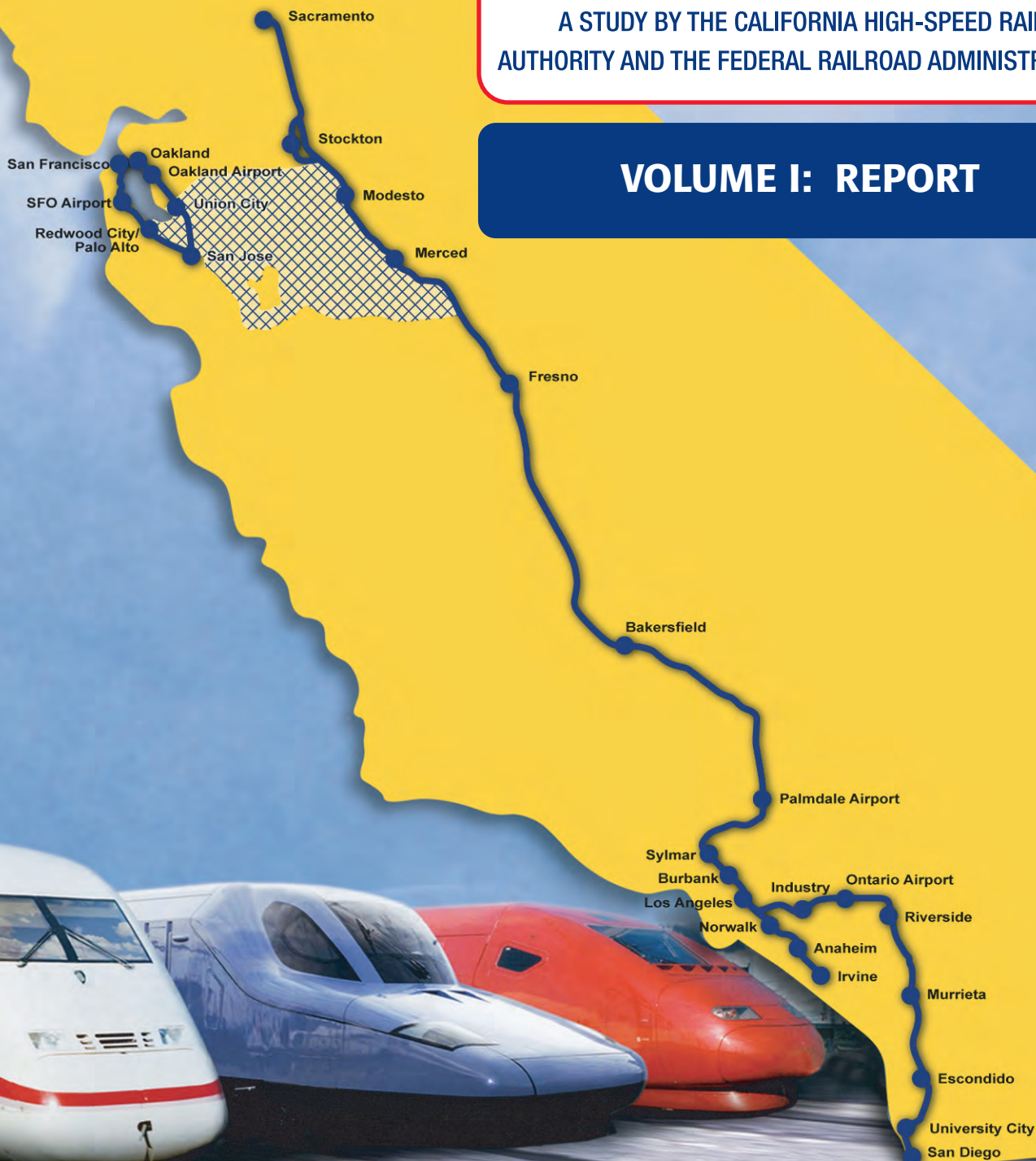


Final Program Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for the *proposed* California High-Speed Train System

A STUDY BY THE CALIFORNIA HIGH-SPEED RAIL AUTHORITY AND THE FEDERAL RAILROAD ADMINISTRATION

VOLUME I: REPORT



**Final Program Environmental Impact
Report/Environmental Impact Statement
(EIR/EIS) for the *Proposed* California
High-Speed Train System**

Volume I: Report

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California High-Speed Train

Final Program Environmental Impact Report/Environmental Impact Statement

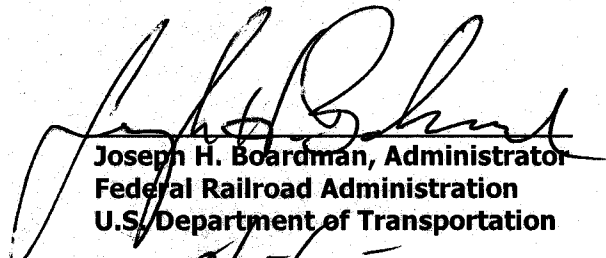
Pursuant to:

California Environmental Quality Act, P.R.C. 21000 *et seq.*; State of California CEQA Guidelines, California Administrative Code, 15000 *et seq.*; and National Environmental Policy Act (42 U.S.C. 4332 *et seq.*), 40 C.F.R. Part 1500 and 64 Fed. Reg. 28545

Prepared by the
California High Speed Rail Authority
and the
Federal Railroad Administration
with Cooperating Agencies:
U.S. Environmental Protection Agency
Federal Highway Administration
Federal Transit Administration
Federal Aviation Administration
U.S. Fish and Wildlife Service
U.S. Army Corps of Engineers


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Abstract: This document considers, describes and summarizes the environmental impacts at a programmatic level of analysis of a proposed high-speed train system for intercity travel in California and alternatives that connect the major metropolitan areas of the state from Sacramento, Oakland, San Francisco, and San Jose, through Stockton, Modesto, Merced, Fresno, and Bakersfield, to Los Angeles, Orange County, and San Diego. Should the proposal be advanced, subsequent project level environmental review would consider site-specific environmental impacts. Three alternatives are considered: 1) No Project Alternative; 2) Modal Alternative (a combination of potential improvements to existing highway and air transportation facilities); and 3) High-Speed Train Alternative (a steel-wheel-on-steel-rail high-speed train system and stations). The need to improve California's transportation infrastructure is directly related to the population growth and increased intercity travel demand expected over the next 20 years and beyond, and the increased travel delays and congestion that would result on California's highways and at airports. The preferred system alternative is the high-speed train alternative. The high-speed train alternative is comprised of preferred alignments and stations for a system over 700 miles (1,127 kilometers) long and capable of speeds in excess of 200 miles per hour (322 kilometers per hour) on tracks that are mostly dedicated, fully grade-separated, and fenced. The Modal Alternative analyzed would include adding over 2,970 lane miles (4,780 lane kilometers) to existing highways and over 90 gates and five runways to existing California airports. Potential environmental impacts of the alternatives include displacement of commercial and residential properties; community and neighborhood disruption; increased noise and vibration; local traffic impacts associated with stations; impacts on historic properties and archaeological sites; impacts on parks and recreation resources; visual impacts; impacts on sensitive biological resources and wetlands; use of energy; and impacts on agricultural lands. Design practices and mitigation strategies are described to guide high speed train project level environmental review to avoid or minimize potential impacts; such strategies would be further refined in project-level environmental review.

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SUMMARY

S.1 INTRODUCTION AND BACKGROUND

The California High Speed Rail Authority (Authority) proposes a high-speed train (HST) system for intercity travel in California between the major metropolitan centers of Sacramento and the San Francisco Bay Area in the north, through the Central Valley, to Los Angeles and San Diego in the south. The HST system is projected to carry as many as 68 million passengers annually by the year 2020. The Authority adopted a final business plan (Business Plan) in June 2000, which examined the economic viability of a train system capable of speeds in excess of 200 miles per hour (mph) (322 kilometers per hour [kph]) on a fully grade-separated track, with state-of-the-art safety, signaling, and automated control systems. Following the adoption of the Business Plan, the Authority initiated this environmental review process for compliance with state and federal laws, in particular the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA).

The Authority is the project sponsor and the lead agency for purposes of the state CEQA requirements. The Federal Railroad Administration (FRA) is the federal lead agency for compliance under NEPA. The Federal Highway Administration (FHWA), U.S. Environmental Protection Agency (EPA), U.S. Army Corps of Engineers (USACE), Federal Transit Administration (FTA), Federal Aviation Administration (FAA), and U.S. Fish and Wildlife Service (USFWS) are cooperating agencies for the federal environmental review process. The Authority and the FRA, in consultation with the cooperating agencies, have determined that a program-level, or first tier, environmental review and document is appropriate for a statewide project of this scope. The program environmental impact report/environmental impact statement (Program EIR/EIS) addresses the potential environmental impacts of the proposed HST system at a conceptual and planning level.

If the Authority should decide to proceed with the proposed HST system after the completion of this Program EIR/EIS process, the Authority envisions seeking possible future federal financial support for the system that may be provided through the FRA, which is within the U.S. Department of Transportation (DOT). The FRA and the DOT have several loan and loan guarantee programs that might be potential sources of future financial assistance. Although no existing grant or federal bond financing programs currently provide such support, several proposals to create such programs are pending before Congress. In addition to possible funding, a Rule of Particular Applicability may be required from the FRA to establish safety standards for the proposed HST system for operating at speeds over 200 mph (322 kph) and for operations in shared-use rail corridors.

This Final Program EIR/EIS analyzes a proposed HST Alternative and compares it with a No Project/No Action (No Project) Alternative and a Modal Alternative (potential improvements to the highways and airports serving the same intercity travel demand as the HST Alternative). This Final Program EIR/EIS is being made available to the public in accordance with CEQA implementing guidelines and NEPA implementing regulations. In this Final Program EIR/EIS, the Authority has identified and the FRA has concurred with preferred HST corridors/general alignments, general station locations, recommended mitigation strategies, recommended design practices and further measures to guide development of the HST system at the project level to avoid and minimize potential adverse environmental impacts. Should the Authority advance the HST to the next stage of analysis, decisions made at the conclusion of the Program EIR/EIS process would focus subsequent phases of project development and environmental review on those alignment and station option most likely to yield acceptable site-specific solutions that best meet overall objectives for the proposed HST system.

S.2 STUDIES LEADING TO THE PROGRAM EIR/EIS

Efforts to consider potential impacts on the environment from a proposed HST system were started as early as 1994 by the High Speed Rail Commission. The Authority started its environmental effort in 1998 with feasibility studies and community outreach to identify a wide range of technology and corridor alternatives to meet intercity travel needs linking major metropolitan areas in California.

The Notice of Preparation (NOP) for this Program EIR/EIS was released April 6, 2001, and the Notice of Intent (NOI) was published in the Federal Register on May 2, 2001. The scoping process was followed by a systematic screening analysis to define and narrow the range of alternatives to be considered in the Program EIR/EIS. For the HST system, a wide range of alignment and station options were assessed using criteria reflective of the general purpose and need for the project and consistent with the Clean Water Act Section 404 alternatives analysis process. Key criteria included:

- Maximize ridership and revenue potential by serving key population centers.
- Maximize intermodal connections with other transportation facilities.
- Maximize compatibility with existing and planned land uses.
- Minimize travel time to be competitive with other modes of travel.
- Minimize operating and capital costs.
- Minimize impacts on natural resources (such as wetlands, wildlife corridors, habitat for special-status species, and floodplains) and farmlands.
- Minimize adverse social and economic impacts.
- Minimize impacts on parks and cultural resources.
- Avoid areas with geologic/seismic and soils constraints.
- Avoid areas with potential hazardous materials.

Constructability and practicability of alignments were also considered in terms of the extent of tunneling, construction issues, capital costs, and right-of-way constraints.

The system-wide alternatives carried forward for environmental evaluation in the EIR/EIS are the No-Project, Modal and HST Alternatives. The screening process identified the HST corridors, alignment options, and station locations to be removed from further analysis and those to carry forward for analysis in this Program EIR/EIS.

S.3 PURPOSE OF AND NEED FOR A HIGH-SPEED TRAIN SYSTEM IN CALIFORNIA

The purpose of the proposed HST system is to provide a reliable mode of travel, which links the major metropolitan areas of the state and delivers predictable and consistent travel times. Further objectives are to provide an interface with commercial airports, mass transit, and the highway network and to relieve capacity constraints of the existing transportation system as intercity travel demand in California increases, in a manner sensitive to and protective of California's unique natural resources. The system needs to be practicable and feasible as well as economically viable. The system should maximize the use of existing transportation corridors and rights-of-way, be implemented in phases, and be completed by 2020.

The number of passengers traveling between cities in California is forecasted to increase up to 63% over the next 20 years, from 155 million passengers to as many as 253 million passengers. The state's population is projected to increase by 31% by 2020, with the highest growth rate expected in the Central

Valley and the greatest increase in population expected in the Los Angeles metropolitan area. The need for improved intercity transportation is demonstrated by the insufficient capacity of the existing transportation system to meet current and expected future travel demand. The need is also reflected in poor air quality, impaired travel reliability, and increased travel congestion and longer travel times. The interstate highway system and commercial airports serving the intercity travel market are currently operating at or near capacity in major parts of the system. In order to meet existing travel demand and future growth over the next 20 years and beyond, the highway and airport systems will require large public investment for maintenance and expansion.

S.4 ALTERNATIVES, INCLUDING HIGH-SPEED TRAIN

The Program EIR/EIS evaluates the No Project, Modal, and HST Alternatives ability to meet the same travel demand, a “representative demand” for intercity travel that is equivalent to the higher end figures expected for ridership on the HST system in 2020, according to the sensitivity analysis completed for the Authority’s Business Plan. The “representative demand” comprises an estimated total of 68 million annual passengers, 58 million intercity passengers and 10 million long distance commuters. Potential improvements or expansion of facilities are defined in both the Modal and HST Alternatives that would provide equivalent capacity to meet the “representative demand”, regardless of funding potential.

S.4.1 No Project Alternative

The Draft Program EIR/EIS compares the No Project, Modal, and HST Alternatives (Figure S.4-1). For the No Project Alternative, both existing and future conditions (2020) are considered. The No Project Alternative represents the state’s transportation system (highway, air, and conventional rail) as it existed in 1999–2000 and as it would be in 2020 with the addition of transportation projects currently programmed for implementation (already in funded programs/financially constrained plans) according to the State Transportation Improvement Program (STIP), regional transportation plans (RTPs) for all modes of travel, airport improvement plans, and intercity passenger rail plans.

The No Project Alternative addresses the geographic area serving the same intercity travel market as the proposed HST Alternative (generally, from Sacramento and the San Francisco Bay Area, through the Central Valley, to Los Angeles and San Diego). This alternative satisfies the statutory requirements under CEQA and NEPA for an alternative that does not include any new action or project beyond what is already committed.

As with all of the alternatives, the No Project Alternative is assessed herein for how it would satisfy the purpose and need and objectives regarding congestion, safety, reliability, and travel times. It is also evaluated for potential adverse impacts on the environment, and this information is used to compare the No Project Alternative with the potential impacts of the Modal and HST Alternatives.

S.4.2 Modal Alternative

There are currently two primary modes of intercity travel between the major urban areas of Oakland/San Francisco, San Jose, Sacramento, the Central Valley, Los Angeles, and San Diego: vehicles on the interstate highway system and state highways, and commercial airlines. Automobile and air transportation account for over 98% of the intercity travel in California. Conventional passenger trains (Amtrak) on freight and/or commuter rail tracks and buses provide secondary modes of intercity travel. The Modal Alternative serves the markets identified for the HST Alternative. The Modal Alternative consists of possible or hypothetical potentially feasible expansions of highways and airports in order to reduce the potentially greater environmental impacts that would result from new facilities.

The Modal Alternative is described as a set of hypothetical improvements representing a possible response to projected intercity travel demand that will not be met by the No Project Alternative. The

improvements described for each Modal Alternative component are capacity oriented (e.g., additional traffic lanes for highways with associated interchange reconfiguration and ramp improvements; additional gates and runways for airports). Overall, the highway improvements assumed under the Modal Alternative represent a total of over 2,970 additional lane miles (mi) (4,780 lane kilometers [km]). Two additional highway lanes would be required on most intercity highways, and as many as four additional lanes would be needed to meet forecasted demand in certain segments. Projected airport improvements would include over 90 new gates and five new runways statewide.

This Program EIR/EIS does not in any way recommend, endorse, or suggest that these improvements could or should be implemented at specific highways or airports. Neither is it assumed that an HST system would negate the potential need for some expansion of highways and airports in the state. The analysis of operations and travel conditions shows that automobile travel time, even with the highway improvements proposed under the Modal Alternative, would increase between San Francisco and Los Angeles from the current 6 hours (hrs) and 54 minutes (min) under the No Project in 2003 to 7 hrs and 24 min under the Modal Alternative in 2020. The estimated cost to implement the Modal Alternative would be over \$82 billion.

S.4.3 High-Speed Train Alternative

The High-Speed Train Alternative represents the proposed action, was identified as the preferred system alternative in the Draft Program EIR/EIS, and is identified as the environmentally preferred alternative under NEPA as well as the environmentally superior alternative under CEQA. The development of the HST Alternative involved consideration of a range of potential HST technologies, corridors, and alignment and station options within the corridors. Informed by previous studies and the scoping process, the Authority and the FRA evaluated potential HST corridors and defined those that would best meet the purpose of the proposed system. Through the screening process, reasonable and feasible technology, and alignment and station options were identified for analysis in this Program EIR/EIS. The general HST corridors and study regions are shown in Figure S.4-2. Following release and circulation of the Draft Program EIR/EIS and after review of comments received, the Authority identified a preferred set of HST alignments and stations that are described in this Final Program EIR/EIS.

State-of-the-art, electrically powered, high-speed, steel-wheel-on-steel-rail technology is being considered for a proposed system that would serve the major metropolitan centers of California, extending from the San Francisco Bay Area and Sacramento, through the Central Valley, to Los Angeles and San Diego. State-of-the-art safety, signaling, and automated train-control systems would be used. By 2020, the proposed service would include approximately 86 weekday trains in each direction to serve the study area intercity travel market, with 64 of the trains running between northern and southern California and the remaining 22 trains serving shorter distance markets. Most passenger service is assumed to run between 6:00 a.m. and 8:00 p.m. The proposed system would be capable of speeds in excess of 200 mph (322 kph), and the projected travel times would be designed to compete with air and auto travel. For example, the projected travel time by HST between San Francisco and Los Angeles would be just under 2 hrs and 30 min, and between Los Angeles and San Diego it would be just over one hour. The route representing the highest return on investment from the Authority's Business Plan is used to represent the HST Alternative for general comparison and evaluation with the other system alternatives. This representative system was forecast to carry between 42 and 68 million passengers in 2020, with the potential to accommodate higher ridership by adding trains or using longer trains. For a conservative assessment of potential environmental impacts, the higher ridership forecast is used in describing the proposed HST Alternative and its impacts, and is referred to in the Program EIR/EIS as the "representative demand" ridership. However, for resource topics where the high-end ridership forecasts would result in potential benefits (e.g., energy, air quality, and travel conditions), additional analysis is included to address the impacts associated with the low-end forecasts.

The proposed HST Alternative includes several corridor/alignment and station options. A steel-wheel-on-steel-rail electrified train is proposed, primarily on exclusive track with small portions of the route on shared track with other passenger rail operations. The train track would be at grade, in an open trench or tunnel, or on an elevated guideway, depending on terrain and physical constraints. To reduce potential environmental impacts, extensive portions of many of the alignment options are within or adjacent to existing rail or highway right-of-way, rather than on new alignment. Tunnel segments of the alignment are proposed through the mountain passes (Diablo Range/Pacheco Pass between south San Jose and the Merced, and the Tehachapi Mountains between Bakersfield and Sylmar).

The cost to implement the representative HST train system, which reflects a similar network of alignment and station options to that presented in the Authority's Business Plan, is estimated to range between \$33 billion and \$37 billion (2003 dollars), depending on the alignment and station options selected. The cost estimate includes right-of-way, track, guideway, tunneling, stations, and mitigation.

S.4.4 Areas of Controversy

In considering a choice of alignment and station options should the HST system be advanced for further consideration, the Authority would take into account potential impacts on natural resources, cost, effects on travel time and ridership, and public and agency input. Other choices the Authority might be responsible for should the HST system be advanced for further consideration would involve possible modifications to alignments by using more costly designs and construction techniques (e.g., tunnels and elevated guideways) or by moving the location of the alignment to avoid or minimize impacts on sensitive resources. The following are the principal areas of controversy from public and agency comments.

A. NORTHERN MOUNTAIN CROSSING

The removal during screening of the Altamont Pass corridor from further consideration for the HST Alternative in the Bay Area to Merced region has prompted many questions. The key difference between this corridor and those carried forward for analysis in the Program EIR/EIS is how they would serve Bay Area populations, and particularly how the HST system would operate in this region. Many comments were received urging further evaluation of the Altamont Pass as a potential alignment option. Federal agency comments and others noted the limitations of available environmental resource information regarding the Diablo Range mountain crossing. Therefore, in consideration of the concerns regarding this mountain crossing, a broad corridor between the Bay Area to Merced that includes the Altamont Pass Corridor (I-580) has been identified as part of the preferred HST Alternative. Subsequent to this Program EIR/EIS, the Authority and FRA intend to undertake further study to select a preferred HST alignment within this broad corridor.

B. SOUTHERN MOUNTAIN CROSSING

In the Bakersfield to Los Angeles Region, the Antelope Valley communities are actively seeking to have the HST serve the Antelope Valley area and to connect with the Palmdale Airport (a key hub for bus, auto, commuter rail). Compared to the more direct Interstate 5 (I-5) alignment, the Antelope Valley State Route 58 (SR-58)/Soledad Canyon alignment option would add travel time (10–12 minutes) between Bakersfield and Los Angeles and would have less potential for intercity ridership. However, the Antelope Valley SR-58/Soledad Canyon could provide superior connectivity and accessibility to the Antelope Valley and would have a higher potential for serving long-distance commuters to Los Angeles. While the SR-58/Soledad Canyon alignment would be 33–36 mi (53–58 km) longer, it would require less tunneling than the I-5 options and is estimated to have approximately the same capital cost.

Following receipt of comments on the Draft Program EIR/EIS and further review of southern mountain crossing tunneling and seismic issues, the Authority identified the SR-58/Soledad Canyon alignment option as preferred. The limited constructability of the I-5 alignment option combined with

a high risk of seismic impacts makes it likely that the I-5 alignment option would be impracticable. Regulatory agency comments have expressed concern about water resources in Soledad Canyon and potential impacts to wildlife. However, there is the opportunity to explore avoidance of Soledad Canyon at the project level and this option would have less potential impact on parklands than I-5.

C. IMPACTS ON PUBLIC PARKS, WILDLIFE AREAS, AND RECREATION RESOURCES

Environmental groups and resource agencies have expressed concern over potential HST impacts on public parks, wildlife habitat, and wildlife movement corridors. Numerous comments were received that about the potential for the HST to have adverse effects on wildlife movement and sensitive habitats. There has been particular concern over the Diablo Range HST alignment options, especially the two that go through Henry Coe State Park. Concerns have been expressed regarding potential impacts on Henry Coe State Park and potential impacts from bisecting areas north of the park. Concerns were raised regarding the potential for impacts on aquatic resources of national importance along Orestimba Creek. Concerns have been expressed regarding the east Bay Area design option through Don Edwards San Francisco Bay National Wildlife Refuge. In Southern California, there have been a considerable number of comments received regarding potential impacts to the Taylor Yard and Cornfield properties owned by California State Parks in the Sylmar to Los Angeles corridor. The California Department of State Parks and the State Parks Foundation have also raised concerns regarding potential impacts to a wide group of State parks.

The development of high-speed rail HST alignment and station options for the Program EIR/EIS included an extensive screening analysis in which many alignment and station options were eliminated from further consideration due according to several criteria including high potential for impacts on natural, park and recreational resources. The remaining alignment and station options were analyzed for their potential to impact the environment in the Program EIR/EIS to identify and compare potential impacts. Decisions made at the conclusion of the Program EIR/EIS would eliminate lesser options focus project-level environmental reviews on those alignment and station options most likely to yield acceptable site-specific solutions that best meet overall objectives. In this process, many additional alignment and station options were also eliminated from further consideration based on several criteria, including potential impacts on park and recreational resources. The preferred HST alignments and stations are principally along already disturbed transportation corridors thereby avoiding and minimizing many potential adverse effects to waters, wildlife, habitat and parklands. The broad corridor that has been identified as preferred for future investigation of the Northern Mountain Pass allows for avoidance of Henry Coe State Park¹ and the "Hayward Line to I-880" that avoids impacts to Don Edwards San Francisco Bay Wildlife Refuge has been identified as the preferred alignment between Oakland and San Jose. In addition, the Authority has identified a relatively wide corridor within which alignment variations will be studied at the project level for the preferred HST option between Burbank and Los Angeles Union Station.

The preferred high-speed rail alignment would not "run through" any State Parks. Only five State Parks are within 900 feet of the over 700-mile long preferred high-speed rail alignment: San Luis Reservoir State Recreation Area, Old Town San Diego, Colonel Allensworth, Taylor Yard, and McConnell State Recreation Area. The San Luis Reservoir State Recreation Area is within a broad corridor between the Bay Area and the Central Valley identified for further investigation. This corridor is generally bounded by the Pacheco Pass (SR-152) to the south and the Altamont Pass (I-580) to the north. The high-speed rail alignments studied as part of the Program EIR/EIS did not go through San Luis Reservoir State Recreation Area and any further analysis in this area will focus on alignment options that avoid impacts to this, and other State Parks. For the other four State Parks, the proposed high-speed rail alignment would be within existing, heavily used rail corridors, adjacent to the State Parks. The Authority and FRA believe that use of these existing rail corridors minimizes

¹ The Authority will not pursue alignment options Henry Coe State Park.

environmental impacts. Subsequent preliminary engineering and project level environmental review will provide further opportunities to avoid and minimize the potential effects to water resources, wildlife, habitat and 4(f) / 6(f) resources.

D. IMPACTS ON COASTAL COMMUNITIES

Concerns have been raised regarding potential impacts on coastal bluffs, beaches, views, historic areas, parklands, and sensitive communities along the coast for HST improvements to the existing LOSSAN rail corridor between South Orange County and San Diego. In the Los Angeles to San Diego via Orange County region, the proposed HST Alternative would extend no further south than from Los Angeles to Irvine. HST options between South Orange County and San Diego along the coast were eliminated as a result of potential environmental impacts and public and agency opposition.

E. STATION LOCATIONS

The selection of preferred station locations is anticipated to be controversial. The HST system would be limited in the number of stations it could serve compared to other rail transit systems. In this Program EIR/EIS, many more potential sites are being considered than would be practical for HST operations. Moreover, there are trade-offs in comparing the alternative station options. For example, downtown terminals that promote high ridership and connectivity often have considerable construction issues and high costs. Potential HST stations at Visalia and Los Banos were not included as part of the preferred HST Alternative. Visalia, Tulare County and Kings County as well as public comments from these counties strongly support a potential HST station at Visalia. The City of Los Banos supports a potential HST station to serve Los Banos.

S.4.5 Avoidance and Minimization

As currently planned the preferred HST system would avoid and minimize potential negative environmental consequences. Conceptual designs for the preferred HST system meet the project objectives and design criteria which set specific goals to avoid and minimize negative environmental consequences. Design and construction practices have been identified that would be employed as the project is developed further in the project specific environmental review, final design and construction stages. Key aspects of the design practices include, but are not limited to, the following:

- Minimize impact footprint and associated direct impacts to farmlands, parklands, biological and water resources through maximum use of existing transportation corridors.
- Minimize impact associated with growth through the selection of multi-modal transportation hubs for potential high-speed rail station locations that would maximize access and connectivity as well as provide for efficient (transit oriented) growth centered on these station locations.
- Increase safety and circulation and potentially reduce air pollution and noise impacts through grade separation of considerable portions of adjacent existing services with construction of the planned HST system.
- The Authority is committed to pursuing agreements with existing owners/rail operators to place the HST alignment within existing rail rights-of-way, which would avoid and /or minimize potential impacts to agricultural resources and other natural resources.
- The Authority will work closely with the regulatory agencies to develop acceptable specific design and construction standards for stream crossings, including, but not limited to, maintaining open surface (bridged versus closed culvert) crossings, infrastructure setbacks, erosion control measures, sediment controlling excavation/fill practices, and other Best Management Practices.

- Based on available geologic information and previous tunneling projects in proximity to proposed tunnels, the Authority plans to fully line tunnels with impermeable material to prevent infiltration of ground- or surface waters.
- Where there is potential for significant barrier effects that could divide wildlife populations or habitat areas or impede wildlife migration corridors, underpasses or overpasses or appropriate passageways will be designed during project-level for implementation at reasonable intervals during construction to avoid, minimize and/or mitigate any potential impacts to wildlife movement.
- The potential impacts associated with construction access roads would be greatly limited, and avoided altogether through sensitive areas, by using in-line construction, i.e., by using the new rail infrastructure as it is built to transport equipment to and from the construction site and to transport excavated materials away from the construction area and to appropriately re-use (e.g., as fill material, aggregate for new concrete, etc.,) or disposal sites. To avoid creating access roads in sensitive areas, necessary geologic exploration would be accomplished using helicopter transport for drilling equipment and site restoration to minimize surface disruption.

S.5 KEY FINDINGS

S.5.1 No Project Alternative

The key findings of this Draft Program EIR/EIS indicate that taking no action under the No Project Alternative would not meet the intercity travel needs projected for the future (2020) as population continues to grow, and would fail to meet purpose and need or the objectives of a statewide HST system. The No Project Alternative would result in an intercity transportation network that would not be as safe as, would have increased travel times, and would be significantly less reliable than existing conditions. The No Project would also exacerbate existing transportation system constraints, energy use, and dependence on petroleum as demand for intercity travel in California increases. The No Project Alternative would result in environmental impacts but would not offer travel improvements compared to the Modal and HST Alternatives. The No Project Alternative is neither a viable nor realistic alternative for California's future intercity travel demands. Gridlock on the highways and at the airports will make additional infrastructure improvements necessary.

Highway traffic conditions are currently highly congested and are projected to further deteriorate under the No Project Alternative. In every region studied, the No Project Alternative would not add sufficient capacity to accommodate the projected growth in highway travel, including both the existing large urban areas (i.e., the San Francisco Bay Area and Los Angeles basin) and the growing urban areas in the Central Valley. Future forecast increases in travel demand will lead to greater congestion, increased total travel time delay, and reduced reliability on the primary highway corridors throughout the study area. Of the highway segments analyzed, over half are already operating beyond their capacity with "stop-start" conditions during peak periods, and congestion is estimated to increase by nearly 40% under the No Project Alternative. Between Los Angeles and Bakersfield, highway traffic congestion is forecasted to increase by over 70%, with portions of I-5 burdened during peak periods with more than three times the volume of traffic than highway capacity to carry it. Typically, this would cause the morning peak period of congestion in urban areas to extend from two hours under existing conditions, to four hours by 2020. Because this program-level analysis could not attempt to quantify localized capacity restriction (e.g., bottlenecks at given interchanges) and incidents on the highways—accidents, breakdowns, and highway maintenance that are unpredictable and are responsible for a majority of the congestion on California's urban highway networks—congestion would be likely considerably greater than forecast under the No Project Alternative.

Likewise, many of the airports in the study area are currently at or near capacity and could become severely congested under the No Project Alternative. The number of passengers that enplaned and deplaned in California in 1999 (almost 173 million) is expected to more than double by 2020. However,

the aviation component of the No Project Alternative consists primarily of additional gates, access improvements, and parking expansion. No additional runways or other major capacity expansion projects are included. Capacity constraints are likely to result in considerable future aircraft delays, particularly at California's three largest airports.² San Francisco International Airport (SFO) has "one of the worst flight delay records of major U.S. airports—only 64 percent of SFO flights were on time during 1998."³ According to the Web site for SFO, within 10 years, the three Bay Area airports will not, even during good weather, have sufficient capacity to meet regional air traffic demand. Los Angeles International Airport projects a demand of 19.2 million more annual passengers than their 78.7 million total passenger capacity by 2015, and San Diego International-Lindbergh Field expects to be at capacity prior to 2020.⁴ The projected delays at heavily used airports and forecasted highway congestion would continue to delay travel, negatively affecting the California economy and quality of life.

S.5.2 Modal Alternative

The evaluation and findings indicate that the Modal Alternative would meet the projected needs for intercity travel in 2020, but would not satisfy the purpose and need or objectives as well as the HST alternative. Highway and air transportation improvements would result in reduced highway travel times and congestion compared to both the No Project and HST Alternatives. While the Modal Alternative would be an improvement over the No Project Alternative, the Modal Alternative would provide an intercity transportation network that would not be as safe or as reliable as the HST Alternative. Moreover, the Modal Alternative would have greater potential for significant environmental impacts than the HST Alternative, including higher potential impact on air quality, noise, biology and wetlands, cultural resources, hydrology, water quality, land use compatibility, and property. The Modal Alternative would also increase energy use and dependence on petroleum and would increase suburban sprawl. The capital cost of the Modal Alternative would be over two times the estimated capital cost of the HST Alternative, yet the Modal Alternative would have considerably less sustainable capacity than the HST Alternative to serve California's intercity travel needs beyond 2020.

S.5.3 High-Speed Train Alternative

The HST Alternative would meet the need for a safe and reliable mode of travel that would link the major metropolitan areas of the state and deliver predictable, consistent travel times sustainable over time. The HST Alternative also would provide quick, competitive travel times between California's major intercity markets. Table S.5-1 shows examples of door-to-door travel times between several city-pairs for 2020, comparing the automobile and air transportation travel times estimated for the No Project Alternative to the travel times estimated for the HST Alternative. The HST Alternative would provide a new intercity, interregional, and regional passenger mode—the high-speed train—, which would improve connectivity and accessibility to other existing transit modes and airports compared to the other alternatives. HST is the only alternative that would improve the travel options available in the Central Valley and other areas of the state with limited bus, rail, and air service for intercity trips. HST also provides system redundancy in cases of extreme events such as adverse weather or petroleum shortages (HST trains are powered by electricity which can be generated from non-petroleum or petroleum-fueled sources; automobiles and airplanes currently require petroleum).

² California High Speed Rail Commission 1996. Working Paper #3, Cost Comparison of Mode Alternatives. June 20.

³ San Francisco International Airport. 2003. Building the future. Available at: <www.flysfo.com>. Accessed: December 2003.

⁴ San Diego Airport. 2001. The San Diego Airport Economic Analysis and Public Information Program. San Diego, CA.

**Table S.5-1
Estimated Total Travel Times (Door to Door) between City Pairs by Auto, Air, and HST in 2020
(Hours:Minutes)**

City Pairs	Auto ¹ (No Project Alternative)	Air (No-Project Alternative)		HST (HST Alternative) (Optimal Express Time)	
	Total	Line Haul ²	Total	Line Haul ²	Total
Los Angeles downtown to San Francisco downtown	7:57	1:20	3:32	2:35	3:30
Fresno downtown to Los Angeles downtown	4:30	1:05	3:02	1:22	2:33
Los Angeles downtown to San Diego downtown	2:49	0:48	3:00	1:13	2:16
Burbank (Airport) to San Jose downtown	6:50	1:00	3:14	1:49	2:52
Sacramento downtown to San Jose downtown	2:40	No service	No service	0:50	1:53

¹ Auto trips are assumed to be "point to point" and therefore do not have a line-haul (time in vehicle) time associated with their travel times.
² Time in airplane or train.
Source: Parsons Brinckerhoff.

The analysis shows that while the HST Alternative would have potentially significant environmental impacts on resources, including noise, biology, wetlands, and farmlands, the HST Alternative would have distinct benefits over the No Project and Modal Alternatives in energy savings, reduced air emissions, and improved intercity travel conditions. In many cases, construction of the HST alternative would result in less adverse impacts than construction of the Modal Alternative. Although the HST Alternative would induce slightly more economic growth than the No Project or Modal Alternative, the HST Alternative is forecasted to result in denser development, which would accommodate more population and employment on less land. The HST Alternative would result in a slight decrease in urban area growth and a statewide increase of 450,000 jobs over the No Project Alternative and 200,000 jobs over the Modal Alternative.

S.5.4 Preferred System Alternative

As informed by the analysis presented in the Draft Program EIR/EIS, public and agency comments, and additional analysis described in this Final Program EIR/EIS, the Authority and the FRA have concluded that the HST alternative is the preferred system alternative and have identified preferable alignments and stations. In addition, the HST Alternative is identified as environmentally preferable under NEPA as well as environmentally superior under CEQA. The Authority identified preferred HST alignment and station options in the early 2005 that have been the subject of Clean Water Act related consultation during preparation of this document. The preferred HST alignment and station options are outlined below (S.7) and shown on figures S.5-1, S.5-2, and S.5-3. The reasons for preferring these alignments and stations are presented in Chapter 6A.

S.6 SYSTEM-WIDE ENVIRONMENTAL IMPACT COMPARISON

The Program EIR/EIS analysis shows that the No Project, Modal, and HST Alternatives would have differences in both potential adverse and beneficial environmental impacts at the system-wide level. These differences, summarized in Table S.6-1, are based on the analysis presented in Chapter 3, *Affected Environment, Environmental Consequences, and Mitigation Strategies*. For some environmental areas discussed in Table S.6-1, only quantification of potentially affected resources are presented, representing

areas within which potential impacts might occur. For example, the area of floodplains includes all floodplains within 100 feet (ft) (30 meters [m]) of either side of the centerline of the alignment considered. However, the actual right-of-way necessary for the improvements considered is much smaller (e.g., only 25 ft [8 m] on either side of centerline for HST). Whenever possible, representative impacts have been quantified based upon estimated areas of direct impact. For instance impacts to wetlands were estimated from a footprint analysis of the HST alignments or Modal highway lanes. It is expected that the magnitude of potential impacts reported is larger than the eventual impacts that would be expected from either the HST or Modal Alternative after design refinement during the project level reviews and associated incorporation of avoidance and minimization measures.

The analysis for this Program EIR/EIS used the best available information concerning environmental resources as applied in a statewide geographic information systems (GIS) database. No significant adverse impacts or key differences among the alternatives are described in Chapter 3 for geology, electromagnetic interference (EMF/EMI), public utilities, or hazardous materials; therefore, these topics are not shown in the summary table.

Design practices have been included in each section of Chapter 3 that have been used to define the HST Alternative and would be used to guide further project development. Mitigation strategies for the HST Alternative are described that would be applied at the project level for potential adverse impacts related to each environmental resource area (shown on Table S.6-1). The significance of potential environmental impacts would be further determined at the next level of environmental review, and specific mitigation measures identified. The subsequent analysis and field studies that would be necessary at the next level of environmental review are also briefly described, and they would offer further opportunities to make changes to the alignments and station locations in order to avoid and to substantially reduce significant impacts on these resources. Project-specific environmental impacts and mitigation measures to address significant impacts would be identified during the next stage of environmental review.

**Table S.6-1
Summary of Key Environmental Impacts and Benefits for System Alternatives**

Key Environmental Issues	Alternative			Mitigation Strategy for HST
	No Project	Modal	HST	
Traffic and Circulation	Capacity is insufficient to accommodate projected growth. Over half of 68 intercity highway segments considered would operate at unacceptable levels of service with increased congestion, travel delays, and accidents compared to existing conditions. Congestion would increase.	Congestion reduction on intercity highways compared to the No Project and HST Alternatives. However, the analysis could not account for potential use of the excess capacity by non-intercity (commuter and short-distance) trips. Congestion and travel delays on surface streets leading to and from highways/airports.	Congestion reduction on intercity highways compared to the No Project Alternative. However, the analysis could not account for potential use of excess capacity by non-intercity (commuter and short-distance) trips. 34 million fewer long-distance automobile passengers on highways. Localized traffic conditions around stations impacted.	Encourage use of transit to stations. Work with transit providers to improve station connections.

Key Environmental Issues	Alternative			Mitigation Strategy for HST
	No Project	Modal	HST	
Travel Conditions (travel time, reliability, safety, connectivity, sustainable capacity, passenger cost)	<p>Longer travel times, more delay.</p> <p>Lower reliability due to dependence on the automobile.</p> <p>Increase in injuries and fatalities due to increase in highway travel.</p> <p>No net improvement to connectivity options.</p> <p>No significant increase in capacity for highway or air infrastructure, and significant worsening of congestion due to increased demand.</p>	<p>Travel time reduction compared to the No Project Alternative.</p> <p>Improved reliability over No Project due to increased capacity.</p> <p>Increase in injuries and fatalities due to more highway travel.</p> <p>No new modes introduced; additional air frequency.</p> <p>Modal improvements would provide sufficient capacity to meet representative demand, but would have little or no capacity beyond that level.</p> <p>Passenger costs approximately the same as the No Project Alternative.</p>	<p>Travel time reduction compared to the No Project Alternative.</p> <p>Greatest improvement in reliability due to high reliability of HST mode; significant levels of diversion to HST from auto and air result in reduced congestion; and additional modal option improves reliability for overall transportation system.</p> <p>Decrease in injuries and fatalities due to diversion of trips from highways.</p> <p>Highest level of connectivity. New mode would add a variety of connections to existing modes, additional frequencies, and greater flexibility.</p> <p>HST system would provide sufficient capacity to meet representative demand and would provide substantial additional capacity with minimal additional infrastructure. HST system would provide a release valve for the existing intercity modes.</p> <p>Overall savings in passenger costs of 8% to 44% compared to No Project, depending on the origin and destination of travel. HST passenger costs are competitive with the automobile travel and less expensive than air travel.</p>	N/A

Key Environmental Issues	Alternative			Mitigation Strategy for HST
	No Project	Modal	HST	
Air Quality (Conformity Rule; tons of pollutants)	Emissions predicted to decrease in 2020 due to low emission vehicles; PM10 to increase statewide. Estimated CO 806,300 tons/year, NO _x 188,000 tons/year, TOG 121,000 tons/year; CO ₂ 374.1 million tons/year.	Vehicle miles traveled increase by 1.1% over 2020 No Project. CO 812,800 tons/year; NO _x 189,200 tons/year; TOG 122,000 tons/year; CO ₂ 374.2 million tons/year.	Air quality benefit. Decrease in pollutants compared to No Project: CO 799,200 to 803,100 tons/year; NO _x 185,200 to 186,400 tons/year; TOG 120,500 to 120,900 tons/year; CO ₂ 368 to 372.4 million tons/year (0.45% to 1.4% less than No Project). (Range based on low- to high-end ridership forecasts.)	Control of construction-related emissions.
Energy Use	24.3 million barrels of oil consumed annually in 2020; 6.8 million over existing conditions.	Higher total energy consumption: 24.5 million barrels of oil in 2020. Higher construction energy consumption 241 MMBtus.	Energy benefit. Lower total energy consumption: 19.1 million (high-end ridership) and 22.3 million (low-end) barrels of oil in 2020; overall decrease of 2.0 to 5.2 million barrels of oil compared to No Project. Increase in electric power demand/use of natural gas. Lower construction energy consumption: 152 MMBtus (high-end ridership) and 127 MMBtus (low-end ridership).	Develop and implement energy conservation plan for construction.
Land Use (compatibility and property impacts)	Expansion of urban sprawl as population grows and congestion increases; development on open space and agricultural lands.	Improved access to outlying areas and communities; sprawl; incompatible with transit-first policies. High property acquisition impacts along constrained existing rights-of-way in heavily urbanized areas; 309 mi (497 km) (20% of corridor) would affect high-impact land uses.	Controlled growth around stations, urban in-fill; compatible with transit-first policies. Majority of property acquisition along existing rights of way, some acquisition along new rights of way in undeveloped areas; between 53 and 88 mi (85 and 142 km) of HST would affect high impact land uses. (Range based on alignment options selected to comprise the HST system.)	Continued coordination with local agencies. Explore opportunities for joint and mixed-use development at stations. Relocation assistance during future project-level review.

Key Environmental Issues	Alternative			Mitigation Strategy for HST
	No Project	Modal	HST	
Visual Quality	No predictable change to existing landscape.	Low to moderate contrasts along existing highways and airports; high contrasts through mountain crossings and natural open space landscapes.	Moderate to high visual contrasts for elevated structures; high sensitivity in scenic open space and mountain crossings.	Design strategies to minimize bulk and shading of bridges and elevated guideways. Use neutral colors and materials to blend with surrounding landscape features.
Noise	More traffic and more air operations from growth in the intercity demand generate more noise.	210 mi (338 km) or 14% of total highway corridor miles improved would have high impacts on noise-sensitive land use/populations. The Modal Alternative would include five additional runways statewide in heavily urbanized areas. Noise is one of the most prominent factors in the environmental acceptability of airport improvement expansion and is often the limiting factor in approval of such improvements.	21 to 107 mi (34 to 172 km) or 3% to 14% of alignment length statewide would have high impacts on noise-sensitive land use/populations; with mitigation, 0% of alignment would have high impacts. Noise increase due to additional high-speed train frequencies. Noise reduction from existing conditions due to elimination of horn and crossing gate noise resulting from grade separation of existing grade crossings. (Range based on alignment options selected to comprise the HST system.)	Consider sound barriers along noise-sensitive corridors; track treatment for vibration.
Farmland (includes area within 50 ft [15 m] on each side of alignment centerline [100 ft or 30 m total])	No predictable change from existing conditions as a result from the No Project transportation improvements. Continued loss of farmland in California at rate of 49,700 ac (20,113 ha) per year from population growth and urbanization (845,000 ac [341,960 ha] by 2020).	Right-of-way needs of the improvements could potentially impact a total of 1,118 ac (452 ha) of farmlands.	Right-of-way needs of the HST could potentially impact a total of 2,445 to 3860 ac (989 to 1,562 ha) of farmlands. New corridor alignments through farmlands could have potential severance impacts. (Range based on alignment options selected to comprise the HST system.)	Avoid or reduce impacts by sharing existing rail rights-of-way to the maximum extent possible and avoiding alignment options in established farmlands. Consider farmland preservation strategies.

Key Environmental Issues	Alternative			Mitigation Strategy for HST
	No Project	Modal	HST	
Biological Resources and Wetlands (Includes area within 50 ft [15 m] on each side of alignment centerline; 100 ft or 30 m total)	No predictable change from existing conditions.	1,476 ac (597 ha) of sensitive habitat; 100ac (40 ha) of wetland; 90 special-status species.	1,201 to 1,568 ac (486 to 635 ha) of sensitive habitat; 30 to 89 ac (12 to 36 ha) of wetland; 67 to 84 special-status species. (Range based on alignment options selected to comprise the HST system.)	Work with resource agencies to develop site-specific mitigation and impact avoidance strategies for project-level review in coordination with local and regional plans and policies.
Hydrology and Water Resources (floodplains include area within 100 ft [30 m] on each side of alignment centerline [200 ft or 61 km total]; streams and lakes include area within 50 ft [15 m] on each side of centerline [100 ft or 30 m total])	No predictable change from existing conditions.	5,540 ac (2,242 ha) of floodplains, 39,520 linear ft (12,045 m) of streams, 25 ac lakes (10 ha) within 50 ft (15 m).	1,865 to 3,873 ac (755 to 1,567 ha) of floodplains; 22,600 to 32,400 linear ft. (6,888 to 9,875 m) of streams; 7 to 27 ac (3 to 11 ha) of lakes within 50 ft (15 m). (Range based on alignment options selected to comprise the HST system.)	Avoid or minimize footprint in floodplains; conduct project-level analysis of surface hydrology and coastal lagoons; BMPs for construction as part of Storm Water Pollution Prevention Plan.
Section 4(f) and 6(f) (Public Parks and Recreation) (includes area within 900 ft [274 m] on each side of alignment centerline [1,800 ft or 549 m total])	No predictable change from existing conditions.	132 Section 4(f) properties potentially affected; 8 wildlife refuges.	54 to 89 Section 4(f) properties potentially affected; 1 to 6 wildlife refuges. (Range based on alignment options selected to comprise the HST system.)	Consider design options to avoid parkland and wildlife refuges; identify potential site-specific mitigation measures.
Cultural Resources (including Section 4(f) historical resources)	Low ranking for impacts on archaeological resources and historic property.	Medium ranking for potential impacts on archaeological resources and historic properties.	Medium to high ranking for potential impacts on archaeological resources and historic properties (HST would use existing rail corridors and some stations and nearby resources developed in historic period).	Develop procedures for fieldwork, identification, evaluation, and determination of effects for cultural resources in consultation with State Historic Preservation Office and Native American Tribes.

Key Environmental Issues	Alternative			Mitigation Strategy for HST
	No Project	Modal	HST	
Growth Potential	Statewide population is expected to grow by about 54%, statewide employment is expected to increase by 46%, and urbanized areas are expected to increase by 48% between 2002 and 2035.	Statewide population is expected to grow by 55% between 2002 and 2035 (360,000 more than No Project), statewide employment is expected to increase by 47% (250,000 jobs more than the No Project), and urbanized areas are expected to increase by 50% (65,500 ac [26,507 ha] more than the No Project) between 2002 and 2035. Increased development at major interchanges along highways and around airports; sprawl, particularly in Central Valley region.	Statewide population is expected to grow by 56% between 2002 and 2035 (700,000 more than No Project), statewide employment is expected to increase by 48% (450,000 jobs more than the No Project), and urbanized areas are expected to increase by 48% (2,600 ac [1,052 ha] less than the No Project). Transit-oriented development around stations; planned growth consistent with RTPs; growth around Merced.	Work with local communities to encourage higher density development around stations.
Cumulative Effects	Air quality effects of increased highway congestion and land use (sprawl) related to growth.	Visual effects of expanded and new facilities (paved surfaces, long linear features); cut and fill through mountain crossings. Impacts on farmlands. Surface runoff impacts and added impervious surface impacts on groundwater.	Visual effects of new linear feature along existing transportation facilities; electric power lines/catenary; construction-related short-term visual impacts. Impacts on farmlands.	See specific environmental areas of concern.
ac = acres CO = carbon monoxide CO ₂ = carbon dioxide ha = hectares MMBtus = million British thermal units NO _x = oxides of nitrogen PM10 = particulate matter 10 microns in diameter or less RTPs = regional transportation plans TOG = total organic gases				

As summarized in Table S.6-1 above, the environmental evaluation showed key differences between the Modal and HST Alternatives on a system-wide level. The following discussion further describes these key differences for the Modal and HST Alternatives.

Both the Modal and HST Alternatives would result in reduced travel times and congestion compared to the No Project Alternative. The highway and air transportation improvements of the Modal Alternative would result in a greater reduction of highway congestion than the HST alternative. However, congestion would still increase on highways and airports compared to existing conditions for both the Modal Alternative and the HST Alternative.

The proposed HST system would provide a new mode of intercity travel and an improved level of connectivity between existing transportation modes (air, highway, transit) that would not be provided under the No Project or Modal Alternative. For longer distance intercity markets such as San Francisco to Los Angeles, the HST Alternative would provide door-to-door travel times that would be comparable to air transportation and less than one half as long as automobile travel times. For intermediate intercity trips such as Fresno to Los Angeles, the HST Alternative would provide considerably quicker travel times than either air or automobile transportation, and would bring frequent HST service to many parts of the state that are not well served by air transportation. The HST Alternative would provide a predominantly separate transportation system that would be less susceptible to many factors influencing reliability, such as capacity constraints, congestion, and incidents that disrupt service. In addition, since high-speed trains are able to operate in all weather conditions, the on-time reliability of this mode of travel would be superior to travel by either auto or air. Based on experience with HST systems in other countries, HST has a lower accident and fatality rate than automobile travel. In terms of sustainable capacity, the HST Alternative would offer greater opportunities to expand service and capacity with minimal expansion of infrastructure, than either the No Project or Modal Alternatives. Finally, the passenger cost for travel via the HST service would be lower than for travel by automobile or air for the same intercity markets.

The HST Alternative has the potential to reduce overall air pollution and total energy consumption compared to the No Project and Modal Alternatives. Comparing the energy required by each mode to carry a passenger 1 mi (1.6 km), an HST needs only about one-third that of an airplane, one-half that of an intercity automobile trip, and one-fifth that of a commuter automobile trip. In addition, the construction of the HST Alternative would require 34% less energy than the construction of the Modal Alternative.

The HST Alternative would be highly compatible with local and regional plans that support rail systems and transit-oriented development and would offer opportunities for increased land use efficiency (i.e., higher density development and reduced rate of farmland loss). The HST Alternative would also meet the need for improved inter-modal connectivity with existing local and commuter transit systems. In contrast, the highway improvement options under the Modal Alternative would encourage dispersed patterns of development and would be inconsistent with the objectives of many local and regional planning agencies to promote transit-oriented, higher-density development around transit nodes as the key to stimulate in-fill development that makes more efficient use of land and resources and can better sustain population growth. Urbanized areas in California are expected to grow by 47% between now and 2035 under the No Project Alternative. Under the Modal Alternative, urbanized area growth is expected to be about 1.4% (65,500 ac [26,507 ha]) higher than the No Project Alternative, while the HST Alternative would result in a slight decrease in urban area growth (2,600 ac [1,052 ha]) compared to the No Project Alternative. However, the HST Alternative is expected to result in a slightly greater increase in population than the No Project and Modal Alternatives.

Compared to the Modal Alternative, the proposed HST Alternative would result in construction of substantially fewer miles of transportation right-of-way (which have potential for high impacts on sensitive land uses and populations). For several alignment options, the HST would be expected to run adjacent to or within shared rights-of-way with existing rail lines. While there would be a potential noise increase due to additional HST services, existing train noise would be reduced in areas with existing grade crossings because horn and crossing gate noise due to grade separation would be eliminated.

Under the Modal Alternative, land use impacts would be considerable in the San Francisco to San Jose and Oakland to San Jose highway corridors where the existing rights-of-way would not accommodate adding lanes, and additional properties would be needed to accommodate potential highway expansions. This would also be true along the urban portions of the SR-99 corridor through the Central Valley, and in Southern California along I-10 from Los Angeles to San Bernardino and Riverside. The HST Alternative would have lower impacts in these regions because of extensive use of existing rights-of-way (e.g., Caltrain from San Francisco to San Jose) and higher compatibility in general with land uses along the rail corridors.

In the Central Valley, one of the most active agricultural regions in the U.S., the right-of-way requirements of the Modal Alternative would potentially impact 1,118 ac (452 ha) of farmlands. The HST Alternative, based on the system-wide application of a 100-foot wide right-of-way, could potentially impact a maximum of 2,445 to 3,860 ac (989 to 1,562 ha). However, it is possible to avoid or substantially reduce potential impacts on farmlands in the HST right-of-way by reducing right-of-way width to 50 ft (15 m) in constrained areas or, if appropriate agreements with the existing owner/operators were developed and safety considerations were addressed, by placing the HST infrastructure completely within the existing rail rights-of-way. Compared to the trend of farmland loss in California of 49,700 ac (20,113 ha) per year, or nearly 845,000 ac (341,960 ha) projected to be lost by 2020, the right-of-way needs of the Modal and HST Alternatives would each represent less than 0.4% of the total potential farmland loss. Furthermore, the indirect effect of the HST Alternative on urban growth would reduce conversion of farmlands by about 4,100 ac (1,659 ha) compared to the No Project Alternative, and about 24,000 ac (9,712 ha) compared to the Modal Alternative on a statewide basis by 2035.

The Modal Alternative would potentially impact similar amounts of sensitive habitat and up to three times more wetlands than the HST Alternative. The Modal Alternative would also have higher potential impacts on other water resources such as floodplains, streams, and groundwater. On a regional basis, differences in potential impacts on biological resources between the Modal Alternative and HST Alternative are identified in the southern mountain crossing along I-5, where significant ecological areas (SEAs) would be impacted. Modal Alternative improvements to I-5 and SR-14 would involve extensive cut and fill through the mountains that would have potentially significant visual and biological impacts in this natural forested landscape.

The Modal Alternative would generally have potential impacts in all regions on public parks, wildlife areas, and recreational resources (Section 4(f) and 6(f) resources) on a greater number of resources than the HST Alternative because existing transportation corridors are bordered by urban development that includes public parks, recreation areas, and historic properties. Potential exceptions are in the Bay Area to Merced and Bakersfield to Los Angeles regions where there could be slightly more Section 4(f) and 6(f) resources along the HST Alternative alignments than along the Modal Alternative alignments. This is primarily due to the proximity of recreational areas to the new I-5 corridor HST alignment options through the southern mountain crossing, and the HST alignment options through Henry Coe State Park that link the Bay Area and the Central Valley in Northern California.

S.7 PREFERRED HIGH-SPEED TRAIN ALIGNMENT AND STATION OPTIONS

Through a comprehensive screening evaluation covering many regions of the state, numerous alignment and station options have been identified and selected for analysis in the Program EIR/EIS. These alignment and station options are evaluated and compared in Chapter 6, *Comparison of HST Alignment and Station Options*, of the Draft Program EIR/EIS. The Authority and FRA have identified the preferred system of alignment and station options in this Final Program EIR/EIS. Figures S.5-1, S.5-2, and S.5-3 show the preferred HST alignment and potential station locations. The Authority and FRA intend to focus future project-specific analysis on alignment and station options selected in this program environmental

process. Site-specific location and design alternatives of the preferred alignment and station options including avoidance and minimization alternatives would be fully investigated and considered during project level environmental review.

The Authority identified and FRA concurred on preferred HST alignment and station locations. The Authority and FRA relied upon the data presented in the Draft Program EIR/EIS, supporting technical reports, the comments received on the Draft Program EIR/EIS and additional analysis described in this Final Program EIR/EIS. The Authority has made a serious commitment to utilize existing transportation corridors and rail lines to minimize the impacts on California's treasured landscape. Furthermore, a key objective to avoid and/or minimize the potential impacts to cultural, park, recreational and wildlife refuges has been largely met. The preferred HST alignment and station locations best meet the objectives and criteria for minimizing potential environmental impacts while maximizing HST ridership potential and connectivity and accessibility.

The station locations identified are all multi-modal transportation hubs that would provide links with local and regional transit, airports and highways. It is assumed that parking at the stations would be provided at market rates (no free parking). Each station site would have the potential to promote higher density, mixed-use, pedestrian oriented development around the station. As the project proceeds to more detailed study, local governments would be expected to provide (through planning and zoning) for transit-oriented development around HST station locations, and to finance (e.g., through value capture or other financing techniques) and to maintain the public spaces needed to support the pedestrian traffic generated by hub stations if they are to have a HST station.⁵

Bay Area-Merced

The Authority, in consultation with the FRA, has identified a broad preferred corridor between the Bay Area and the Central Valley containing a number of feasible route options within which further study will permit the identification of a single preferred alignment option⁶. This corridor is generally bounded by (and includes) the Pacheco Pass (SR-152) to the south, the Altamont Pass (I-580) to the north, the BNSF Corridor to the east, and the Caltrain Corridor to the west, but the Authority would not pursue alignment options through Henry Coe State Park and station options at Los Banos.⁷ Future studies would focus on the identification of a preferred alignment between the Central Valley and the San Francisco Bay area.

San Francisco Peninsula: Caltrain Corridor⁸ with potential stations at downtown San Francisco (Transbay Terminal), SFO (Milbrae), and Redwood City or Palo Alto.

East Bay Alignment: "Hayward Line to I-880" alignment with potential stations at Oakland (West Oakland) or 12th Street/City Center, Union City, and San Jose.

Sacramento-Bakersfield

Sacramento-Stockton: Union Pacific alignment option or the CCT alignment with potential stations at Downtown Sacramento and Downtown Stockton⁹.

⁵ Described in more detail in Chapter 6B "HST Station Area Development"

⁶ Future studies would involve a next-tier EIR/EIS to identify and select a single preferred alignment option between the Central Valley and the San Francisco Area. The FRA consulted with the Council on Environmental Quality (CEQ), and CEQ concurred that the proposed approach would be consistent with NEPA and would provide for compliance with Section 404 of the Clean Water Act.

⁷ Highway route numbers are provided only as a convenient reference for the reader, not as a limitation on the corridor to be considered.

⁸ Future studies would determine how much of the Caltrain alignment between San Francisco and San Jose would be included.

Stockton-Merced: Burlington Northern Santa Fe (BNSF) alignment option with potential stations at Modesto (Amtrak Briggsmore), and Merced (Castle Air Force Base or Downtown Merced).

Merced-Fresno: BNSF alignment option with a potential station at Downtown Fresno.

Fresno-Bakersfield: BNSF alignment option¹⁰ with a potential station at Downtown Bakersfield (Truxtun)

Bakersfield-Los Angeles

Bakersfield-Sylmar: SR-58/Soledad Canyon Corridor (Antelope Valley) with a potential station at Palmdale Airport/Transportation Center.

Sylmar-Los Angeles: MTA/Metrolink with potential stations at Downtown Burbank (Burbank Metrolink Media Station) and Los Angeles Union Station¹¹.

Los Angeles to San Diego via the Inland Empire

Los Angeles to March AFB: UPRR Riverside/UPRR Colton Line alignment option with potential stations at East San Gabriel Valley (City of Industry), Ontario Airport, and Riverside (UC Riverside).

March AFB-Mira Mesa: I-215/I-15 alignment with potential stations at Temecula Valley (Murrieta), and Escondido.

Mira Mesa-San Diego: Carroll Canyon or Miramar Road alignment option with potential stations at University City and Downtown San Diego (Santa Fe Depot).

Los Angeles to Orange County

Los Angeles to Irvine: LOSSAN Corridor with potential stations at Norwalk, Anaheim Transportation Center, and Irvine Transportation Center.

S.8 LEAST ENVIRONMENTALLY DAMAGING PREFERRED ALTERNATIVE (LEDPA)

The USEPA and USACE have participated in the development of both the Draft and Final Program EIR/EIS and in accordance with the memorandum of understanding among Federal agencies for this environmental review, were consulted concerning the selection of the preferred corridor and route most likely to yield the least environmentally damaging practicable alternative (LEDPA) and as identified as preferred in the Final Program EIR/EIS. The USEPA and USACE have concurred that the preferred HST alignment and station options identified in S.7 above are most likely to contain the LEDPA.

⁹ The Union Pacific alignment is the CHSRA and FRA preferred option. The CCT alignment will be further evaluated at the project level due to Clean Water Act federal regulations because the UPRR alignment option has more potential impacts to waters and biological resources.

¹⁰ However, an additional study of an alignment option between Fresno and Bakersfield, or variations thereof, to serve a potential Visalia station located in an existing and/or planned urbanized area, is to be conducted prior to the commencement of project-level environmental documents for this segment.

¹¹ Between Burbank and Los Angeles Union Station, the MTA/Metrolink refers to a relatively wide corridor within which alignment variations will be studied at the project level.

S.9 PUBLIC AND AGENCY INVOLVEMENT

Pursuant to the requirements of CEQA and NEPA, a comprehensive public and agency involvement effort was conducted as part of the program environmental process. Public and agency involvement was accomplished through a variety of means, including the scoping process that included a series of public and agency scoping meetings, consultation meetings with federal and state resource agency staff representatives throughout the environmental process, informational meetings with interest groups and agencies, presentations and briefings to a broad spectrum on interest groups, information materials including a series of region-specific fact sheets, the Authority's Web site presenting information about the proposed project and study evaluations, noticed public meetings of the Authority's governing board at which key policy issues and decisions were raised and discussed and opportunities for public comment were provided, public circulation of the Draft Program EIR/EIS and posting on the Authority's website including technical studies, public information sessions and public hearings on the Draft Program EIR/EIS, and numerous written comments.

S.10 NEXT STEPS IN THE ENVIRONMENTAL PROCESS

This Program EIR/EIS considers the No Project, Modal, and HST Alternatives at a program level of environmental analysis. In the Draft Program EIR/EIS, the Authority and the FRA identified the HST Alternative as the preferred system alternative. The Draft Program EIR/EIS was available for public review and comment for more than six months and was the subject of a number of public hearings. Many extensive comments on the draft document were submitted at the public hearings and in writing to the Authority and to the FRA. After considering public and agency comment, the Authority and the FRA have prepared this Final Program EIR/EIS, which includes responses to responsible comments and a description of the preferred system of HST alignment and station options.

At the completion of this program environmental process, the Authority expects to be able to certify the Program EIR/EIS and make findings for compliance with CEQA, the FRA expects to be able to issue a Record of Decision for compliance with NEPA, and both agencies expect to be able to make various determinations, including whether to advance an HST system alternative to the next phase of project development and environmental analysis.

After completing the program environmental process, should the State of California decide to proceed with the development of the proposed HST system, preliminary engineering and project-level environmental review would commence to the extent needed to assess site-specific issues and potential environmental impacts not already addressed in this Program EIR/EIS. Project-level environmental review would focus on a portion or portions of the proposed HST system and would provide further analysis of potential impacts and issues at an appropriate site-specific level of detail in order to obtain needed permits and to implement HST projects. Also, after completing the program environmental process the Authority would begin working with local governments, transportation agencies and private parties on right-of-way preservation and protective advance acquisition consistent with state and federal requirements.