S Summary

S.1 Introduction and Background

The California High-Speed Rail Authority (Authority), a state governing board, was formed in 1996 with the responsibility of planning, designing, constructing, and operating a California high-speed rail (HSR) system that coordinates with the state's existing transportation network—intercity rail and bus lines, regional commuter rail lines, urban rail and bus transit lines, highways, and airports. The California High-Speed Rail System will provide intercity, high-speed service on 800 miles of track throughout California, connecting the major population centers of Sacramento, the San Francisco Bay Area (Bay Area), the Central Valley, Los Angeles, the Inland Empire, Orange County, and San Diego. Figure S-1 shows this system. It will use electrically powered, high-speed, steel-wheel-on-steel-rail technology, and will incorporate state-of-the-art, safety, signaling, and automated train control systems to enable trains to travel up to 220 miles per hour (mph) over a dedicated track alignment. When completed, the system will provide new passenger rail service to more than 90 percent of the state's population, providing more than 200 weekday trains to serve the statewide intercity travel market.

High-Speed Rail System

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

Per the Authority's *2016 Business Plan Ridership and Revenue Forecasting* report (Authority 2016a),[1] the Authority plans to implement the California High-Speed Rail System in two phases. Phase 1[2] 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 extend the system from Merced to connect the Central Valley to the state capitol of Sacramento and will extend the system from Los Angeles to San Diego.

As part of the Merced to Fresno Section of the statewide HSR system, the Central Valley Wye would create the HSR connection between the San Jose to Merced Section to the west and the north-south portion of the Merced to Fresno Section to the east. A total of four Central Valley Wye alternatives are evaluated in the *Merced to Fresno Section: Central Valley Wye Draft Supplemental Environmental Impact Report (EIR)/Environmental Impact Statement (EIS)* (Draft Supplemental EIR/EIS). Figure S-2 shows the Central Valley Wye alternatives, including required electrical interconnection facilities (traction power substations, switching stations, and parallel stations). Network upgrades are proposed that would connect the Central Valley Wye to the statewide electrical grid's existing facilities owned by Pacific Gas & Electric to serve the increased electrical load from implementation of the HSR system.

[1] The Authority released the Draft 2018 Business Plan (Authority 2018) for public review and comment on Friday, March 9th for a mandatory 60-day public review and comment period before Board adoption of the plan on May 15th 2018. The 2018 Business Plan continues the vision of the 2016 Business Plan in delivering the initial Silicon Valley to Central Valley Line, which includes the Merced to Fresno Section: Central Valley Wye, and refines and updates the project delivery schedule and ridership projections provided in the 2016 Business Plan.

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

Source: Authority, 2016c

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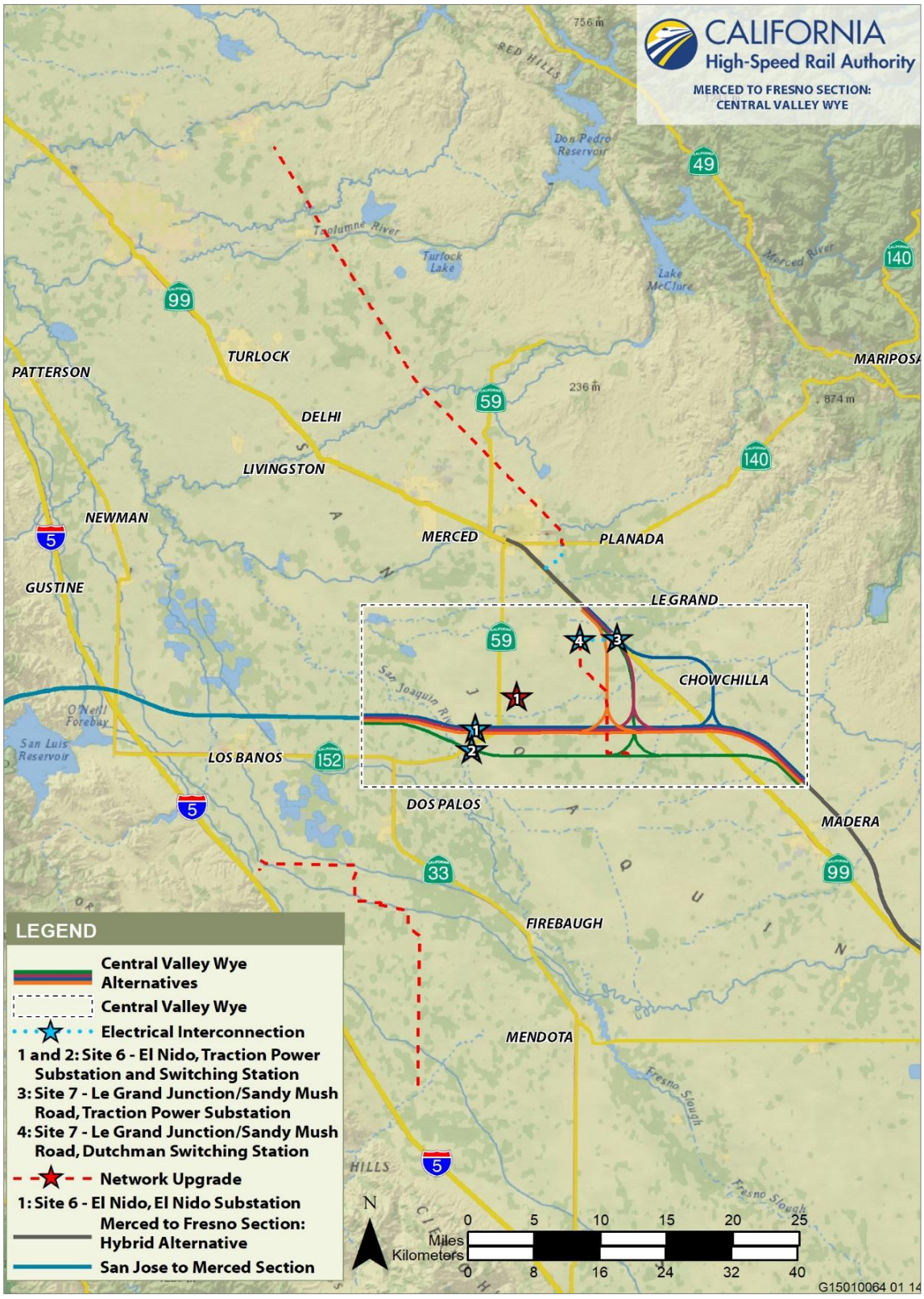
Figure S-1 California High-Speed Rail Statewide System



Source: Authority and FRA, 2016

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Figure S-2 Central Valley Wye Alternatives

This summary presents an overview of the Draft Supplemental EIR/EIS, specifically presenting:

- The Draft Supplemental EIR/EIS as part of the tiered environmental review
- The issues raised during public outreach on the Draft Supplemental EIR/EIS
- The purpose of and need for the HSR system and the Merced to Fresno Section, including the Central Valley Wye
- A description of the Central Valley Wye alternatives and the No Project Alternative
- The impact avoidance and minimization features (IAMF) incorporated into the design of each Central Valley Wye alternative
- The No Project Alternative impacts
- The Central Valley Wye alternatives evaluation, including:
  - Benefits, comparison of impacts, and mitigation measures
  - Section 4(f) and Section 6(f) property impacts
  - Environmental justice community benefits and impacts
  - Capital costs of the Central Valley Wye alternatives
- Areas of controversy
- Next steps in the environmental review process, including identification of a Preferred Alternative
- Project implementation

The full text of the environmental analysis in the Draft Supplemental EIR/EIS is available on the Authority's website at: http://hsr.ca.gov/Programs/Environmental_Planning/supplemental_merced_fresno.html.

S.2 The Draft Supplemental EIR/EIS as Part of Tiered Environmental Review

The Council on Environmental Quality (CEQ) regulations establish procedures for compliance with the National Environmental Policy Act (NEPA) (42 United States Code [U.S.C.] § 4321 et seq.). The CEQ regulations allow a phased process, known as *tiering.* This phased decisionmaking process supports a broad-level programmatic decision using a first-tier EIS. This first tier process is followed by more specific decisions at the second tier, with one or more second-tier EISs. The NEPA tiering process allows incremental decisionmaking for large projects that would be too extensive and cumbersome to analyze in one traditional project EIS. The California Environmental Quality Act (CEQA) (Public Resources Code 21000 et seq.) also encourages tiering and provides for first-tier and second-tier EIRs.

Sequence of California HSR Tiered Environmental Documents

1st Tier/Program Documents

- Final Program EIR/EIS for the Proposed California High-Speed Train System **(2005)**
- San Francisco Bay Area to Central Valley High-Speed Train Final Program EIR/EIS **(2008)**
- Bay Area to Central Valley High-Speed Train Revised Final Program EIR **(2010)**
- Bay Area to Central Valley High-Speed Train Partially Revised Final Program EIR **(2012)**

2nd Tier/Project Documents

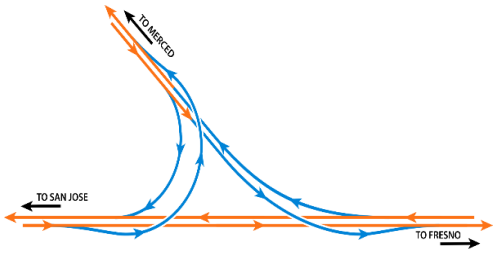
- Merced to Fresno Section Final EIR/EIS **(2012)**
- Merced to Fresno Section: Central Valley Wye Draft Supplemental EIR/EIS **(this document)**

The Authority and the Federal Railroad Administration (FRA) prepared the 2005 *Final Program EIR/EIS for the Proposed California High-Speed Train System* (Statewide Program EIR/EIS) (Authority and FRA 2005), which provided a first-tier analysis of the general effects of implementing the HSR system across two-thirds of the state. The 2008 *Bay Area to Central Valley High-Speed Train Final Program EIR/EIS* (Bay Area to Central Valley EIR/EIS) (Authority and FRA 2008) and the Authority's 2012 *Bay Area to Central*

Valley High-Speed Train Partially Revised Final Program EIR (Authority 2012) were also first-tier, programmatic documents, but they focused on the Bay Area to Central Valley region. These first-tier EIR/EIS documents provided the Authority and FRA with the environmental analysis necessary to evaluate the overall HSR system and make broad decisions about general HSR alignments and station locations for further study in the second-tier EIR/EISs. These documents are available on the Authority's website: http://hsr.ca.gov/Programs/Environmental_Planning/.

The *Merced to Fresno Section California High-Speed Train Final EIR/EIS* (Merced to Fresno Final EIR/EIS) (Authority and FRA 2012) was a second-tier EIR/EIS; it provided project-level information for decisionmaking on the Merced to Fresno Section of the HSR system. The Merced to Fresno EIR/EIS identified the Hybrid Alternative[3] as the preferred alternative, for the north/south alignment of the high-speed rail, and examined two design options for an east-west connection to the San Jose to Merced Section, referred to as the *wye connection* (Authority and FRA 2012: pages 2-3, 2-21). Figure S-2 shows the Merced to Fresno Section: Hybrid Alternative, and more detail is provided in Chapter 1, Introduction and Purpose, Need, and Objectives, in the Draft Supplemental EIR/EIS.

What Is a "Wye"?



The term wye refers to the Y-like formation that is created at the point where the train tracks branch off the mainline to continue in different directions.

The Authority Board of Directors certified the Merced to Fresno Final EIR/EIS under CEQA on May 3, 2012, and filed a Notice of Determination on May 4, 2012. The FRA issued a Record of Decision (ROD) on September 18, 2012, and the Surface Transportation Board (STB) issued a ROD on June 13, 2013. Although approvals by the Authority Board of Directors and FRA identified the Merced to Fresno Section: Hybrid Alternative as the preferred alternative, for the north/south alignment of the high-speed rail, these approvals deferred a decision on the area known as the "wye connection", that is, the east-west high-speed rail connection between the San Jose to Merced Section to the west and the north-south Merced to Fresno Section to the east, for additional environmental analysis.

This document, the Draft Supplemental EIR/EIS, is the next step in the environmental review process to select a wye connection. The Draft Supplemental EIR/EIS evaluates the impacts and benefits of implementing the wye connection alternatives in the more geographically limited area of the wye connection between the Cities of Merced and Madera and is based on additional project planning and engineering that has occurred over the last several years. The analysis therefore builds on the earlier decisions and program EIR/EISs while providing more site-specific analysis.

For the HSR system, including the Central Valley Wye alternatives, the FRA is the lead federal agency for compliance with NEPA and other federal laws. The Authority is the project sponsor and state lead agency under NEPA, as well as the state lead agency under CEQA. There are three cooperating agencies included in the NEPA review process. The U.S. Army Corps of Engineers (USACE) agreed by letter, dated December 30, 2009, to be a cooperating agency under NEPA. The STB, by letter dated May 2, 2013, is also a cooperating agency under NEPA. The U.S. Bureau of Reclamation.

S.3 Issues Raised during Public Outreach on the Draft Supplemental EIR/EIS

The Authority and FRA developed and implemented a public and agency involvement program as part of the environmental review process for the Merced to Fresno Final EIR/EIS and the Draft Supplemental EIR/EIS. The public and agency program included public involvement and

[3] The Hybrid Alternative consists of the north/south alignment of the high-speed rail within the Merced to Fresno Section connecting the Downtown Merced and Downtown Fresno Mariposa Street station locations.

outreach, agency involvement, and notification and circulation of the Merced to Fresno Final EIR/EIS and the Draft Supplemental EIR/EIS for public review and comment. Public and agency involvement for the Draft Supplemental EIR/EIS started in 2012 following publication of the Merced to Fresno Final EIR/EIS and has continued through publication of the Draft Supplemental EIR/EIS. Refer to Chapter 9, Public and Agency Involvement, of the Merced to Fresno Final EIR/EIS for a summary of activities related to the environmental review process leading up to and including publication of the Merced to Fresno Final EIR/EIS.

During the preparation of the Draft Supplemental EIR/EIS, questions were received from members of the public and interested parties via email, phone calls, public information meetings, and one-on-one discussions with landowners. Some of the most frequently asked questions were related to impacts on property, homes, agricultural lands and operations, local road circulation and access, and the process for selecting the final alignment. Other commonly asked questions included impacts on school transportation, the tax base, and impacts from noise and vibration during construction and future rail operations. The Authority conducted specific outreach efforts to potentially affected minority and/or low-income populations in order to gain input and obtain their comments as part of the public record, and to accurately reflect the setting and potential impacts of the Central Valley Wye alternatives on these communities. These meetings were advertised in Spanish; materials were available in Spanish and on the website; and Spanish-speaking interpreters were available at the meetings.

Public outreach meetings, briefings, presentations, workshops, and webinars were held in the vicinity of the Central Valley Wye throughout the process to determine the Central Valley Wye alternatives. These engagement efforts were attended by stakeholders, including landowners, farmers, residents, organizations, public agencies, and elected officials, who expressed opinions on the selection of a wye alternative. The key themes specific to selection of alternatives, as expressed by these stakeholders, include:

- Preference for alignment along existing transportation corridors.
- Minimization of impacts on the City of Chowchilla.
- Minimization of impacts on valuable agricultural land and irrigation facilities.
- Minimization of impacts on road closures for transportation of farming equipment, school district buses, and general community circulation.

The Authority regularly met with the Farm Bureau Working Group, composed of staff from the Merced and Madera County Farm Bureaus, Chowchilla Water District, and members of Preserve Our Heritage, a local community group. The Authority and FRA also consulted with staff from environmental resource agencies, including the USEPA, U.S. Fish and Wildlife Service, USACE, U.S. Bureau of Reclamation, California Department of Fish and Wildlife, State Water Resources Control Board, Central Valley Flood Protection Board, and other agencies with jurisdiction over or interest in the Central Valley Wye alternatives. During the development of the Draft Supplemental EIR/EIS, the Authority and FRA held meetings to consult with federal, state, and local agencies to provide updates and obtain feedback from these stakeholders. Public information meetings were held to inform the public about the development of alternatives and to provide regular updates on the preparation of the Draft Supplemental EIR/EIS. In addition, these meetings provided information about various HSR project components and served as forums for obtaining feedback. The Authority exchanged communications with Native America tribal representatives during coordination meetings and a project tour, both of which were attended by multiple tribes and tribal representatives.

Notice regarding the availability and circulation of the Draft Supplemental EIR/EIS was provided pursuant to NEPA and CEQA requirements in both English and Spanish. Notice included a publication announcement in newspapers; a letter, information brochure, fact sheet, and notice of availability mailed to those within a 300-foot buffer of all permanent impacts associated with the alignment; a postcard mailed to additional stakeholders; e-mail blasts sent to a distribution list and local and regional elected officials in the Central Valley; a notice of completion indicating the

availability of the Draft Supplemental EIR/EIS filed with the State Clearinghouse and sent to state agencies; a notice of availability for the Draft Supplemental EIR/EIS published by the USEPA in the *Federal Register*; and several dozen notices displayed at businesses and public gathering places, such as post offices and local transit stations in the vicinity of the Central Valley Wye. The Draft Supplemental EIR/EIS was circulated among federal, state, and local agencies, regional transportation agencies, and organizations and persons who had expressed an interest in the Central Valley Wye alternatives. In addition, the Draft Supplemental EIR/EIS is available on the Authority and FRA's websites and electronically upon request. See Chapter 9, Public and Agency Involvement, in the Draft Supplemental EIR/EIS for details on the public and agency involvement program and on the locations and dates of public and agency meetings held as part of this program.

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

S.4.1 Purpose of the HSR System

The purpose of the HSR system is stated as follows:

> *The purpose of the statewide HSR 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 (Authority and FRA 2005).*

S.4.2 Purpose of the Merced to Fresno HSR Section

The purpose of the Merced to Fresno HSR Section is to provide the public with electric-powered HSR service that provides predictable and consistent travel times between major urban centers and connectivity to airports, mass transit systems, and the highway network in the south San Joaquin Valley. The Merced to Fresno Section of the HSR will also connect the northern and southern portions of the system.

The purpose of the wye itself is to connect the Merced to Fresno Section, which runs north-south, to the San Jose to Merced Section, which runs primarily east-west. The two tracks traveling west from the San Jose to Merced Section would connect to a set of two tracks branching north toward Merced and to a set of two tracks branching south toward Fresno.

S.4.3 CEQA Project Objectives for the HSR System in California and in the Central San Joaquin Valley Region

The Authority has responded to its mandate to plan, build, and operate an HSR system that is coordinated with California's existing transportation network. The Authority has adopted the following objectives and policies for the proposed HSR system. These objectives and policies are described in the Merced to Fresno Final EIR/EIS (Authority and FRA 2012: page 1-4) and have been updated to be consistent with *Connecting and Transforming California: 2016 Business Plan* (2016 Business Plan) (Authority 2016b) as follows:

- 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 and generate revenues in excess of operations and maintenance costs.
- Provide intercity travel in a manner sensitive to and protective of the region's natural and agricultural resources and reduce emissions and vehicle miles traveled (VMT) for intercity trips.

The Central Valley Wye alternatives would be an essential part of the statewide HSR system and would serve as a critical link between the Merced to Fresno and San Jose to Merced Sections of the HSR system. The transition of mainline track to a wye requires splitting two tracks into four tracks that cross over one another before the wye legs can diverge in opposite directions to allow two-way travel. In this case, where the San Jose to Merced Section connects with the Merced to Fresno Section, the two east-west tracks of the San Jose to Merced Section must become four tracks—two tracks branching north toward Merced and two tracks branching south toward Fresno.

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

The need for an HSR system exists statewide, with regional needs contributing to this broader need. The Merced to Fresno Section is an essential component of the statewide HSR 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 demand. The current and projected future system congestion will continue to result in deteriorating air quality, reduced reliability, and increased travel times. The current transportation system has not kept pace with the increase in population, economic activity, and tourism within the state, including 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. These transportation systems 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 southern 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 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 San Joaquin Valley region.
- Reduced mobility because 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 because of expanded highways and airports and urban development pressures, including the development pressures within the central part of the San Joaquin Valley region.

Figure S-1 shows the location of the Merced to Fresno Section within the overall HSR system. The region of the Merced to Fresno Section contributes significantly to the statewide need for a new intercity transportation service that will connect it with major population and economic

centers and to other regions of the state. California's major population, economic, and political centers are located on the northern and southern coasts of California and in the Sacramento Valley. Chapter 1 in the Draft Supplemental EIR/EIS provides additional information about factors relevant to intercity travel between Merced, Fresno, the Sacramento Valley, the Bay Area, and Southern California that has been updated since the Merced to Fresno Final EIR/EIS.

S.4.5 HSR Benefits

The HSR would accommodate anticipated population growth and associated travel needs by providing millions of people the option to travel by train rather than by automobile or airline. This document utilizes ridership forecasts consistent with the Authority's 2016 Business Plan (Authority 2016b), which refines and updates the ridership projections from the Authority's Revised 2012 Business Plans. Because population is expected to increase by 51 percent between 2010 and 2040 in the San Joaquin Valley and by 52 percent and 58 percent in Merced and Madera Counties, respectively, there will be a need for additional transit to accommodate this population growth. Along with addressing the capacity constraints of automobile and airline travel, the HSR would improve air quality, reduce congestion, and improve transportation safety and travel time.

While the HSR project would increase electricity consumption in comparison to the No Project Alternative, the HSR project would reduce carbon emissions by providing a cleaner means of travel than auto transportation. An HSR trip from San Francisco to Los Angeles would save 324 pounds of carbon dioxide for each car making the same trip, and a trip between San Jose and Los Angeles would save 288 pounds of carbon dioxide per car. Not only would the HSR project create fewer carbon emissions than the same trips under the No Project Alternative, but it would also be more energy efficient. An HSR trip would use one-third of the energy of a similar trip by airline travel and one-fifth of the energy used by automobile travel on a similar trip (Bay Area Council Economic Institute 2008).

During 2012 to 2040, vehicle miles traveled are expected to increase by 101 percent in Merced County and 133 percent in Madera County (Caltrans 2009; Caltrans 2014). The HSR service from Merced to Fresno would alleviate congestion on the roads, especially with regard to long-distance travel, which is expected to increase by at least 50 percent from 2010 to 2040 (Authority and FRA 2016).

The HSR system would stimulate growth and development around transit centers in central business districts, thereby creating hubs for economic investment (Bay Area Council Economic Institute 2008). HSR train stations are anticipated to become magnets for development because of the attraction they provide by access to high-speed rail. It is also anticipated that property owners and developers could benefit from rising land values near the HSR system because of improved access by companies to their workers, to the quality of life benefits that residents perceive from access to public transit, and to retail activity stimulated by the greater flow of residents and commuters through the station (Bay Area Council Economic Institute 2008). As a result, concentrated development around multimodal centers is expected to reduce future sprawl and could reduce the likelihood of development and land use changes on the periphery of urban areas. In this way, the HSR system would seek to reduce the displacement or loss of valuable agricultural land.

S.5 Alternatives

This section provides an overview of the Central Valley Wye alternatives evaluated in the Draft Supplemental EIR/EIS. Details on the identification of the Central Valley Wye alternatives are included in Chapter 2, Alternatives, in the Draft Supplemental EIR/EIS.

S.5.1 Evaluation and Development of Alternatives

Along with public and agency input from the outreach process, extensive local and agency involvement, stakeholder meetings, and public and agency comments, the Authority relied on information in the following documents to develop the alternatives evaluated in the Draft Supplemental EIR/EIS:

- Statewide Program EIR/EIS (Authority and FRA 2005)
- Bay Area to Central Valley High-Speed Train Program EIR/EIS (Authority and FRA 2008)
- Bay Area to Central Valley High-Speed Train Revised Final Program EIR (Authority 2010)
- Bay Area to Central Valley High-Speed Train Partially Revised Final Program EIR (Authority 2012)
- Merced to Fresno Final EIR/EIS (Authority and FRA 2012)

All the alternatives have been subjected to a thorough screening process, which considered the impacts of the alternatives on the social, natural, and built environment. In addition to the four alternatives, a No Project Alternative was also evaluated.

S.5.2 No Project Alternative

The No Project Alternative considers the impacts that would occur if none of the Central Valley Wye alternatives is approved. Under the No Project Alternative, implementation of current land use and transportation plans in all of Merced and Madera Counties, including all planned improvements to the highway, aviation, conventional passenger rail, and freight rail systems, would continue through the 2040 planning horizon for the environmental analysis, with the exception of the Central Valley Wye alternatives.[4] The No Project Alternative assumes no high-speed rail is constructed in the area of the Central Valley Wye alternatives, but that the construction that is currently underway in the Merced to Fresno section would continue to completion and connect to the adjacent Fresno to Bakersfield section, which is also under construction. The No Project Alternative also assumes that other parts of the Phase 1 HSR System between San Francisco and Los Angeles would be built and operational by 2040, achieving many, but not all, of the benefits of a continuous, 540 mile Phase 1 system. A gap in the Phase 1 HSR System in the wye area, like a gap in the system anywhere else in the state, would reduce the transportation connectivity and environmental benefits of the Phase 1 system as a whole until the gap is eliminated. The No Project Alternative is included in the Draft Supplemental EIR/EIS to allow a qualitative comparison to the impacts of the Central Valley Wye alternatives.[5]

The two-county region of Merced and Madera Counties is projected to grow at a higher rate than California as a whole, and their growth is anticipated at an average of approximately 1.6 percent per year through 2040 (California Department of Finance 2014; U.S. Census Bureau 2010). This growth projection is used to estimate the amount of land needed to accommodate future growth and is used as the basis for comparing impacts of the Central Valley Wye alternatives. It is used as the common growth projection for all the Central Valley Wye alternatives. Additional details on growth and development and related impacts expected to occur under the No Project Alternative are described in Section S.7, No Project Alternative Impacts.

S.5.3 Central Valley Wye Alternatives

The Draft Supplemental EIR/EIS evaluates four Central Valley Wye alternatives: the State Route (SR) 152 (North) to Road 13 Wye, the SR 152 (North) to Road 19 Wye, the Avenue 21 to Road 13 Wye, and the SR 152 (North) to Road 11 Wye. The Authority and FRA have identified the SR 152 (North) to Road 11 Wye alternative as the Preferred Alternative (see Section S10.2, Identification of Preferred Alternative, for more information). The Central Valley Wye alternatives cross Merced and Madera Counties near the city of Chowchilla, Figure S-2 shows the four alternatives analyzed in the Draft Supplemental EIR/EIS and provides details of the associated electrical interconnections and network upgrades.

The four Central Valley Wye alternatives present different routes and characteristics as detailed in Chapter 2 in the Draft Supplemental EIR/EIS and as summarized in Section S.5.4, Central Valley Wye Alternatives Alignments. All four alternatives share common end points to allow for a meaningful comparison of engineering and environmental considerations across all alternatives.

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[4] While electrical network upgrades are proposed in Stanislaus and Fresno Counties, there are no planned Pacific Gas & Electric projects within the study area that would occur if the HSR project was not approved; therefore, the scope of the No Project Alternative is appropriately limited to Merced and Madera Counties.

[5] CEQA requires consideration of a No Project Alternative, whereas NEPA requires consideration of a "No Action Alternative." The No Project Alternative as defined in the Supplemental Draft EIR/EIS serves as both the No Project alternative under CEQA and the No Action Alternative under NEPA.

The shared termini of the alternatives are at Henry Miller Road/Carlucci Road on the west, Ranch Road/SR 99 on the north, and Avenue 19 near Madera Acres on the south. The termini for the Central Valley Wye alternatives extend farther west and north than the limits of the wye design options examined in the Merced to Fresno Final EIR/EIS (Authority and FRA 2012: page 2-25). Table S-1 provides a high-level comparison of key design features associated with each of the alternative alignments being carried forward in the Draft Supplemental EIR/EIS.

Table S-1 Design Features of Alternatives Carried Forward

Design Features	Central Valley Wye Alternatives			
	SR 152 (North) to Road 13 Wye	SR 152 (North) to Road 19 Wye	Avenue 21 to Road 13 Wye	SR 152 (North) to Road 11 Wye
Total length (linear miles)[1]	52	55	53	51
At-grade profile (linear miles)[1]	48.5	48.5	48.5	46.5
Elevated profile (linear miles)[1]	3	3.5	4	4.5
Below-grade profile (linear miles)[1]	0.5	3	0.5	0
Number of straddle bents	32	31	32	27
Number of railroad crossings	1	3	1	1
Number of major water crossings	12	13	11	13
Number of road crossings	62	65	58	57
Approximate number of public roadway closures	38	36	30	33
Number of roadway overcrossings and undercrossings	24	29	28	24
Traction power substation sites	1	2	1	1
Switching stations	1	2	1	1
Paralleling stations	8	7	7	7
Signaling and train-control elements	18	21	15	19
Communication towers	9	6	6	9
Wildlife crossing structures	39	41	44	37

Source: Authority 2016c; BNSF Railway and Union Pacific Railroad 2016

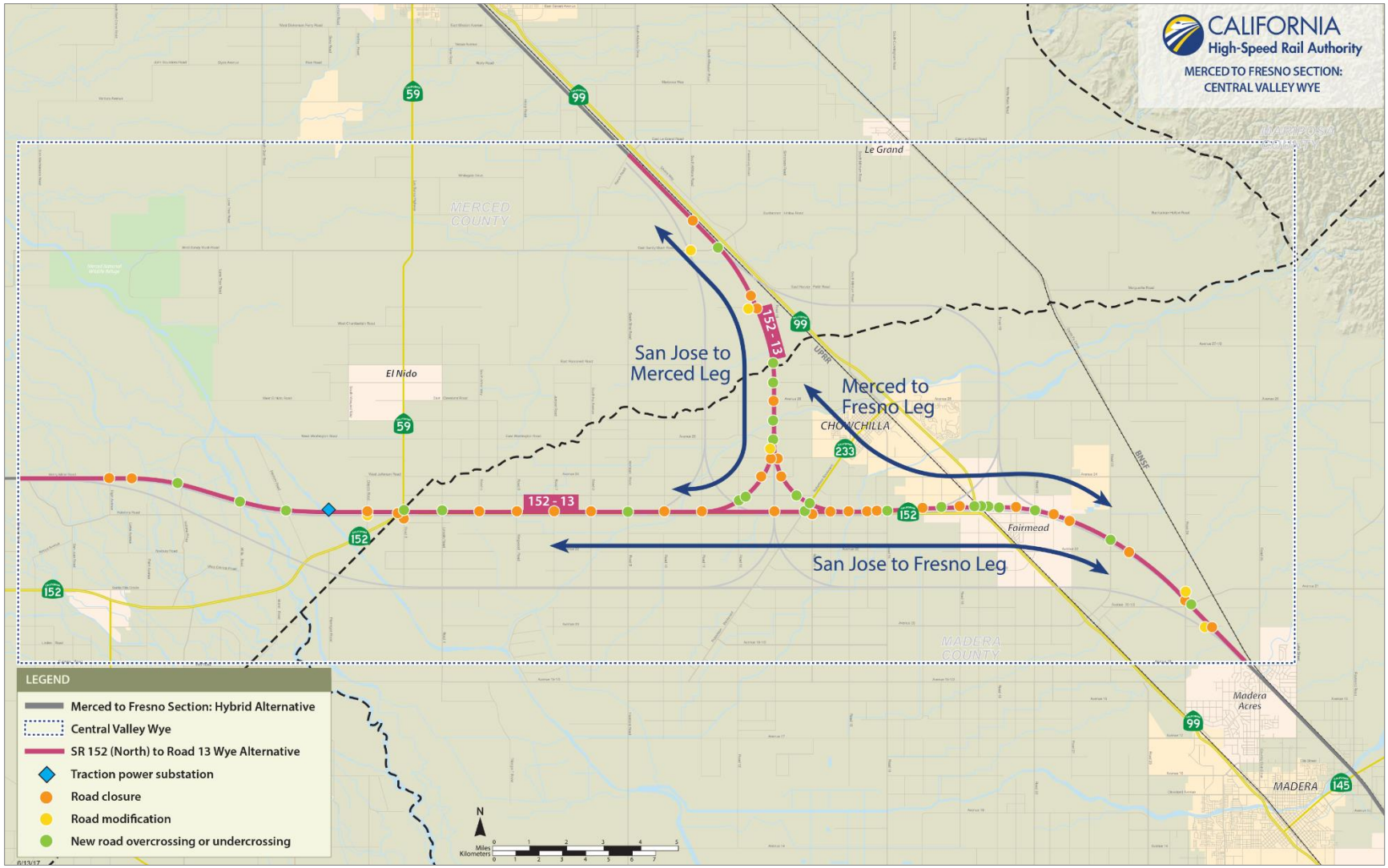
[1]Lengths shown are based on equivalent dual-track alignments and are one-way mileages. For example, the length of single-track elevated structure is divided by a factor of 2 to convert to dual-track equivalents.

S.5.4 Central Valley Wye Alternatives Alignments

Many features of the Central Valley Wye alternatives are common to all four alignments. Project design components, travel times, safety and security procedures, roadway modifications, and railroad modifications are similar for all alternatives. These features are described in Section 2.2.3.6, Features Common to All Central Valley Wye Alternatives, in the Draft Supplemental EIR/EIS. The Central Valley high-speed steel-wheel-on-steel-rail train wye alternatives connecting the two HSR sections (San Jose to Merced and Merced to Fresno) would consist of three legs: San Jose to Fresno (Carlucci Road to Avenue 19), Merced to Fresno (Ranch Road to Avenue 19), and San Jose to Merced (Carlucci Road to Ranch Road). Travel times for these legs would be similar across the Central Valley Wye alternatives (see Chapter 2 in the Draft Supplemental EIR/EIS for anticipated travel times for the Central Valley Wye alternatives).

The SR 152 (North) to Road 13 Wye Alternative (Figure S-3) would extend approximately 52 miles, following the Road 13, SR 99, and BNSF Railway (BNSF) rights-of-way in the north-south direction, while the SR 152 (North) to Road 19 Wye Alternative (Figure S-4) would extend approximately 55 miles, following the Road 19, SR 99, and BNSF rights-of-way in the north-south direction. The Avenue 21 to Road 13 Wye Alternative (Figure S-5) would extend approximately 53 miles, following the existing Henry Miller Road and Avenue 21 rights-of-way as closely as practicable in the east-west direction and the Road 13, SR 99, and BNSF rights-of-way in the north-south direction. The SR 152 (North) to Road 11 Wye Alternative (Figure S-6) would extend approximately 51 miles, following the existing Henry Miller Road and SR 152 rights-of-way as closely as practicable in the east-west direction, and the Road 11, SR 99, and BNSF rights-of-way in the north-south direction.

Some deviations from these existing transportation routes or corridors are necessary to accommodate design requirements; specifically, wider curves are necessary to accommodate the speed of the HSR compared to lower-speed roadway alignments. The alternative alignments would be mostly at grade on raised embankment, although they would also use aerial structures and a short segment of retained cut (depressed alignment). The alternative alignments would not follow existing transportation rights-of-way where they transition from following one transportation corridor to another (Figures S-4 through S-6).



Source: ESRI, 2013; CAL FIRE, 2004; ESRI/National Geographic, 2015

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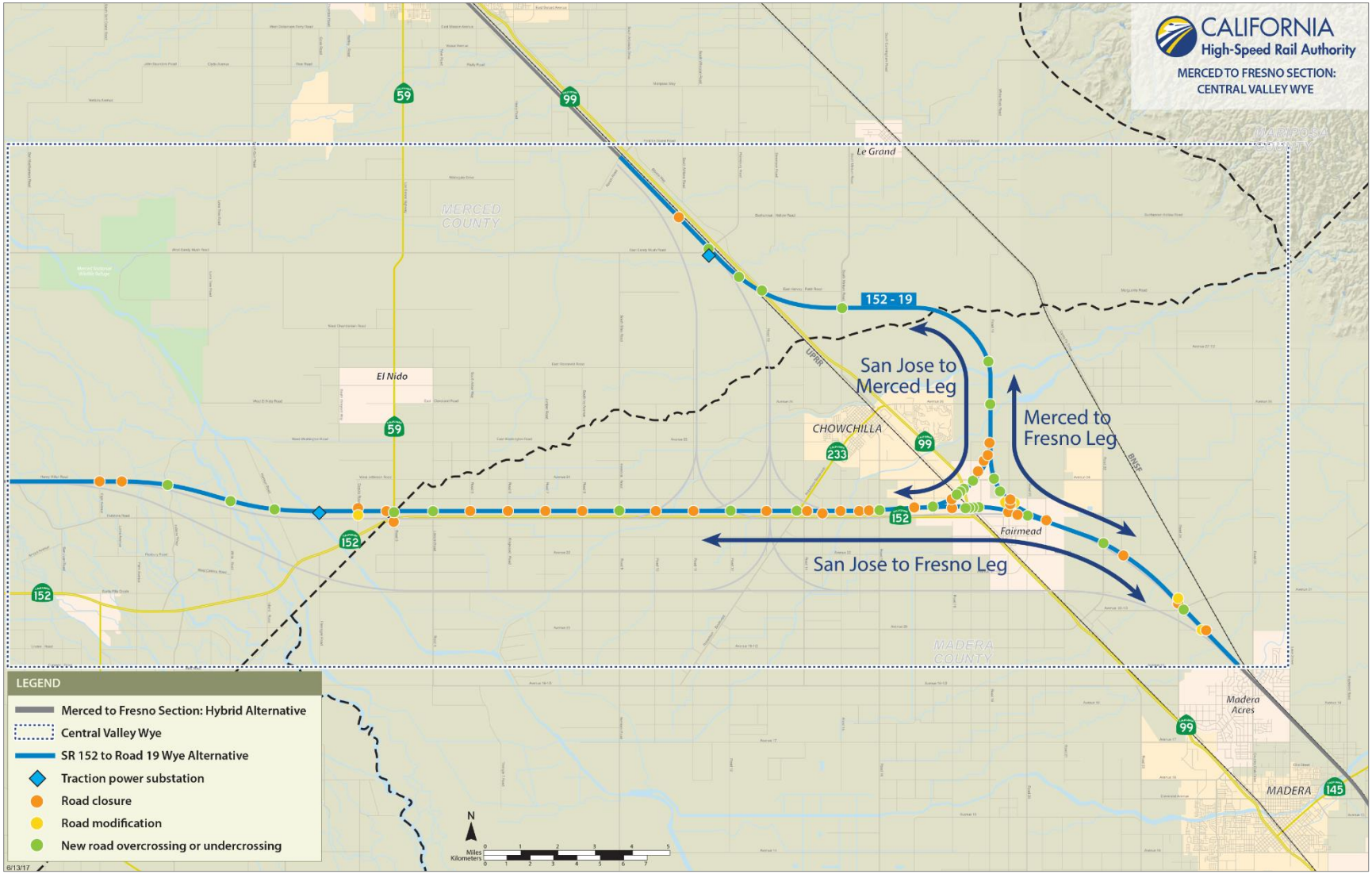
Figure S-3 SR 152 (North) to Road 13 Wye Alternative Alignment and Key Design Features



Source: ESRI, 2013; CAL FIRE, 2004; ESRI/National Geographic, 2015

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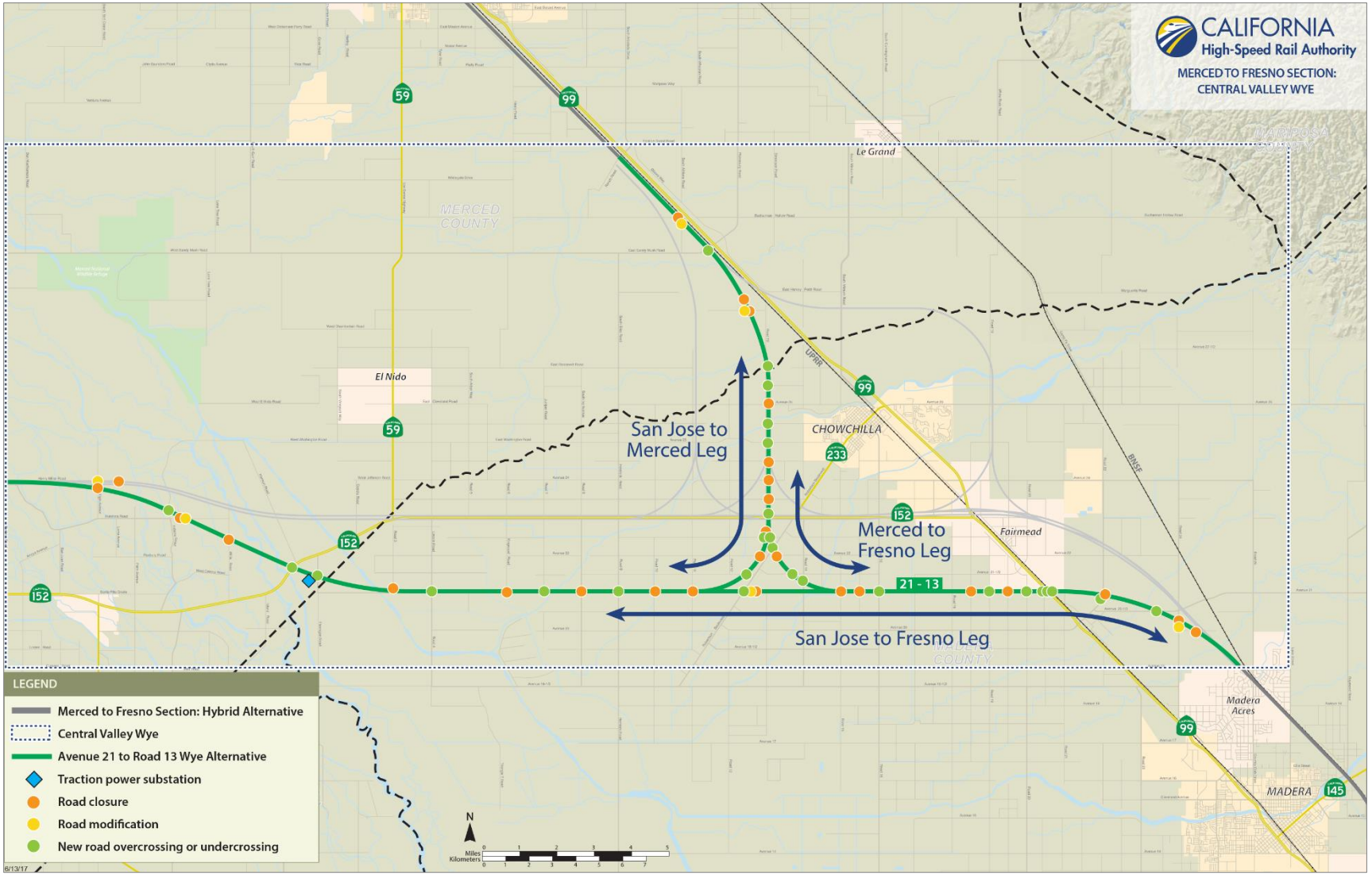
Figure S-4 SR 152 (North) to Road 19 Wye Alternative Alignment and Key Design Features



Source: ESRI, 2013; CAL FIRE, 2004; ESRI/National Geographic, 2015

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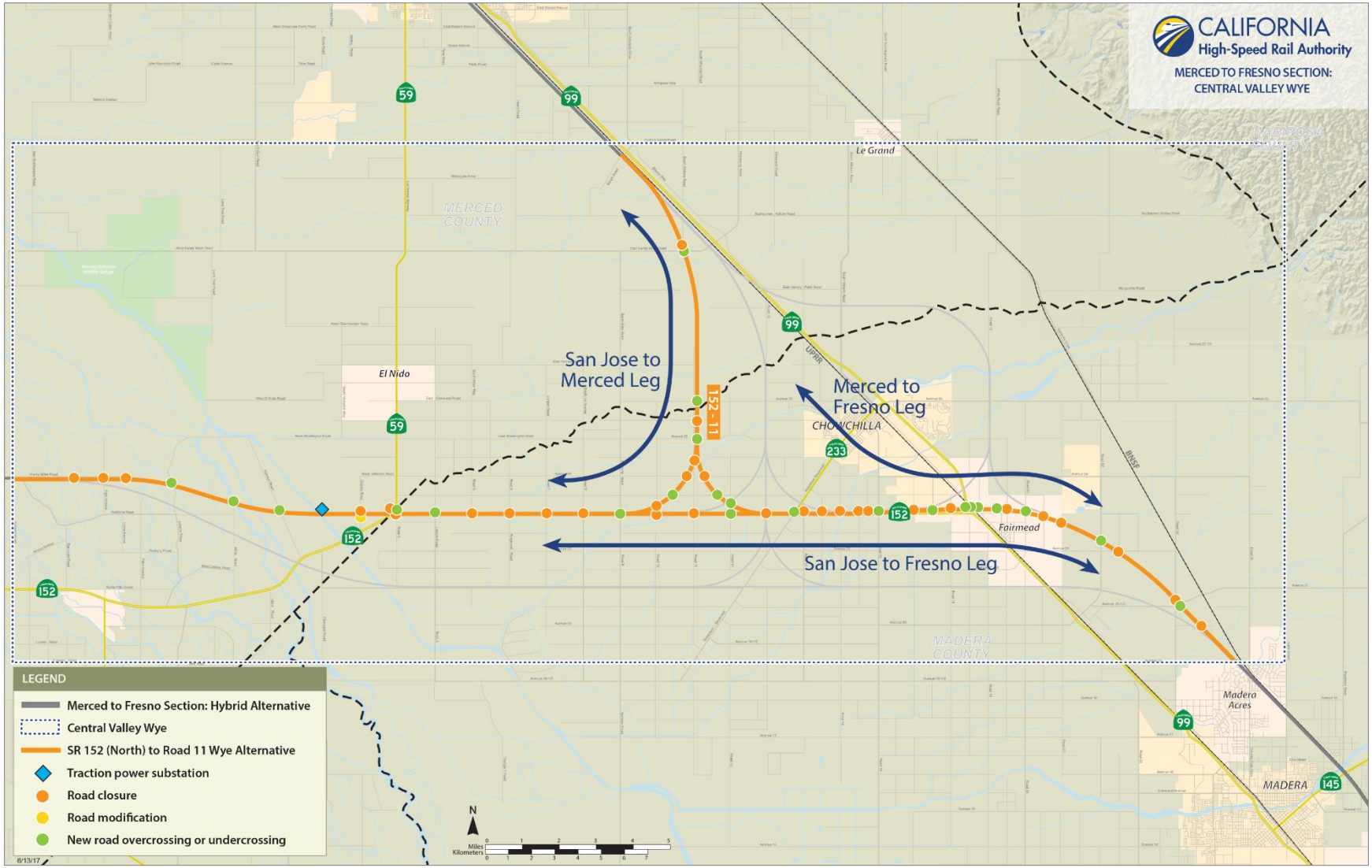
Figure S-5 Avenue 21 to Road 13 Wye Alternative Alignment and Key Design Features



Source: ESRI, 2013; CAL FIRE, 2004; ESRI/National Geographic, 2015

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Figure S-6 SR 152 (North) to Road 11 Wye Alternative Alignment and Key Design Features

S.6 Impact Avoidance and Minimization Features

The Authority and FRA have pledged to integrate programmatic IAMFs consistent with the (1) 2005 Statewide Program EIR/EIS, (2) 2008 Bay Area to Central Valley Program Final EIR/EIS, and (3) 2012 Bay Area to Central Valley Partially Revised Final Program EIR into the HSR project. The Authority has also developed IAMFs to be incorporated into the Central Valley Wye alternatives. These IAMFs are standard practices, actions, and design features (see Appendix 2-B, California High-Speed Rail: Impact Avoidance and Minimization Features). These IAMFs include measures related to:

- Transportation
- Air quality
- Noise and vibration
- Electromagnetic fields (EMF) and electromagnetic interference (EMI)
- Public utilities and energy
- Biological resources
- Hydrology and water resources
- Geologic resources
- Hazardous materials and waste
- Safety and security
- Socioeconomics and communities
- Land use and development
- Agricultural and farmland
- Parks, recreation, and open space
- Aesthetics and visual quality
- Cultural resources

The incorporation of IAMFs would minimize or avoid impacts of the Central Valley Wye alternatives and comply with design standards described in Appendix 2-C, Applicable Design Standards. Examples of these features include:

- Following existing transportation corridors to the extent feasible
- Spanning water crossings where practical
- Using shared right-of-way when feasible
- Including passages for wildlife movement
- Including narrowed footprint with elevated or retained cut profile
- Avoiding sensitive environmental resources to the extent practical

S.7 No Project Alternative Impacts

As discussed in Section S.4.5, HSR Benefits, the populations of Merced and Madera Counties are expected to grow by over 50 percent between 2010 and 2040—a rate higher than that of California as a whole. Despite the recent economic downturn, which has temporarily slowed growth, regional projections show a growth by 2040 of approximately 221,790 new inhabitants and 28,700 new employees (California Department of Finance 2014; Caltrans 2014). To support this expected growth in Merced and Madera Counties, development would require new dwelling units, the conversion of farmland to urban uses, and associated commercial, transportation, and supporting infrastructure, such as schools, parks, water treatment, and medical facilities. This projection is used as the common growth projection for all the Central Valley Wye alternatives.

Intraregional long-distance travel in the San Joaquin Valley is expected to increase by 72 percent between 2010 and 2040. Correspondingly, the total VMT in Merced and Madera Counties is projected to double between 2012 and 2040. Daily VMT in the region could increase from approximately 12 million in 2012 to 24 million in 2040 (Authority 2016a). To accommodate this growth, transportation improvements would be completed to maintain or expand existing capacity. A full list of anticipated future development projects is provided in Appendix 3.19-A, Cumulative Plans and Non-Transportation Projects List, and Appendix 3.19-B, Cumulative Transportation Projects Lists, in Volume II of this Draft Supplemental EIR/EIS.

Development under the No Project Alternative would result in impacts (relative to existing conditions) on the following resources evaluated in the Draft Supplemental EIR/EIS:

- **Air Quality.** Development would lead to increases in emissions of sulfur dioxide, particulate matter smaller than or equal to 10 microns in diameter (PM_{10}), and particulate matter smaller than or equal to 2.5 microns in diameter ($PM_{2.5}$). These emissions are commonly generated from power plants and other industrial facilities or emitted from noncombustion processes, which are expected to increase along with population and economic growth.
- **Electromagnetic Frequency (EMF) and Electromagnetic Interference (EMI).** The generation of EMF and EMI would increase, associated with additional electricity use and radio frequency communications.
- **Public Utilities and Energy.** Growing energy demands would require additional electricity generation and transmission capacity, and greater VMT would increase petroleum demands.
- **Biological Resources.** Habitat loss and degradation and species population decline would continue or worsen from changes in land use, vehicle strikes, pollution, and noise and dust.
- **Water Resources.** Demands for water supplies would increase, leading to pressures on water resources and decreased groundwater supplies.
- **Hazardous Materials and Wastes.** Development would continue to use or potentially disturb hazardous materials or wastes.
- **Socioeconomics.** Planned projects would result in changes to the local economy, a net increase in housing units, and contributions to increased regional urbanization. Transportation projects would result in land acquisition and may result in displacements and relocations.
- **Agricultural Land.** Growth would result in the conversion of agricultural land, including Important Farmland,[6] to nonagricultural uses.
- **Cultural Resources.** Changes in land use and ground disturbance from infrastructure improvements would continue to disturb unknown archaeological resources and result in the demolition, destruction, relocation, or alteration of historic architectural resources or their setting. Public access to areas containing cultural resources has the potential to affect cultural resources through collection, vandalism, and intentional or unintentional destruction of artifacts.

As described in Section 2.1, Background, in 2012 the Authority and FRA approved a north-south alignment and stations in Merced and Fresno but deferred a decision on the wye connection until further study could be completed. FRA made a similar decision for the Merced to Fresno Section, also choosing to defer a decision on the Central Valley Wye connection pending further study. Construction is proceeding on the already approved Merced to Fresno Section alignment south of the Central Valley Wye. Construction is also commencing on the adjacent Fresno to Bakersfield Section. Under the No Project Alternative, the Central Valley Wye alternatives would not be constructed, but construction of the Merced to Fresno Section alignment would continue south of the Central Valley Wye and would connect to the adjacent Fresno to Bakersfield Section. Construction would also proceed in the portion of the already approved Merced to Fresno Section alignment north of the Central Valley Wye. The No Project Alternative would also include construction of the adjacent San Jose to Merced Section west of the Central Valley Wye.

S.8 Central Valley Wye Alternatives Evaluation

This section provides an overview of the benefits common to all four Central Valley Wye alternatives. It also compares the differences in capital costs between the alternatives and then

[6] See Section 3.14, Agricultural Farmland, for a definition of Important Farmland

presents a summary of impacts that differentiate the alternatives and proposed mitigation to avoid and reduce impacts that would occur under any of the alternatives.

S.8.1 Central Valley Wye Alternatives Benefits

Construction of the Central Valley Wye alternatives would result in a number of benefits to communities, members of the public, infrastructure, the environment, and the economy, which would not occur under the No Project Alternative. The design of the Central Valley Wye alternatives includes roadway improvements that would reduce the exposure of motorists, pedestrians, and bicyclists to traffic hazards and would provide a safety benefit for children. The introduction of grade-separated interchanges would improve the safety of existing motorists by reducing vehicle conflicts with local intersecting roadways. The Central Valley Wye alternatives, as part of the HSR system, would decrease greenhouse gas (GHG) emissions, improve regional access, and result in a net savings in energy. In addition, the Central Valley Wye alternatives would benefit the regional economy by creating jobs during construction and generating new sales tax revenues for the region through project spending on operations and maintenance.

The Central Valley Wye alternatives would also result in local and regional benefits that could accrue to a greater degree to environmental justice communities because they compose the majority of the region's population. These benefits would include improved regional mobility, improved traffic conditions on freeways as people increasingly use HSR, improved safety of intersections from grade-separation, and declines in regional air quality emissions.

S.8.2 Comparison of Impacts for the Central Valley Wye Alternatives

This section describes the impacts that would occur under construction and operations of each Central Valley Wye alternative. Table S-2 (provided at the end of this Summary) and Table S-3 compare the differences in construction impacts and operations impacts, respectively, among the four Central Valley Wye alternatives, prior to mitigation. Information is not provided in these summary tables for resource impacts that are the same or very similar for all four Central Valley Wye alternatives (for detailed discussion of the impacts of each of the Central Valley Wye alternatives, see the resource sections in Chapter 3, Affected Environment, Environmental Consequences, and Mitigation Measures in the Draft Supplemental EIR/EIS). Chapter 3 also includes a discussion of impacts that would occur under the No Project Alternative in comparison to the Central Valley Wye alternatives in each resource section. Cumulative Impacts are summarized in Section S.8.3, Summary of Cumulative Impacts under NEPA and CEQA. Section S.8.4, CEQA Summary of Impacts and Mitigation, presents a summary of impact determinations under CEQA as well as mitigation applied to avoid or reduce significant impacts under CEQA, where applicable.

> *Methods for NEPA and CEQA Impact Analysis*
>
> Under NEPA, impacts are described in terms of their *context* (the environment in which a proposed project impact occurs) and *intensity* (the severity of the impact). NEPA's approach compares the context and intensity of impacts between alternatives under consideration.
>
> Under CEQA, thresholds are established for each resource to determine the level of significance of impacts. If a threshold is exceeded, the impact is considered significant under CEQA.

Many regulations require standard measures to avoid and minimize environmental impacts. Because the Authority would comply with these regulations, these standard measures are not summarized here. IAMFs would be incorporated into the selected Central Valley Wye alternative and would help minimize and avoid impacts (see Section S.6, Impact Avoidance and Minimization Features). When required, mitigation measures would be applied as part of project approval to help reduce impacts. Table S-4 presents a summary of the mitigation measures that would be applied to each of the Central Valley Wye alternatives to address significant impacts under CEQA. In addition, the Authority would continue to refine the design to further avoid and minimize impacts of the HSR project.

Section S.8.5, Section 4(f) and Section 6(f), describes Section 4(f) and Section 6(f) properties and any incurred uses on these properties as a result of the Central Valley Wye alternatives. Adverse effects on and benefits to environmental justice communities as a result of the Central Valley Wye

alternatives are described in Section S.8.6, Environmental Justice. Section S.8.7, Capital Cost, compares the differences in capital costs for each of the Central Valley Wye alternatives.

S.8.2.1 SR 152 (North) to Road 13 Wye Alternative

The SR 152 (North) to Road 13 Wye Alternative would extend approximately 52 miles through Merced and Madera Counties. This alternative would follow the existing Henry Miller Road and SR 152 rights-of-way as closely as possible in the east-west direction and the Road 13, SR 99, and BNSF rights-of-way in the north-south direction. Of the four alternatives, this alternative would result in the most temporary (17) and permanent road closures (38), as well as the largest anticipated generation of waste, including demolition waste that could contain asbestos and lead. Under this alternative, approximately 96 single-family residences would be displaced and 315 residents relocated. The community of Fairmead would be divided, resulting in impacts on community cohesion. Eight businesses would be displaced and five dairies would require reconfiguration. Noise impacts associated with the use of construction equipment would include daytime impacts on 65 sensitive receptors and nighttime impacts on 107 sensitive receptors. In addition, two sensitive receptors would be exposed to a permanent increase in traffic noise that would exceed Federal Highway Administration (FHWA) Noise Abatement Criteria related to permanent realignment of portions of a state route. As with all four alternatives, train operations would expose sensitive receptors to severe noise impacts; 27 single-family residences would be affected under this alternative.

In regard to the natural environment, the SR 152 (North) to Road 13 Wye Alternative would have a greater potential for impacts on special-status plant species, special-status wildlife species, and special-status plant communities than the Avenue 21 to Road 13 Wye Alternative or SR 152 (North) to Road 11 Wye Alternative; only the SR 152 (North) to Road 19 Wye Alternative would have greater impacts on these biological resources during construction.

S.8.2.2 SR 152 (North) to Road 19 Wye Alternative

The SR 152 (North) to Road 19 Wye Alternative would extend approximately 55 miles through Merced and Madera Counties. This alternative would follow the existing Henry Miller Road and SR 152 rights-of-way as closely as practicable in the east-west direction, and the Road 19, SR 99, and BNSF rights-of-way in the north-south direction. This alternative would result in 13 temporary and 36 permanent road closures. This alternative would also result in the greatest water use and energy consumption from construction, the greatest potential for risks related to geologic and soil hazards, and the greatest potential for impacts on surface water hydrology and quality during construction. This alternative also has the potential to affect the most subsurface oil and gas wells and the most potential environmental concern (PEC) sites on or near construction sites. The SR 152 to Road 19 Wye Alternative would also result in the greatest impact on community cohesion in the community of Fairmead and the most residential displacements. This alternative would result in the greatest conversion of land uses and it would expose the most sensitive receptors in single-family residences to noise impacts associated with the use of construction equipment during the daytime (106) and nighttime (314). In addition, two sensitive receptors would be exposed to a permanent increase in traffic noise that would exceed FHWA Noise Abatement Criteria related to permanent realignment of portions of a state route. During operations, this alternative would expose the fewest sensitive receptors to severe operations noise (23 single-family residences), in part because more residences would be removed under this alternative.

In regard to the natural environment, the SR 152 (North) to Road 19 Wye Alternative would have the greatest potential for impacts on special-status plant species, special-status wildlife species, and wetlands. It also would have the greatest potential for impacts on wildlife movement corridors. In general, the SR 152 to Road 19 Wye Alternative would result in greater impacts on both the human and natural environmental than any of the other alternatives, with the majority of these impacts occurring during construction.

S.8.2.3 Avenue 21 to Road 13 Wye Alternative

The Avenue 21 to Road 13 Wye Alternative would extend approximately 53 miles through Merced and Madera Counties and would follow the existing Henry Miller Road and Avenue 21 rights-of-way as closely as practicable in the east-west direction and the Road 13, SR 99, and BNSF rights-of-way in the north-south direction. This alternative would result in 15 temporary road closures and the smallest number of permanent road closures (30), and it would not require any construction on or cause disruption to SR 152. However, given the more rural nature, these road closures would result in the most miles of detours on major roadways (36 miles). In regard to community impacts, one of the major distinguishing factors between the Central Valley Wye alternatives is the tradeoff in the location of the SR 152 alternatives through the northern portion of the community of Fairmead, which would not occur under the Avenue 21 to Road 13 Wye Alternative. In comparison to the three SR 152 alternatives, the Avenue 21 to Road 13 Wye Alternative would minimize socioeconomic, visual, and displacement impacts on the community of Fairmead because the alignment would be south of Fairmead as opposed to the center of the community. The Avenue 21 to Road 13 Wye Alternative would also have the fewest nighttime (80) noise impacts associated with the use of construction equipment. However, the Avenue 21 to Road 13 Wye Alternative, when compared to other alternatives, would result in greater impacts on the agricultural economy and community, related to larger losses of agricultural revenue and jobs. This alternative would also have the greatest impacts on the historic Robertson Boulevard Tree Row. Train operations would expose the most sensitive receptors to severe noise impacts, affecting 39 single-family residences under this alternative.

In regard to the natural environment, the Avenue 21 to Road 13 Wye Alternative would have greater potential for impacts on vernal pools and associated plant species but would have less potential for direct impacts for most other categories of biological resource impacts than the other alternatives. This alternative would result in less impact on other types of special-status species and habitats, including non-vernal pool plant communities, and bird species.

S.8.2.4 SR 152 (North) to Road 11 Wye Alternative

The SR 152 (North) to Road 11 Wye Alternative would extend approximately 51 miles through Merced and Madera Counties and would follow the existing Henry Miller Road and SR 152 rights-of-way as closely as practicable in the east-west direction and the Road 11, SR 99, and BNSF rights-of-way in the north-south direction. This alternative would have an intermediate number of road closures compared to other alternatives, with 13 temporary and 33 permanent road closures. This alternative would generally have less intensive community impacts than other alternatives, though it would still result in impacts on of the community of Fairmead. Relative to the other alternatives, the SR 152 (North) to Road 11 Wye Alternative would have the fewest residential displacements, less daytime noise impacts associated with the use of construction equipment, the lowest permanent conversion of Important Farmland, and require the relocation or reconfiguration of the fewest dairies. This alternative would also result in the least amount of linear disturbance to the historic Robertson Boulevard Tree Row. As with the other two SR 152 alternatives, the SR 152 (North) to Road 11 Wye Alternative would expose two sensitive receptors to a permanent increase in traffic noise that would exceed FHWA Noise Abatement Criteria related to permanent realignment of state routes. Train operations under this alternative would expose 35 sensitive receptors to severe noise impacts, all single-family residences. This number would be higher than for the other two SR 152 (North) Wye alternatives because fewer residences would be displaced under this alternative.

With regard to the natural environment, the SR 152 (North) to Road 11 Wye Alternative would have the least potential for direct impacts on special-status plant communities because it would have the least vegetation removal. It would have the least potential for impacts on wetlands and waters of the United States, including associated species.

Table S-2 Comparison of Construction Impacts by Alternative

Resource Category	Impact under the Central Valley Wye Alternatives			
	SR 152 (North) to Road 13 Wye	SR 152 (North) to Road 19 Wye	Avenue 21 to Road 13 Wye	SR 152 (North) to Road 11 Wye
Transportation				
Property Access				
Permanent loss of property access (number of properties)	3	3	3	1
Changes to Roads Affecting Traffic Circulation, Pedestrian/Bicycle Access, Transit Operations, School Bus Routing, Emergency Access, and Roadway Operations				
Number of temporary road closures	17	13	15	13
Number of permanent road closures	38	36	30	33
Length of detours of major roadways (miles)	30	25	36	26
Temporary impacts on SR 152 (traffic conditions)	Closure of traffic lanes, reduction of lane widths, reduced speeds, ramp closures, detours	Closure of traffic lanes, reduction of lane widths, reduced speeds, ramp closures, detours	No impacts on SR 152	Closure of traffic lanes, reduction of lane widths, reduced speeds, ramp closures, detours
Permanent impacts on SR 152 (traffic conditions)	New grade-separated interchanges would improve motorist safety	New grade-separated interchanges would improve motorist safety	HSR bridge over SR 152 would have no impact on SR 152 traffic	New grade-separated interchanges would improve motorist safety
Air Quality and Global Climate Change[1]				
Temporary Direct Impacts on Air Quality Exceeding the SJVAB Emissions Thresholds and the General Conformity *de minimis* Threshold				
2020 NO_X emissions (tons per year)[2]	139.49	133.86	144.40	136.32
Temporary Indirect Impacts on Air Quality Outside the SJVAB				
Impacts related to ballast hauling quantities	Ballast hauling emissions outside of the SJVAB associated with all of the Central Valley Wye alternatives would be below the GC thresholds for all pollutants in the SFBAAB.			
Permanent Direct and Indirect Impacts on Global Climate Change—Greenhouse Gas Emissions				
Impacts related to total construction GHG emissions (metric tons CO_2e)	85,285	79,654	91,828	80,960
Impacts related to 25-year amortized construction GHG emissions (metric tons CO_2e per year)	3,411	3,186	3,673	3,238

Resource Category	Impact under the Central Valley Wye Alternatives			
	SR 152 (North) to Road 13 Wye	SR 152 (North) to Road 19 Wye	Avenue 21 to Road 13 Wye	SR 152 (North) to Road 11 Wye
Temporary Direct Impacts on Air Quality—Asbestos and Lead-Based Paint				
Impacts related to demolition quantities (CY)	1,765,727	1,594,922	787,083	1,452,016
Noise and Vibration				
Temporary exposure of sensitive receptors to construction noise—daytime (am)/nighttime (pm) (number of single-family residences)	65 (AM) 107 (PM)	106 (AM) 314 (PM)	70 (AM) 80 (PM)	57 (AM) 101 (PM)
Permanent exposure of sensitive receptors to traffic-generated noise from realigned state highways and local roads	Potential for exposure of sensitive receptors to increased traffic noise related to permanent vertical or horizontal realignment of three state routes. Traffic on local roads provides only a minor contribution to overall noise levels, diversion of traffic on these roads is not expected to affect noise levels.	Potential for exposure of sensitive receptors to increased traffic noise related to permanent vertical or horizontal realignment of three state routes. Traffic on local roads provides only a minor contribution to overall noise levels, diversion of traffic on these roads is not expected to affect noise levels.	No realignment of state routes. Traffic on local roads provides only a minor contribution to overall noise levels, diversion of traffic on these roads is not expected to affect noise levels.	Potential for exposure of sensitive receptors to increased traffic noise related to permanent vertical or horizontal realignment of three state routes. Traffic on local roads provides only a minor contribution to overall noise levels, diversion of traffic on these roads is not expected to affect noise levels.
EMF and EMI				
Permanent interference with communication equipment	None	None	None	None
EMF/EMI impacts related to length of HSR tracks paralleling existing UPRR tracks	3 miles of adjacent track	4 miles of adjacent track	3 miles of adjacent track	1.3 miles of adjacent track
Public Utilities and Energy				
Temporary Impacts from Water Use				
Total anticipated water use (million gallons)	2,289	2,475	2,095	2,125

Resource Category	Impact under the Central Valley Wye Alternatives			
	SR 152 (North) to Road 13 Wye	SR 152 (North) to Road 19 Wye	Avenue 21 to Road 13 Wye	SR 152 (North) to Road 11 Wye
Temporary Generation of Solid Waste and Hazardous Wastes				
Total anticipated waste generation (tons)	77,752	71,297	40,531	57,800
Permanent Conflicts with Existing Utilities Requiring Relocation				
Electrical lines	8	11	11	7
Natural gas transmission lines	7	9	6	7
Petroleum and fuel pipelines	1	3	1	1
Electrical substation	0	0	1	0
Communications facilities	6	11	6	6
Canals/pipelines	44	42	69	45
Temporary Impacts from Energy Consumption				
Construction energy consumption (MMBtu)	2,391,012	3,125,586	2,431,996	2,232,212
Assuming high ridership, payback period for energy consumed during construction in years	1.96	2.56	1.99	1.83
Assuming medium ridership, payback period for energy consumed during construction in years	2.40	3.14	2.44	2.24
Biological Resources and Wetlands				
Special-Status Plants				
Permanent (P) and temporary (T) area of disturbance for 21 plant species associated with California annual grassland community (acres)	90.14 (P) 9.57 (T)	91.23 (P) 38.97 (T)	25.01 (P) 8.31 (T)	69.53 (P) 8.58 (T)
Permanent (P) and temporary (T) area of disturbance for 9 plant species associated with vernal pool community (acres)	0.18 (P) 0.04 (T)	0.19 (P) 0.04 (T)	0.10 (P) 0.64(T)	0.19 (P) 0.04 (T)

Resource Category	Impact under the Central Valley Wye Alternatives			
	SR 152 (North) to Road 13 Wye	SR 152 (North) to Road 19 Wye	Avenue 21 to Road 13 Wye	SR 152 (North) to Road 11 Wye
Permanent (P) and temporary (T) area of disturbance for 2 plant species associated with other riparian community (acres)	1.22 (P) 0.22 (T)	0.42 (P) 0.12 (T)	1.85 (P) 0.57 (T)	0.77 (P) 0.09 (T)
Permanent (P) and temporary (T) area of disturbance for 3 plant species associated with freshwater marsh, natural watercourses, open water, seasonal wetland (acres)	7.03 (P) 3.81 (T)	9.30 (P) 4.79 (T)	5.96 (P) 5.48 (T)	5.11 (P) 3.12 (T)
Effects related to total area of disturbance (acres) for 2 plant species associated with valley sink scrub community	4.26 acres (T) under any of the Central Valley Wye alternatives			
Effects related to total area of disturbance (acres) for 1 plant species associated with California Annual Grassland and valley sink scrub communities (within mapped range)	0.00 (P) 4.32 (T)	0.34 (P) 28.53 (T)	0.00 (P) 4.32 (T)	0.00 (P) 4.32 (T)
Effects related to total area of disturbance (acres) for 1 plant species associated with California Annual Grassland and valley sink scrub communities	90.14 (P) 13.83 (T)	91.23 (P) 43.23 (T)	25.01 (P) 12.57 (T)	69.53 (P) 12.84 (T)
Special-Status Wildlife—Fish, Amphibians, Reptiles				
Permanent (P) area of disturbance for 3 wildlife species associated with vernal pool and seasonal wetland communities (acres)	2.16 (P)	2.44 (P)	2.49 (P)	1.87 (P)
Permanent (P) and temporary (T) area of disturbance for 1 wildlife species associated with mixed riparian and other riparian communities (acres)	1.49 (P) 0.43 (T)	1.21 (P) 0.39 (T)	2.11 (P) 0.86 (T)	1.15 (P) 0.38 (T)
Permanent (P) area of disturbance for 7 fish species associated with natural watercourses and other riparian (San Joaquin River only) (acres)	2.24 (P)	2.24 (P)	1.97 (P)	2.18 (P)
Permanent (P) and temporary (T) area of disturbance for California tiger salamander aquatic and upland habitat (acres)	140.72 (P) 48.56(T)	150.89 (P) 164.43 (T)	78.15 (P) 36.51 (T)	110.32 (P) 45.94 (T)

Resource Category	Impact under the Central Valley Wye Alternatives			
	SR 152 (North) to Road 13 Wye	SR 152 (North) to Road 19 Wye	Avenue 21 to Road 13 Wye	SR 152 (North) to Road 11 Wye
Permanent (P) and temporary (T) area of disturbance for western spadefoot aquatic and upland habitat (acres)	43.59 (P) 1.67 (T)	48.78 (P) 23.15 (T)	14.79 (P) 2.22 (T)	26.03 (P) 3.03 (T)
Permanent (P) and temporary (T) area of disturbance for western pond turtle aquatic and upland habitat (acres)	77.13 (P) 14.48 (T)	80.15 (P) 44.73 (T)	34.90 (P) 15.71 (T)	53.75 (P) 13.16 (T)
Permanent (P) and temporary (T) area of disturbance for blunt-nosed leopard lizard upland habitat (acres)	29.89 (P) 13.53 (T)	24.83 (P) 17.22 (T)	9.33 (P) 10.85 (T)	26.16 (P) 11.28 (T)
Permanent (P) and temporary (T) area of disturbance for Blainville's horned lizard upland habitat (acres)	133.29 (P) 70.48 (T)	135.66 (P) 147.60 (T)	68.15 (P) 56.29 (T)	107.90 (P) 68.43 (T)
Permanent (P) and temporary (T) area of disturbance for giant garter snake aquatic and upland habitat (acres)	18.32 (P) 9.29 (T)	16.89 (P) 15.34 (T)	12.62 (P) 10.53 (T)	12.77 (P) 7.16 (T)
Permanent (P) and temporary (T) area of disturbance for silvery legless lizard upland habitat (acres)	0.00 (P) 4.32 (T)	0.34 (P) 28.54 (T)	0.00 (P) 4.32 (T)	0.00 (P) 4.32 (T)
Permanent (P) and temporary (T) area of disturbance for San Joaquin coachwhip upland habitat (acres)	0.00 (P) 4.32 (T)	0.00 (P) 4.32 (T)	0.00 (P) 4.32 (T)	0.00 (P) 4.32 (T)
Special-Status Wildlife—Birds				
Permanent (P) and temporary (T) area of disturbance for American peregrine falcon foraging habitat (acres)	2,612.66 (P) 656.90 (T)	2,803.99 (P) 1,227.35 (T)	2,411.59 (P) 485.80 (T)	2,563.60 (P) 536.24 (T)
Permanent (P) and temporary (T) area of disturbance for bald eagle nesting and foraging habitat (acres)	1,324.23 (P) 352.25 (T)	1,215.48 (P) 485.14 (T)	1,067.25(P) 272.18 (T)	1,248.69 (P) 292.29 (T)
Permanent (P) and temporary (T) area of disturbance for golden eagle nesting and foraging habitat (acres)	1,284.82 (P) 381.24 (T)	1,206.85 (P) 480.62 (T)	1,029.18 (P) 299.87 (T)	1,210.70 (P) 321.86 (T)
Permanent (P) and temporary (T) area of disturbance for Swainson's hawk nesting and foraging habitat (acres)	2,178.01 (P) 557.39 (T)	2,224.49 (P) 1,092.81 (T)	2,122.64 (P) 417.10 (T)	2,129.86 (P) 459.16 (T)

Resource Category	Impact under the Central Valley Wye Alternatives			
	SR 152 (North) to Road 13 Wye	SR 152 (North) to Road 19 Wye	Avenue 21 to Road 13 Wye	SR 152 (North) to Road 11 Wye
Permanent (P) and temporary (T) area of disturbance for greater sandhill crane foraging habitat (acres)	1,341.02 (P) 251.01 (T)	1,173.61 (P) 403.48 (T)	1,083.04 (P) 170.08 (T)	1,271.55 (P) 192.86 (T)
Permanent (P) and temporary (T) area of disturbance for western snowy plover foraging habitat (acres)	1,360.22 (P) 291.82 (T)	1,204.81 (P) 468.47 (T)	1,103.81 (P) 209.61 (T)	1,286.91 (P) 232.60 (T)
Permanent (P) and temporary (T) area of disturbance for least Bell's vireo nesting and foraging habitat (acres)	7.83 (P) 0.86 (T)	9.05 (P) 0.77 (T)	7.12 (P) 1.72 (T)	5.88 (P) 0.77 (T)
Permanent (P) and temporary (T) area of disturbance for tricolored blackbird nesting and foraging habitat (acres)	1,251.47 (P) 240.33 (T)	1,107.82 (P) 319.05 (T)	954.89 (P) 151.55 (T)	1,200.16 (P) 174.80 (T)
Permanent (P) and temporary (T) area of disturbance for western burrowing owl nesting and foraging habitat (acres)	1,134.84 (P) 386.15 (T)	1,351.02 (P) 887.98 (T)	1,180.91 (P) 281.92 (T)	1,107.01 (P) 332.68 (T)
Permanent (P) and temporary (T) area of disturbance for ground nesting bird species (acres)	1,433.66 (P) 361.62 (T)	1,309.20 (P) 595.93 (T)	1,056.99 (P) 217.61 (T)	1,373.83 (P) 289.39 (T)
Permanent (P) and temporary (T) area of disturbance for wading bird/shorebird/duck species (acres)	1,383.96 (P) 309.45 (T)	1,233.35 (P) 529.68 (T)	1,134.23 (P) 227.48 (T)	1,303.87 (P) 247.53 (T)
Permanent (P) and temporary (T) area of disturbance for tree-nesting bird species (acres)	2,254.66 (P) 504.98 (T)	2,217.77 (P) 969.39 (T)	2,197.48 (P) 365.52 (T)	2,210.65 (P) 407.80 (T)
Special-Status Wildlife—Mammals				
Permanent (P) and temporary (T) area of disturbance for roosting and foraging habitat of pallid bat and Western red bat (acres)	2,616.20 (P) 656.90 (T)	2,803.99 (P) 1,227.35 (T)	2,415.13 (P) 485.80 (T)	2,567.14 (P) 536.24 (T)
Permanent (P) and temporary (T) area of disturbance for roosting and foraging habitat of Western mastiff bat (acres)	2,616.20(P) 656.90 (T)	2,803.78 (P) 1,226.96 (T)	2,415.13 (P) 485.80 (T)	2,567.14 (P) 536.24 (T)
Permanent (P) and temporary (T) area of disturbance for ringtail habitat (acres)	1.49 (P) 0.43 (T)	1.21 (P) 0.39 (T)	2.11 (P) 0.86 (T)	1.15 (P) 0.38 (T)

Resource Category	Impact under the Central Valley Wye Alternatives			
	SR 152 (North) to Road 13 Wye	SR 152 (North) to Road 19 Wye	Avenue 21 to Road 13 Wye	SR 152 (North) to Road 11 Wye
Permanent (P) and temporary (T) area of disturbance for American badger habitat (acres)	212.42 (P) 97.08 (T)	188.57 (P) 218.08 (T)	159.40 (P) 77.81 (T)	169.69 (P) 86.00 (T)
Permanent (P) and temporary (T) area of disturbance for San Joaquin kit fox denning and movement habitat (acres)	960.34 (P) 291.38 (T)	1,114.19 (P) 710.83 (T)	1,238.00 (P) 273.38 (T)	926.37 (P) 252.52 (T)
Effects related to total area of disturbance (acres) for giant kangaroo rat habitat	0.00 (P) acres under any of the Central Valley Wye alternatives 0.06 (T) acres under any of the Central Valley Wye alternatives			
Effects related to total area of disturbance (acres) for Nelson's antelope squirrel habitat	0.00 (P) acres under any of the Central Valley Wye alternatives 4.26 (T) acres under any of the Central Valley Wye alternatives			
Effects related to total area of disturbance (acres) for Fresno kangaroo rat habitat	46.33 (P) 12.04 (T)	41.36 (P) 12.10 (T)	10.29 (P) 10.88 (T)	42.39 (P) 10.03 (T)
Special-Status Plant Community Impacts				
Impacts related to total area of disturbance (acres): vernal pools	0.18	0.19	0.10	0.19
Impacts related to total area of disturbance (acres): bisected vernal pools	0.04	0.04	0.64	0.04
Impacts related to total area of disturbance (acres): mixed riparian	0.36	1.06	0.42	0.68
Impacts related to total area of disturbance (acres): other riparian	1.44	0.54	2.43	0.86
Impacts related to total area of disturbance (acres): seasonal wetland	0.78	1.99	1.47	0.49
Impacts related to total area of disturbance (acres): palustrine forested wetland	0.12	0.00	0.12	0.00
Impacts related to total area of disturbance (acres): valley sink scrub	4.26	4.26	4.26	4.26

Resource Category	Impact under the Central Valley Wye Alternatives			
	SR 152 (North) to Road 13 Wye	SR 152 (North) to Road 19 Wye	Avenue 21 to Road 13 Wye	SR 152 (North) to Road 11 Wye
Jurisdictional Aquatic Resources Impacts				
Permanent (P) and temporary (T) area of disturbance for wetlands (acres) considered under Section 404 of the Clean Water Act	1.00 (P) 0.13 (T)	1.69 (P) 0.52 (T)	1.76 (P) 0.58 (T)	0.62 (P) 0.11 (T)
Permanent (P) and temporary (T) area of disturbance for other or non-wetland waters (acres) considered under Section 404 of the Clean Water Act	28.26 (P) 9.82 (T)	25.71 (P) 9.65 (T)	34.19 (P) 9.15 (T)	22.11 (P) 7.15 (T)
Permanent (P) and temporary (T) area of disturbance for riparian habitats (acres) considered under Section 1600 et seq. of the California Fish and Game Code	1.49 (P) 0.43 (T)	1.21 (P) 0.39 (T)	2.11 (P) 0.86 (T)	1.15 (P) 0.38 (T)
Permanent (P) and temporary (T) area of disturbance for stream types (acres) considered under Section 1600 et seq. of the California Fish and Game Code	6.34 (P) 3.72 (T)	7.83 (P) 4.26 (T)	5.02 (P) 4.95 (T)	4.73 (P) 3.01 (T)
Critical Habitat Impacts				
Effects related to total area of disturbance (acres) for 4 plant species and 3 invertebrate species associated with vernal pool community, and 1 species associated with riverine habitat (mapped CH versus aquatic habitat)	No	367.46/4.72	No	2.94/0.21
Wildlife Movement Corridor Impacts				
Impacts related to total length of designated wildlife movement corridors crossed (miles)	11.02	17.48	11.84	10.42
Hydrology and Water Resources				
Surface Water Hydrology and Stormwater Quality				
Impacts related to temporary area of disturbance (acres)	3,272	4,031	2,900	3,101
Impacts related to permanent area of disturbance (acres)	2,615	2,804	2,414	2,565
Stormwater quality impacts related to number of culverts and tunnels	19	20	22	16

Resource Category	Impact under the Central Valley Wye Alternatives			
	SR 152 (North) to Road 13 Wye	SR 152 (North) to Road 19 Wye	Avenue 21 to Road 13 Wye	SR 152 (North) to Road 11 Wye
Temporary Groundwater Quality and Volume Impacts				
Groundwater quality and volume impacts	No anticipated groundwater impacts	Impacts related to tunnel construction	No anticipated groundwater impacts	No anticipated groundwater impacts
Permanent Floodplain and Flood Risk Impacts				
Impacts related to total acreage of development within 100-year floodplain	889	1,057	1,118	790
Geology, Soils, Seismicity, and Paleontological Resources				
Soil Erosion				
Soils subject to erosion (acres)	896	1,115	773	976
Groundwater dewatering affecting soil erosion and soil settlement at structures or along trackway	No anticipated erosion impacts related to dewatering	Potential Impacts related to tunnel construction	No anticipated erosion impacts related to dewatering	No anticipated erosion impacts related to dewatering
Moderate to High Shrink-Swell Potential				
Impacts on soils with moderate to high shrink-swell potential (acres)	735	938	1,013	580
Moderately to Highly Corrosive Soils				
Impacts on soils with high corrosivity to steel (acres)	2,176	2,173	2,005	2,016
Moderately to highly corrosive soils – impacts on soils with high corrosivity to concrete (acres)	1,524	1,268	1,394	1,384
Natural Waterbody Crossings Affecting Unstable Soils Resulting in On-Site or Off-Site Slumps and Small Slope Failures, Soil Settlement at Structures or along Trackway, Slope Failure and Liquefaction and Seismically Induced Slope Failure				
Number of natural waterbody crossings	31	32	39	30
Soil settlement at structures or along trackway – groundwater dewatering	No anticipated subsidence related to dewatering	Impacts related to tunnel construction	No anticipated subsidence related to dewatering	No anticipated subsidence related to dewatering

Resource Category	Impact under the Central Valley Wye Alternatives			
	SR 152 (North) to Road 13 Wye	SR 152 (North) to Road 19 Wye	Avenue 21 to Road 13 Wye	SR 152 (North) to Road 11 Wye
Seismic-Induced Ground Shaking and Secondary Seismic Hazards				
Ground shaking	3 miles aerial track 0.5 mile tunnel	3.5 miles aerial track 3 miles tunnel	4 miles aerial track 0.5 mile tunnel	4.5 miles aerial track 0 mile tunnel
Areas of Difficult Excavation				
Difficult excavations due to hardpan and shallow groundwater (acres)	819	1,106 Impacts related to tunnel	753	835
Mineral and Energy Resources				
Loss of availability of mineral or energy resources and increase in safety risk due to disruption of subsurface oil and gas resources	44 wells (1 active)	45 wells (1 active)	34 wells (1 active)	44 wells (1 active)
Hazardous Materials and Wastes				
Temporary Impacts from the Transport, Use, Storage, and Disposal of Hazardous Materials and Wastes and Inadvertent Disturbance of Hazardous Materials and Wastes				
Risk of upset related to proximity to high traffic volume roadways/potential for aerially deposited lead in soils related to proximity to high traffic volume roadways	Greater, because of location along SR 152	Greater, because of location along SR 152	Located along lower traffic volume routes	Greater, because of location along SR 152
Impacts related to agricultural land permanently converted by Central Valley Wye alternative (acres)	2,209	2,490	2,277	2,219
Temporary Impacts from Construction on or near PEC Sites				
Impacts related to number of PEC sites near each alternative	6	9	7	5
Temporary Impacts from Hazardous Materials and Wastes Activities in Proximity to Schools				
Number of schools close to increases in hazardous materials and wastes activities	2	4	2	2
Impacts related to number of recreational areas (school play areas and parks) in the vicinity of each alternative	1	4	0	1

Resource Category	Impact under the Central Valley Wye Alternatives			
	SR 152 (North) to Road 13 Wye	SR 152 (North) to Road 19 Wye	Avenue 21 to Road 13 Wye	SR 152 (North) to Road 11 Wye
Temporary Impacts Associated with Risks during Construction on or near Landfills and Oil and Gas Wells				
Impacts related to the number of landfills in the vicinity of each alternative	0	1	1	0
Number of oil and gas wells within 200 feet of alignment centerline	12 wells (1 idle, 11 plugged)	14 wells (1 idle, 13 plugged)	5 wells (1 idle, 4 plugged)	12 wells (1 idle, 11 plugged)
Safety and Security				
Temporary Interference with Emergency Response Times				
Number of temporary road closures	17	13	15	13
Detours (miles)	30	25	36	26
Permanent Interference with Emergency Response Times				
Number of permanent road closures	38	36	30	33
Permanent Motor Vehicle, Pedestrian, and Bicycle Safety Risks				
Number of overcrossings and undercrossings	24	29	28	24
Safety benefits to motorists on SR 152	Yes	Yes	No	Yes
Temporary Exposure to Landfill Hazards				
Number of landfills within 0.25 mile of the alternative	0	1	1	0
Explosion risk to the public and construction site workers	No impact	Temporary explosion risk from landfills during construction avoided through incorporation of IAMFs	Temporary explosion risk from landfills during construction avoided through incorporation of IAMFs	No impact

Resource Category	Impact under the Central Valley Wye Alternatives			
	SR 152 (North) to Road 13 Wye	SR 152 (North) to Road 19 Wye	Avenue 21 to Road 13 Wye	SR 152 (North) to Road 11 Wye
Socioeconomics and Communities				
Community Cohesion				
Temporary impacts on community cohesion	Disruption to Fairmead and agricultural community during construction.	Greatest disruption to Fairmead, as well as disruption to agricultural community, during construction. Noise-related disruption in Waterford and Merced.	Disruption to agricultural community during construction. Limited disruption to Fairmead.	Disruption to Fairmead and agricultural community during construction.
Permanent impacts on community cohesion—division of communities	Division of Fairmead and disruption of agricultural community	Greatest division of Fairmead and disruption of agricultural community	No established communities divided	Division of Fairmead and disruption of agricultural community
Permanent noise impacts on community cohesion	92 severe and moderate noise impacts	81 severe and moderate noise impacts	79 severe and moderate noise impacts	96 severe and moderate noise impacts
Permanent road closures within Fairmead	2 road closures within Fairmead's residential core	2 road closures within Fairmead's residential core	1 road closures within southern Fairmead	2 road closures within Fairmead's residential core
Permanent visual changes in Fairmead	HSR extends through Fairmead on embankment, blocking residential views and degrading visual quality	Two legs of the wye extend through Fairmead on embankment and structure, blocking residential views and resulting in the greatest degradation of visual quality	No visual impact	HSR extends through Fairmead on embankment, blocking residential views and degrading visual quality
Displacements and Relocations				
Estimated number of residential units displaced	96	119	65	62
Estimated number of residents to be relocated	315	391	213	224
Estimated number of total displaced business (commercial and industrial/manufacturing) units	8	8	1	7

Resource Category	Impact under the Central Valley Wye Alternatives			
	SR 152 (North) to Road 13 Wye	SR 152 (North) to Road 19 Wye	Avenue 21 to Road 13 Wye	SR 152 (North) to Road 11 Wye
Number of dairies to be relocated or reconfigured	5	2	4	2
Agricultural facilities displaced	21	17	29	16
Direct and indirect conversion of important farmland (acres)	2,385	2,537	2,467	2,336
Children's Health and Safety				
Use of hazardous materials near schools	Fairmead Elementary School and Fairmead Head Start	Fairmead Elementary School, Fairmead Head Start, Washington Elementary School, El Capitan High School, and Richard Bernasconi Park	Alview Elementary and Chowchilla Seventh-day Adventist School	Fairmead Elementary School and Fairmead Head Start
Noise impacts on schools	None	None	Daytime construction noise impacts on Chowchilla Seventh-day Adventist School	None
Economic Impacts				
Temporary impacts on employment—jobs created	8,610 jobs created	9,450 jobs created	8,740 jobs created	8,120 jobs created
Permanent impacts on school district funding from student relocations	Sufficient relocation resources available within affected school districts	Sufficient relocation resources available within affected school districts	Insufficient relocation resources available within the Alview-Dairyland Elementary School District	Sufficient relocation resources available within affected school districts
Permanent impacts on school district funding and city and county revenues from reduced property tax revenues	$798,300 decrease	$906,200 decrease	$688,800 decrease	$702,900 decrease
Permanent impacts on agricultural economy—financial and employment	$8.4 million estimated revenue loss, and 80 estimated jobs lost	$8.6 million estimated revenue loss, and 86 estimated jobs lost	$7.6 million estimated revenue loss and 79 estimated jobs lost	$7.9 million estimated revenue loss, and 77 estimated jobs lost
Permanent impacts on agricultural economy—loss of agricultural parcels	245 acres of Williamson Act and 180 acres FSZ remnant parcels below county thresholds	203 acres of Williamson Act and 184 acres of FSZ remnant parcels below county thresholds	94 acres of Williamson Act and 136 acres of FSZ remnant parcels below county thresholds	155 acres of Williamson Act and 155 acres of FSZ remnant parcels below county thresholds

Resource Category	Impact under the Central Valley Wye Alternatives			
	SR 152 (North) to Road 13 Wye	SR 152 (North) to Road 19 Wye	Avenue 21 to Road 13 Wye	SR 152 (North) to Road 11 Wye
Temporary impacts on sales tax revenues	$4.89 million in additional tax revenue estimated	$5.37 million in additional tax revenue estimated	$4.80 million in additional tax revenue estimated	$4.61 million in additional tax revenue estimated
Land Use and Development				
Temporary use of land outside of the right-of-way (acres)	653	1,208	476	471
Maximum amount of land use permanently converted to transportation or electrical utility uses (acres)	2,799	3,035	2,599	2,739
Amount of land identified in the draft Fairmead Colony Area Plan for future development permanently converted to transportation use (acres)	58	75	148	111
Permanent indirect impacts on land use patterns related to permanent road closures	38	36	30	33
Permanent indirect impacts on land use patterns related to number of over/undercrossings	24	29	28	24
Direct impacts on existing land uses within Chowchilla planning boundaries (acres)	758	914	275	625
Miles of land converted to transportation uses	46.1	50.5	49.1	49.3
Agricultural Farmland				
Temporary use of Important Farmland (acres)	493	590	412	362
Permanent conversion of Important Farmland (acres)	2,182	2,305	2,263	2,144
NRCS conversion rating score—Merced County	142	147	138	146
NRCS conversion rating score—Madera County	159	161	162	159
Permanent indirect conversion from creation of remnant parcels (number of acres)	203	232	204	192

Resource Category	Impact under the Central Valley Wye Alternatives			
	SR 152 (North) to Road 13 Wye	SR 152 (North) to Road 19 Wye	Avenue 21 to Road 13 Wye	SR 152 (North) to Road 11 Wye
Parks and Recreation				
Permanent impacts on future development of recreational trail corridors	No	Yes	No	No
Change in character and noise and visual environment at play areas and park facilities	One play area	Four play areas and park facilities	No impacts	One play area
Aesthetics and Visual Resources				
Degraded visual quality for residential viewers during construction	Would affect the most residential viewers	Would affect residential viewers	Would affect the least residential viewers	Would affect residential viewers
Decreased visual quality in the San Joaquin River landscape unit	Would affect fewer viewer groups than Avenue 21 to Road 13	Would affect fewer viewer groups than Avenue 21 to Road 13	Would affect the greatest number of viewer groups	Would affect fewer viewer groups than Avenue 21 to Road 13
Decreased visual quality in the rural agricultural landscape unit	Would affect the fewest number of viewer groups	Would affect the second fewest number of viewer groups	Would affect the greatest number of viewer groups	Would affect the second greatest number of viewer groups
Decreased visual quality in the Robertson Boulevard landscape unit	Would affect the greatest number of viewer groups	Would affect fewer viewer groups than the SR 152 (North) to Road 13 Wye Alternative	Would affect the fewest number of viewer groups	Would affect fewer viewer groups than the SR 152 (North) to Road 13 Wye Alternative
Decreased visual quality in the Fairmead landscape unit	Would affect fewer residential viewers than the SR 152 (North) to Road 19 Wye Alternative	Would affect the greatest number of residential viewers	No effect	Would affect fewer residential viewers than the SR 152 (North) to Road 19 Wye Alternative
Visual quality changes in the freeway-expressway landscape unit	Would result in less visual improvement than the SR 152 (North) to Road 19 Wye Alternative	Would result in the greatest visual improvement	No effect	Would result in less visual improvement than the SR 152 (North) to Road 19 Wye Alternative
Cultural Resources				
Impacts related to one historic property, the Robertson Boulevard Tree Row	4,516 linear feet disturbed	4,428 linear feet disturbed	5,590 linear feet disturbed	4,088 linear feet disturbed

Resource Category	Impact under the Central Valley Wye Alternatives			
	SR 152 (North) to Road 13 Wye	SR 152 (North) to Road 19 Wye	Avenue 21 to Road 13 Wye	SR 152 (North) to Road 11 Wye
Regional Growth				
Peak-year 2020 direct employment	+870	+950	+850	+820
Percent of projected 2020 construction employment	+4%	+5%	+4%	+4%
Peak-year 2020 total employment impacts (direct, indirect, induced)	+3,020	+3,310	+2,960	+2,840
Total employment over 4 years of construction	+8,610	+9,450	+8,470	+8,120

Source: Authority and FRA 2018

SR State Route
SJVAB San Joaquin Valley Air Basin
NO_X nitrogen oxide
GHG greenhouse gas
CO_2e carbon dioxide equivalent
CY cubic yards
EMF electromagnetic frequency
EMI electromagnetic interference
MMBtu million British thermal units
PEC potential environmental concern
NRCS Natural Resources Conservation Service
FHWA Federal Highway Administration
UPRR Union Pacific Railroad
HSR high-speed rail
CH critical habitat

[1] The analysis of construction emissions for the Central Valley Wye alternatives is based on a fleet average mix of engine tier standards (i.e. Tiers 1-4). Subsequent to the preparation of the analysis, the Authority implemented a new mandate for all construction contractors to use construction equipment that meets the more stringent Tier 4 standards. As such, the analysis as prepared represents a conservative estimate of emissions.
[2] Year 2020 represents the estimate of worst-case construction-related air quality emissions. Emissions estimates for all other years are less than the year 2020 emissions estimates presented herein. See Section 3.3.6.3, Central Valley Wye Alternatives, Table 3.3-11 through Table 3.3-14 for emissions estimates for all years.

Table S-3 Comparison of Operations Impacts by Alternative

Resource Category	Impact under the Central Valley Wye Alternatives			
	SR 152 (North) to Road 13 Wye	SR 152 (North) to Road 19 Wye	Avenue 21 to Road 13 Wye	SR 152 (North) to Road 11 Wye
Noise and Vibration				
Exposure of sensitive receptors to operations (train) noise – severely affected (number of single-family residences)	27	23	39	35

Source: Authority and FRA 2017
SR State Route

S.8.3 Summary of Cumulative Impacts under NEPA and CEQA

NEPA and CEQA both require lead agencies to analyze a project's cumulative impacts in addition to its direct impacts because cumulative impacts can result from individually minor but collectively detrimental actions taking place over a period. As described in detail in Section S.8, Central Valley Wye Alternatives Evaluation, all four of the Central Valley Wye alternatives would considerably contribute to the following construction-related cumulative impacts:

- Permanent conversion of Important Farmland to nonagricultural use
- Degradation of existing visual character or quality of views from removal of trees from Robertson Boulevard Tree Row
- Partial destruction of a known historic resource, Robertson Boulevard Tree Row, as a result of the removal of trees

Mitigation measures for resource impacts are provided in the resource discussions in Chapter 3 in the Draft Supplemental EIR/EIS. No additional mitigation is proposed for these cumulative impacts. No operations-related cumulative impacts were identified.

S.8.4 CEQA Summary of Impacts and Mitigation

This section provides a summary of the CEQA determination of significant impacts for the Central Valley Wye alternatives. Where feasible, mitigation measures would be applied to avoid or reduce impacts from construction and operations of the Central Valley Wye alternatives. A determination of the level of significance after mitigation measures also is required under CEQA. In most cases these mitigation measures would reduce the impacts to a less-than-significant level. The following resources would not have significant impacts under CEQA for any of the Central Valley Wye alternatives and would not require mitigation:

- Transportation
- EMF/EMI
- Public utilities and energy
- Hydrology and water resources
- Geology, soils, seismicity, and paleontological resources
- Safety and security
- Regional growth

Table S-4 describes significant CEQA impacts for each resource, summarizes the applicable mitigation measures, and indicates the level of significance after mitigation. This information is also provided for resources where cumulative impacts have been identified to which the Central Valley Wye alternatives would considerably contribute.

Table S-4 CEQA Summary of Resources with Significant Impacts and Applicable Mitigation Measures

Resource Category	Summary of Significant (CEQA) Impacts Before Mitigation[1]	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation[2]
Air Quality and Global Climate Change[3]			
Construction	Construction emissions resulting in air quality impacts and exceeding applicable San Joaquin Valley Control District CEQA thresholds for NOx and PM_{10} emissions Construction emissions released from transportation of materials resulting in criteria pollutant emissions that could exceed Bay Area Air Quality Management District CEQA thresholds for NOx	Offset construction and off-site emissions Reduce criteria exhaust emissions from construction equipment, on-road vehicles, and concrete batch plants Offset construction emissions through a San Joaquin Valley Air Pollution Control District voluntary emissions reduction agreement Purchase emissions offsets	Less than significant
Cumulative—Construction	Construction emissions resulting in air quality impacts and exceeding applicable San Joaquin Valley Control District CEQA thresholds for NOx and PM_{10} emissions Construction emissions released from transportation of materials resulting in criteria pollutant emissions that could exceed Bay Area Air Quality Management District CEQA thresholds for NOx	Offset construction and off-site emissions Reduce criteria exhaust emissions from construction equipment, on-road vehicles, and concrete batch plants Offset construction emissions through a San Joaquin Valley Air Pollution Control District voluntary emissions reduction agreement Purchase emissions offsets	Not cumulatively significant
Noise and Vibration			
Construction	Temporary or periodic increases in noise levels that would affect sensitive receptors	Noise control measures to meet noise limits Prepare a noise monitoring program	Less than significant
	Permanent exposure of sensitive receptors to traffic-generated noise from realigned state highways and local roads	Implement HSR noise guidelines	Significant
Operations	Intermittent permanent operations (train) noise that would affect sensitive receptors	Implement HSR noise guidelines Analyze noise during final design	Significant
Biological Resources and Wetlands			
Construction	Construction activities that include removal or disruption of plants and vegetation; habitat degradation, conversion, or modifications; placement of temporary and permanent infrastructure; in-water work; removal, filling, or interruption of wetlands and aquatic features; land disturbance; vehicle	Pre-construction surveys to identify special-status plants in areas where permission was not granted prior to construction, allowing for the removal or avoidance of special-status plant species disturbance	Less than significant

Resource Category	Summary of Significant (CEQA) Impacts Before Mitigation[1]	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation[2]
	traffic; altered topography; and permanent linear barriers to wildlife movement that would affect: Special-status plant species Special-status wildlife species Special-status plant communities Jurisdictional aquatic resources Critical habitat Wildlife movement corridors	Preparation and implementation of a habitat management plan to create, restore, enhance, and preserve habitat affected by construction Pre-construction surveys of potential or suitable habitat, breeding habitat, presence (or absence) of special-status or listed species, larvae or larvae emergence, and habitat for nesting raptors or active nests Avoidance, or if avoidance is not feasible, coordination with the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service to determine proper relocation Removal of special-status plant species prior to disturbance Obtain a take authorization if required for removal of a species Overseeing of activities by a biological monitor to avoid or relocate special-status amphibians and reptiles to suitable habitat, and to document compliance of activities occurring in habitat areas of identified species On-site and off-site habitat restoration and preservation for special-status species, jurisdictional waters, and critical habitat Development of a fish rescue plan if and when water depths are low within the cofferdam (i.e., the area from which water is pumped to permit construction) Monitor underwater sound pressure levels during bridge construction Apply BMPs seasonally to avoid habitat for special-status species, avoid or reduce impacts on species, and to reduce impacts on vernal pools in temporary impact areas Installation and maintenance of exclusion fencing within suitable habitat for special-status amphibians and reptiles	

Resource Category	Summary of Significant (CEQA) Impacts Before Mitigation[1]	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation[2]
		Require project biologist to verify structures are bird and raptor safe Permanent security fencing adjacent to wildlife movement corridors and natural habitats Control of construction lighting	
Cumulative—Construction	Permanent conversion of existing land uses, removal and disturbance of vegetation, increased vehicle traffic, and topography alteration that would impact special-status plants and wildlife Removal or disruption of vegetation that would impact special-status plant communities Filling of federal and state jurisdictional waters and wetlands Destruction or degradation of federally designated Critical Habitat Increased turbidity and siltation in essential fish habitat Barriers to and degradation of wildlife movement corridors	Protocol-level surveys to identify species for avoidance, relocation, or propagation Preparation and implementation of a habitat management plan to create, restore, enhance, and preserve habitat affected by construction Salvage, relocate, propagate On-site and off-site restoration and preservation Delineation of habitat features as environmentally sensitive areas On-site and off-site restoration of fish habitat and fish rescue Inclusion of wildlife crossing features Permanent fencing of right-of-way to prevent intrusion onto tracks	Not cumulatively significant
Hazardous Materials and Wastes			
Construction	Potential release of hazardous materials and wastes near schools	Limit use of extremely hazardous materials near schools Monitor all extremely hazardous substances Permit no extremely hazardous substances within 0.25 mile of a school	Less than significant
Socioeconomics and Communities			
Construction	Division or disruption of the community of Fairmead that would affect community cohesion (excluding Avenue 21 to Road 13 Wye Alternative)	Measures to reduce impacts associated with the division of residential neighborhoods and communities	Significant
Cumulative—Construction	Closure of one community meeting center (Fairmead Elementary School) in Fairmead	Measures to reduce impacts associated with the division of residential neighborhoods and communities	Not cumulatively significant

Resource Category	Summary of Significant (CEQA) Impacts Before Mitigation[1]	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation[2]
Land Use and Development			
Construction	Physical conversion of land use resulting in restricted access and changes to land use patterns (excluding Avenue 21 to Road 13 Wye Alternative)	Outreach to affected persons and organizations to understand relocation needs and identify options that strengthen community cohesion Collaborate with the city or county to advance the final design through a collaborative, context-sensitive solutions approach	Less than significant
Agricultural Farmland			
Construction	Permanent conversion of Important Farmland to nonagricultural use Creation of remnant parcels of Important Farmland	Measures to preserve Important Farmland	Significant
Cumulative—Construction	Permanent conversion of Important Farmland to nonagricultural use	Measures to preserve Important Farmland Coordinate construction activities with utility providers Compliance with design standards	Cumulatively significant
Parks, Recreation, and Open Space			
Construction	Crossing of corridors that would limit future development opportunities and use of planned recreational trail corridors (SR 152 (North) to Road 19 Wye Alternative only)	Undercrossings below HSR tracks and other design features that allow for future development of trails	Less than significant
Aesthetics and Visual Resources			
Construction	Degraded visual quality for residential viewers	Minimize visual and light disturbance Minimize visual disruption, such as through use of screening	Less than significant
	Degradation of visual quality in the Robertson Boulevard Landscape Unit Degradation of visual quality in the Fairmead Landscape Unit for residential viewers (excluding Avenue 21 to Road 13 Wye Alternative)	Vegetation screening Landscape treatments Incorporate design criteria that can adapt to local context Replant unused portions of land	Significant

Resource Category	Summary of Significant (CEQA) Impacts Before Mitigation[1]	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation[2]
Cumulative—Construction	Degradation of existing visual character or quality of views from removal of trees from Robertson Boulevard Tree Row	Vegetation screening Landscape treatments Incorporate new trees and landscaping	Cumulatively significant
Cultural Resources			
Construction	Ground-disturbance of unknown or unrecorded archaeological resources	Archaeological and built environment treatment plans Mitigate impacts on archaeological and built environment resources identified during phased identification Follow appropriate schedule restrictions and halt work in the event of an unanticipated discovery	Less than significant
	Destruction of a known historic resource, the Robertson Boulevard Tree Row	Mitigate impacts of historic architectural resources or settings	Significant
Cumulative—Construction	Removal of trees from Robertson Boulevard Tree Row	No mitigation is feasible to further reduce contributions to this impact	Cumulatively significant

Source: Authority and FRA 2017

[1] The determination before mitigation for the consideration of cumulative impacts is cumulatively significant.

[2] The determination after mitigation would be either Cumulatively Considerable or Not Cumulatively Considerable under CEQA.

[3] The analysis of construction emissions for the Central Valley Wye alternatives is based on a fleet average mix of engine tier standards (i.e. Tiers 1-4). Subsequent to the preparation of the analysis, the Authority implemented a new mandate for all construction contractors to use construction equipment that meets the more stringent Tier 4 standards. As such, the analysis as prepared represents a conservative estimate of emissions.

CEQA California Environmental Quality Act
NOx nitrogen oxides
PM_{10} particulate matter less than or equal to 10 micrometers in diameter
CEQA California Environmental Quality Act
HSR High-speed rail
SR State Route
BMP best management practice

S.8.5 Section 4(f) and Section 6(f)

S.8.5.1 Section 4(f)

Three Section 4(f) properties are present in the Central Valley Wye alternatives resource study areas for recreational and cultural resources: one outdoor play area (at the Fairmead Elementary School) and two historic resources (the Chowchilla Canal and Robertson Boulevard Tree Row).

The Fairmead Elementary School play areas would not incur a use under Section 4(f) because no land from the play areas would be used by any of the Central Valley Wye alternatives. Moreover, permanent noise and visual impacts associated with operations would not be of a severity that the protected activities, features, or attributes that qualify the play areas for protection under Section 4(f) are substantially impaired.

What are Section 4(f) properties?

Section 4(f) properties are publicly owned lands of parks, recreation areas, or wildlife and waterfowl refuges or publicly or privately owned lands of national, state, or local significance. Historic properties on or eligible for listing on the National Register of Historic Places may also qualify for protections under Section 4(f). A project that uses Section 4(f) properties may not be approved unless there are no prudent or feasible alternatives and the project includes all possible planning to minimize harm to such properties.

The Chowchilla Canal would be crossed by all of the four Central Valley Wye alternatives and therefore would incur a use; however, it would not be realigned nor impaired by any of the alternatives; therefore, there would be no adverse effect on this historic property. Because the Central Valley Wye alternatives would not have an adverse effect on the Chowchilla Canal, FRA intends to make a *de minimis* impact determination (i.e., when the use of land from a Section 4(f) property is so minor that its permanent incorporation into a project would not adversely affect its features) for this resource and to notify the State Historic Preservation Office (SHPO) during the Section 106 process. FRA cannot make the determination of *de minimis* impact for the Chowchilla Canal without the written concurrence from the SHPO on the finding of no adverse effect.

The Robertson Boulevard Tree Row is the other historic resource that would incur a use under each of the Central Valley Wye alternatives because all four of the wye alternatives would cross the tree row, resulting in the physical demolition, destruction, damage, or substantial alteration of a portion of the Robertson Boulevard Tree Row. Under each of the four alternatives, the Robertson Boulevard Tree Row would incur an unavoidable use under Section 4(f). FRA anticipates that the use of the Robertson Tree Row would result in an adverse effect on this historic property, and therefore FRA is not proposing to make a finding of *de minimis* impact under Section 4(f).

Because all four Central Valley Wye alternatives would result in a Section 4(f) use of the Robertson Boulevard Tree Row, and that use is not *de minimis*, the FRA had completed a Section 4(f) evaluation, which considers the potential for feasible and prudent avoidance alternatives and includes a least-harm analysis. The FRA has preliminarily concluded there are no feasible and prudent avoidance alternatives for the Robertson Boulevard Tree Row and the SR 152 (North) to Road 11 Wye Alternative is the alternative that causes the least overall harm. As with the other SR 152 alternatives, SR 152 (North) to Road 11 Wye Alternative would remove trees at a location that has been previously disturbed, but would also result in the fewest linear feet of disturbance among all the Central Valley Wye alternatives. The FRA and the Authority are continuing coordination, as appropriate, with the SHPO. During the FRA's consideration of its decision and during final design, additional measures to minimize harm may be agreed on to further reduce potential impacts on Section 4(f) properties. For additional information, see Chapter 4, Section 4(f) and Section 6(f) Evaluations, of the Draft Supplemental EIR/EIS.

S.8.5.2 Section 6(f)

Section 6(f) properties are recreation resources funded by the Land and Water Conservation Fund Act. Land purchased with these funds cannot be converted to nonrecreation use without coordination with the National Park Service and mitigation that includes replacement of the quality

and quantity of land used. No Section 6(f)-protected property was identified as part of this review. Therefore, there would be no Section 6(f) impacts associated with any of the Central Valley Wye alternatives.

S.8.6 Environmental Justice

Environmental justice in terms of transportation projects can be defined as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, from the early stages of transportation planning and investment decision-making through construction, operations, and maintenance. The process must have evaluated, to the extent practicable and permitted by law, the potential disproportionately high adverse human health and environmental impacts of their programs, policies, and activities on minority and low-income populations.

The Central Valley Wye alternatives would result in local and regional benefits to the low-income and minority populations that constitute a large percentage of the region. These benefits would include improvements in mobility within the region, air quality improvements, and new employment opportunities during construction and operations. Because low-income and minority populations comprise the majority of the population within the area, these project benefits are likely to accrue to a greater degree to low-income and minority populations.

The design of the Central Valley Wye alternatives would minimize or avoid impacts related to health risks associated with electromagnetic fields and electromagnetic interference; geology, soils, and seismicity; safety and security; the disruption of public utilities and services; biological resources and wetlands; agricultural farmland; and land use and development. Additionally, there would be no impacts on community facilities or public services that serve low-income and minority populations. These topics do not have the potential to adversely affect low-income and minority populations (see discussion of these resource topics in Chapter 5, Environmental Justice, in the Draft Supplemental EIR/EIS for more information).

Laws and Regulations that Govern Environmental Justice:

- Title VI of the Civil Rights Act (Public Law 88-352)
- Presidential Executive Order (USEO) 12898, known as the Federal Environmental Justice Policy and the Presidential Memorandum accompanying USEO 12898
- Improving Access to Services for Persons with Limited English Proficiency (USEO 13166)
- U.S. Department of Transportation Order 5610.2(a), which updates the original Environmental Justice Order
- The Council on Environmental Quality's Environmental Justice Guidance under NEPA (CEQ 1997)
- Americans with Disabilities Act (42 U.S.C. § 12101 et seq.)
- Uniform Relocation Assistance and Real Property Program (42 U.S.C. § 4601 et seq.)
- California Government Code Section 65040.12(e)
- California Global Warming Solutions Act of 2006: Greenhouse Gas Reduction Fund (Assembly Bill 32, Chapter 488, Statutes of 2006)

Additionally, the Authority's Title VI policy and plan and a Limited English Proficiency policy and plan address the Authority's commitment to nondiscrimination on the basis of race, color, national origin, age, sex, or disability and to provide language assistance to individuals with limited English proficiency.

The Central Valley Wye alternatives would result in adverse effects on low-income and minority populations residing along the project corridor. The greatest effects would occur within the low-income and minority community of Fairmead under the SR 152 (North) to Road 19 Wye Alternative, followed by the SR 152 (North) to Road 13 Wye and SR 152 (North) to Road 11 Wye Alternatives. These alternatives would result in direct impacts on Fairmead associated with noise and vibration, aesthetics, community division, and residential displacements. The Avenue 21 to Road 13 Wye Alternative would mostly avoid the community of Fairmead, resulting in few direct or indirect impacts on that community. Resource-specific mitigation measures would reduce potential adverse effects on Fairmead. Specific community improvements are proposed as mitigation under the SR 152 alternatives that would reduce community cohesion impacts on Fairmead through the provision of roadway improvements and a multiuse trail that would ensure

access is maintained within the community, improve pedestrian and bicycle safety, and revitalize the community aesthetically through landscaping and streetscaping.

The Authority has conducted extensive coordination with the community of Fairmead to identify and evaluate measures that could mitigate impacts beyond the resource-specific measures that, for example, reduce noise, visual impacts, and community division stemming from construction and operations of the Central Valley Wye alternatives and offset the HSR contribution to stressors on the community. The Authority proposes mitigation measures to address environmental justice effects on the community of Fairmead, including the purchase of Fairmead Elementary School after closure and transferring it back to Madera County for operation and maintenance as a community center and provision of funding assistance to connect Fairmead to the Chowchilla Wastewater Treatment Plant and the nearest safe and reliable municipal water supply system. These mitigation measures, which would be applied only with construction and operation of any of the SR 152 alternatives, would reduce the negative effect of existing stressors in the community, improve the quality of life of Fairmead residents, and remove a constraint to development in Fairmead. With the beneficial effect of the mitigation proposed for the SR 152 alternatives, FRA has preliminarily determined that there would be no disproportionately high and adverse effects on the community of Fairmead from construction and operations of any of the Central Valley Wye alternatives. The preliminary determination assumes that agreement can be reached with the necessary parties to implement the mitigation measures. A final determination as to whether there are disproportionately high and adverse effects on Fairmead will be included in the Merced to Fresno Section: Central Valley Wye Final Supplemental EIR/EIS.

S.8.7 Capital Cost

The costs reflect the total effort and materials for each of the Central Valley Wye alternatives in 2015 dollars. The estimates are for common HSR elements and construction methods. The design includes costs for at-grade and elevated profiles, structure types, placement of retaining walls, and earth fill. For additional information, see Chapter 6, Capital Cost Estimates, in the Draft Supplemental EIR/EIS. The total estimated capital costs for each alternative are presented in Table S-5.

Table S-5 Capital Cost by Alternative (2015$ Thousands)

Alternative	Cost
SR 152 (North) to Road 13 Wye	$3,834,181
SR 152 (North) to Road 19 Wye	$4,208,116
Avenue 21 to Road 13 Wye	$3,764,704
SR 152 (North) to Road 11 Wye	$3,613,068

Source: Authority 2016d
Note: Costs are rounded to the nearest thousand dollar.

S.9 Areas of Controversy

Based on the public outreach efforts throughout the environmental review process, the following are known areas of controversy associated with the Central Valley Wye alternatives:

- Selection of the preferred HSR alternative.
- Impacts on special-status plants and wildlife and wildlife habitat preserves.
- Impacts on corridor communities (including noise, air quality and climate change impacts, 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.

S.10 Next Steps in the Environmental Process

The Authority and FRA are circulating the Draft Supplemental 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 vicinity of the Central Valley Wye, and on the Authority's website at: http://hsr.ca.gov/Programs/Environmental_Planning/supplemental_merced_fresno.html. The document must receive the same circulation and review as was conducted for the Merced to Fresno Final EIR/EIS in accordance with CEQA Guidelines Section 15163(a)(1); CEQ Section 1502.9. The following discussion outlines the next steps in the environmental process, from public and agency comment on the Draft Supplemental EIR/EIS to construction and operation.

S.10.1 Public and Agency Comment

The Draft Supplemental EIR/EIS will be circulated for a 45-day review and comment period, which will include public meetings and workshops and one public hearing. Information about the schedule of public meetings and hearings is available on the Authority's website at: http://hsr.ca.gov/Programs/Environmental_Planning/supplemental_merced_fresno.html .

S.10.2 Identification of Preferred Alternative

The Authority's and FRA's Preferred Alternative is the SR 152 (North) to Road 11 Wye Alternative. This identification was based on balancing the impacts of the Central Valley Wye alternatives on the natural environment and community resources presented in the Draft Supplemental EIR/EIS in the context of CEQA, NEPA, stakeholder preferences, and capital construction costs. The Preferred Alternative achieves the HSR system's purpose and need while resulting in fewer impacts on both the natural environment and community resources than the other three alternatives. It also better meets other non-environmental criteria because of its proximity to existing transportation corridors. Additional supporting information for the recommendation of the Preferred Alternative is provided in Chapter 8, Preferred Alternative, in the Draft Supplemental EIR/EIS.

S.10.2.1 FRA Decisionmaking

The FRA's environmental process is completed with publication of a Final Supplemental EIR/EIS and a ROD. The ROD will describe the project and alternatives considered, describe the selected alternative, and identify the environmentally preferable alternative; make environmental findings and determinations with regard to air quality conformity, the Endangered Species Act, Section 106, Section 4(f), and environmental justice; and identify any required mitigation measures.

The State of California has requested that the FRA assign its responsibilities under NEPA and related federal environmental laws to the state pursuant the Surface Transportation Project Delivery Program. Since the state's application remains under review, FRA remains the NEPA lead agency for the Draft Supplemental EIR/EIS. However, if the FRA approves the state's application prior to completion of the NEPA process, the Authority may issue the ROD and finalize any related environmental reviews in lieu of FRA.

S.10.2.2 U.S. Army Corps of Engineers Decisionmaking

Construction of the Central Valley Wye alternatives would require a permit from the USACE under Section 404 of the Clean Water Act (33 U.S.C. § 1251 et seq.), Section 10 of the Rivers and Harbors Act (33 U.S.C § 403), and Section 14 of the Rivers and Harbors Act (33 U.S.C. § 408). The USACE is using the Draft Supplemental EIR/EIS to integrate requirements of NEPA and its permitting responsibilities (including the USEPA's Section 404(b)(1) Guidelines) to provide a single document that streamlines and enables informed decisionmaking, including but not limited to adoption of the EIS, issuance of necessary RODs, Section 404 permit decisions,

Section 10 permit decisions, and Section 408 permit decisions (as applicable). This single document can be used 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.10.2.3 Surface Transportation Board

The Authority received STB permission to construct the Merced to Fresno Section in June 2013, but anticipates seeking additional permission from the STB specific to the Central Valley Wye alternative selection. On completion of the environmental process and issuance of a ROD by the FRA and upon request from the Authority, the STB is anticipated to issue a final decision on whether to approve the Central Valley Wye alternatives (the final decision also serves as the STB's ROD under NEPA). In making its final decision, the STB will consider the transportation merits, environmental record, and recommendations from the STB's Office of Environmental Analysis on the Preferred Alternative and mitigation measures. No project-related construction on the Wye may begin until the STB's final decision has been issued and has become effective.

S.10.2.4 California High-Speed Rail Authority Decisionmaking

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

- Changes or alternatives have been required or incorporated into the project that avoid or substantially lessen the significant environmental impact as identified in the Final Supplemental EIR.
- Changes or alternatives 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 HSR alternatives identified in the Final Supplemental 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 would have a significant impact on the environment. If the Authority approves a project that would result in the occurrence of a significant impact identified in the Final Supplemental EIR but not avoided or substantially lessened, CEQA requires the preparation of a Statement of Overriding Considerations. This provides specific reasons to support the project, including economic, legal, social, technological, or other benefits of the proposed project that outweigh adverse environmental impacts. If such a statement is prepared, the Authority's NOD will reference the statement.

For purposes of the Merced to Fresno Section: Central Valley Wye Draft Supplemental EIR/EIS, project approval would include selection of an alternative.

S.11 Project Implementation

The anticipated dates for completion of key milestones as part of the environmental process are shown in Table S-6. 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 before construction. Information on the implementation of the project, the issuance of the FRA's ROD and the Authority's NOD can be found in the Authority's 2018 Business Plan (Authority 2018).

Table S-6 Central Valley Wye Alternatives Milestone Schedule

Date	Key Milestones
Fall 2018	Public release of Draft Supplemental EIR/EIS
Spring 2019	Final Supplemental EIR/EIS published
Summer 2019	Notice of Determination and Record of Decision

Source: Authority and FRA 2017