPACE					
Construction-Period Impacts					
PK#1: Sharon Avenue Linear Park (City of Madera) temporary closure. At Sharon Avenue Linear Park, the UPRR/SR 99 Alternative would require temporary closure of the park during construction, including temporary access restrictions.	X			PK-MM#1: Compensate for staging on park property for construction.	Significant

Table S-5, continued
 Comparison of Potential Adverse Effects of HST Alternatives

Impact	HST Alternatives			Mitigation Measure	CEQA Level of Significance after Mitigation
	UPRR/SR 99	BNSF	Hybrid		
<p>PK#2: Road 27¾ Park (City of Madera) construction use.</p> <p>At Road 27¾ Linear Park, the UPRR/SR 99 Alternative would require temporary closure of the park during construction.</p>	X			<p>PK-MM#1: Compensate for staging on park property for construction.</p>	Significant
<p>PK#3: Camp Pashayan (City of Fresno).</p> <p>At Camp Pashayan, all three HST alternatives would (1) require temporary use during construction, (2) result in similar visual changes because of the use of construction equipment, (3) decrease the visual buffer from the adjacent UPRR right-of-way because of the removal of vegetation, and (4) generate similar noise and dust, and possible access restrictions because of construction activities in adjacent areas of the park.</p>	X	X	X	<p>PK-MM#1: Compensate for staging on park property for construction.</p>	Less than significant
Project Impacts					
<p>PK#4: Riverside Park (City of Madera).</p> <p>At Riverside Park, the UPRR/SR 99 Alternative would permanently acquire 0.4 acre of area at the west end of the park.</p>	X			<p>PK-MM#1: Acquire park property.</p>	Less than significant

Table S-5, continued
 Comparison of Potential Adverse Effects of HST Alternatives

Impact	HST Alternatives			Mitigation Measure	CEQA Level of Significance after Mitigation
	UPRR/ SR 99	BNSF	Hybrid		
<p>PK#5: County Road 27¾ Linear Park (City of Madera).</p> <p>At County Road 27¾ Linear Park, the UPRR/SR 99 Alternative would acquire 1.0 acre of area for the alignment.</p>	X			<p>PK-MM#1: Acquire park property.</p>	Significant
<p>PK#6: Camp Pashayan Park.</p> <p>At Camp Pashayan, all three HST alternatives would acquire 0.6 acre of park area for support columns and easement for elevated structure.</p>	X	X	X	<p>PK-MM#3: Property Acquisition for Camp Pashayan.</p>	Less than significant
<p>PK#7: Roeding Park (City of Fresno).</p> <p>At Roeding Park, all three HST alternatives would have noise impacts on the eastern portions of the park.</p>	X	X	X	<p>PK-MM#4: Address noise at Roeding Park with City of Fresno.</p>	Less than significant
AESTHETICS AND VISUAL RESOURCES					
Construction-Period Impacts					
<p>VQ#1: Visual disturbance during construction.</p> <p>For all HST alternatives, construction activities would cause visual impacts in urban areas.</p>	X	X	X	<p>VQ-MM#1: Minimize visual disruption from construction.</p>	Less than significant

Table S-5, continued
 Comparison of Potential Adverse Effects of HST Alternatives

Impact	HST Alternatives			Mitigation Measure	CEQA Level of Significance after Mitigation
	UPRR/ SR 99	BNSF	Hybrid		
<p>VQ#2: Nighttime lighting during construction.</p> <p>Nighttime lighting annoyance would be more frequent under the UPRR/SR 99 Alternative, although all alternatives would affect Merced and Fresno urban areas.</p>	X	X	X	<p>VQ-MM#2: Minimize light disturbance.</p>	Less than significant
Project Impacts					
<p>VQ#3-10: Lower visual quality.</p> <p>Number of landscape units with decreased visual quality:</p>	3	5	2	<p>One or more of the following, depending on landscape unit:</p> <p>VQ-MM#3: Incorporate design criteria for elevated and station elements that can be adapted to the local context.</p> <p>VQ-MM#3a: Integrate an elevated guideway into the City of Madera's parks, trails, and urban core designs.</p> <p>VQ-MM#3b: Construct elevated guideways adjacent to residential areas.</p> <p>VQ-MM#4: Replant unused portions of lands acquired for the HST.</p> <p>VQ-MM#5: Use landscape treatments along the HST project overcrossings and retained fill elements of the HST.</p>	Significant
<p>VQ#11: Sound barrier would block views.</p> <p>All of the HST alternatives would require the use of sound barriers along the guideway equally in urbanized areas, potentially blocking existing views.</p>	X	X	X	<p>VQ-MM#6: Provide sound-barrier treatments.</p>	Significant

Table S-5, continued
 Comparison of Potential Adverse Effects of HST Alternatives

Impact	HST Alternatives			Mitigation Measure	CEQA Level of Significance after Mitigation
	UPRR/ SR 99	BNSF	Hybrid		
<p>VQ#12: Traction power distribution stations would alter the visual character or block views.</p> <p>All of the HST alternatives would require the placement of stations at approximately 30-mile intervals along the alignment, which would potentially alter the visual character of adjacent lands and/or block views toward areas beyond the alignment, depending on the size and location of the stations.</p>	X	X	X	VQ-MM#7: Screen traction power distribution stations.	Less than significant
CULTURAL AND PALEONTOLOGICAL RESOURCES					
Construction-Period Impacts					
<p>Arch#1: Effect on significant prehistoric and historic-era archaeological resources during construction.</p>	11	6	6	<p>Arch-MM#1: Conduct archaeological training.</p> <p>Arch-MM#2: Perform data recovery as required by the Draft Programmatic Agreement.</p> <p>Arch-MM#3: Plan an intentional site burial or avoidance for preservation in place.</p> <p>Arch-MM#4: Halt work in the event of an archaeological discovery.</p>	Less than significant
<p>Pale#2: Effect on paleontological resources during construction.</p>	Least	Most	Between UPRR/ SR 99 and BNSF	<p>Pale-MM#1: Engage a paleontological resources specialist to direct monitoring during construction.</p> <p>Pale-MM#2: Prepare and implement a PRMMP.</p> <p>Pale-MM#3: Halt construction when paleontological resources are found.</p>	Less than significant

Table S-5, continued
 Comparison of Potential Adverse Effects of HST Alternatives

Impact	HST Alternatives			Mitigation Measure	CEQA Level of Significance after Mitigation
	UPRR/ SR 99	BNSF	Hybrid		
<p>Hist#3: Effect on historically significant built-environment resources during construction.</p> <p>Resources listed or eligible for the NRHP (Section 106):</p> <p>Historical resources (CEQA):</p>	7	8	5	<p>Hist-MM#1: Avoid adverse vibration effects.</p> <p>Hist-MM#2: Develop protection and stabilization measures.</p> <p>Hist-MM#3: Minimize impact through relocation of historic structures.</p> <p>Hist-MM#4: Prepare and submit NRHP nominations.</p> <p>Hist-MM#5: Prepare and submit CRHR nominations.</p> <p>Hist-MM#6: Prepare and submit HABS/HAER/HALS documentation.</p> <p>Hist-MM#7: Prepare historic structure reports.</p> <p>Hist-MM#8: Prepare interpretive exhibits.</p> <p>Hist-MM#9: Plan the repair of inadvertent damage.</p>	Significant
Project Impacts – NONE					
REGIONAL GROWTH - NONE					

Table S-6
 HMF Alternative Differentiating Environmental Impacts

Impact	HMF Alternatives					Mitigation Measure	CEQA Level of Significance after Mitigation
	Castle Commerce Center	Harris-DeJager	Fagundes	Gordon-Shaw	Kojima Development		
TRANSPORTATION							
Construction-Period Impacts - NONE							
Project Impacts							
<p>TR#8: HMF site intersection impacts.</p> <p>Number of intersections:</p>	22 to 25	1	4	5	6	<p>TR-MM#3, TR-MM#4, TR-MM#5, TR-MM#6, TR-MM#7, TR-MM#8, TR-MM#9:</p> <p>These mitigation measures propose to improve intersections, traffic lights, and lane movement.</p>	Less than significant
AIR QUALITY AND GLOBAL CLIMATE CHANGE							
Construction-Period Impacts - NONE							
Project Impacts							
<p>AQ#7: Operation of the HMF (Castle Commerce Center, Gordon-Shaw, and Kojima Development HMF sites) may expose sensitive receptors to substantial TAC pollutant concentrations.</p> <p>Significant for TAC.</p>	X			X	X	<p>AQ-MM#6: Reduce the potential impact of toxics.</p> <p>AQ-MM#7: Reduce the potential impact of stationary sources.</p>	Less than significant
<p>AQ#8: Operation of the HMF may cause the total PM₁₀ and PM_{2.5} ambient concentrations to exceed CAAQS due to the existing exceedances in the area.</p> <p>Significant for PM₁₀ and PM_{2.5}.</p>	X	X	X	X	X	<p>AQ-MM#7: Reduce the potential impact of stationary sources.</p>	Significant

Table S-6, Continued
 HMF Alternative Differentiating Environmental Impacts

Impact	HMF Alternatives					Mitigation Measure	CEQA Level of Significance after Mitigation
	Castle Commerce Center	Harris-DeJager	Fagundes	Gordon-Shaw	Kojima Development		
NOISE AND VIBRATION – NONE							
ELECTROMAGNETIC FIELDS AND ELECTROMAGNETIC INTERFERENCE – NONE							
PUBLIC UTILITIES AND ENERGY – NONE							
BIOLOGICAL RESOURCES AND WETLANDS							
Construction-Period Impacts - NONE							
Project Impacts							
Bio#45: Project impacts from the Harris-DeJager HMF site would permanently affect the Eastman Lake-Bear Creek ECA.		X				Bio-MM#4, Bio-MM#14, Bio-MM#55, Bio-MM#56, Bio-MM#57, Bio-MM#58, Bio-MM#59, N&V-MM#3: These mitigation measures propose to prepare a weed control plan, prepare a habitat mitigation and monitoring plan, compensate for permanent impacts, and install noise barriers.	Significant
Bio#46: Project impacts from the Kojima Development HMF site would permanently affect the Berenda Slough riparian corridor.					X	Bio-MM#4, Bio-MM#55, Bio-MM#56, Bio-MM#57, Bio-MM#58, Bio-MM#59, N&V-MM#3: These mitigation measures propose to prepare a weed control plan, prepare a habitat mitigation and monitoring plan, compensate for permanent impacts, and install noise barriers.	Significant
HYDROLOGY AND WATER RESOURCES – NONE							

Table S-6, Continued
 HMF Alternative Differentiating Environmental Impacts

Impact	HMF Alternatives					Mitigation Measure	CEQA Level of Significance after Mitigation
	Castle Commerce Center	Harris-DeJager	Fagundes	Gordon-Shaw	Kojima Development		
GEOLOGY, SOILS, AND SEISMICITY – NONE							
HAZARDOUS MATERIALS AND WASTES – NONE							
SAFETY AND SECURITY – NONE							
SOCIOECONOMICS, COMMUNITIES, AND ENVIRONMENTAL JUSTICE							
Construction-Period Impacts - NONE							
Project Impacts							
<p>SO#2: Division of Merced Estates Mobile Home Park.</p> <p>The Castle Commerce Center HMF guideway would bisect an existing mobile home community, displacing approximately 50% of the homes.</p>	X					<p>SO-MM#2: Develop a relocation mitigation plan.</p> <p>SO-MM#3: Implement measures to reduce impacts associated with the division of existing communities.</p> <p>SO-MM#5: Continue outreach to disproportionately and negatively affected environmental justice communities of concern.</p> <p>SO-MM#6: Investigate avoidance of displacements or consider other replacement housing options in Franklin-Beachwood, Le Grand, and Fairmead.</p>	Significant
<p>SO#3: Displacement of community facilities.</p> <p>The guideway between the Castle Commerce Center HMF and the Downtown Merced Station would require the acquisition of three</p>	X					<p>SO-MM#2: Develop a relocation mitigation plan.</p> <p>SO-MM#4: Avoid or replace community facilities.</p> <p>SO-MM#5: Continue outreach to disproportionately and negatively affected environmental justice communities of concern.</p>	Less than significant

Table S-6, Continued
 HMF Alternative Differentiating Environmental Impacts

Impact	HMF Alternatives					Mitigation Measure	CEQA Level of Significance after Mitigation
	Castle Commerce Center	Harris-DeJager	Fagundes	Gordon-Shaw	Kojima Development		
community facilities.							
STATION PLANNING, LAND USE, AND DEVELOPMENT – NONE							
AGRICULTURAL LANDS							
Construction-Period Impacts - NONE							
Project Impacts							
<p>AG#1: Permanent conversion of agricultural land to non-agricultural use.</p> <p>Acreage converted:</p>	114 acres	313 acres	168 acres	313 acres	246 acres	<p>Ag-MM#1: Preserve the total amount of prime farmland, farmland of statewide importance, farmland of local importance, and unique farmland.</p> <p>Ag-MM#2: Consolidate non-economic remnants and create a farmland consolidation program.</p>	Significant
PARKS, RECREATION, AND OPEN SPACE							
Construction-Period Impacts - NONE							
Project Impacts							
<p>PK#8: Joe Stefani Elementary School.</p> <p>At Joe Stefani Elementary School, an HMF at Castle Commerce Center would require acquisition of the entire school property (14.5 acres) for project construction.</p>	X					<p>PM-MM#1: Acquire park property.</p>	Significant
AESTHETICS AND VISUAL RESOURCES – NONE							
CULTURAL AND PALEONTOLOGICAL RESOURCES – NONE							
REGIONAL GROWTH - NONE							