9 UNAVOIDABLE ADVERSE ENVIRONMENTAL IMPACTS

This chapter of the Program EIR/EIS describes any potentially significant adverse environmental effects, identifiable at the program level of environmental review, that cannot be avoided should the proposed HST system or a network alternative be implemented and any unavoidable adverse impacts of the alternatives, as required by CEQA and NEPA, respectively. This chapter also describes any significant irreversible or irretrievable commitments of resources or foreclosures of future options, identifiable at the program level of environmental review, that would be involved in the proposed HST system or network alternatives should one be implemented.

This Program EIR/EIS represents the second part of the first conceptual planning stage of a tiered environmental evaluation that analyzes a broad range of HST Alignment Alternatives and a number of Network Alternatives. Most potentially significant impacts that have been described in previous chapters of this document can be avoided or minimized by selecting an alignment alternative that avoids or minimizes impacts on environmental resources through refinement to the design or specific location of the alignment or station, or through incorporation of mitigation measures. For example, some potentially significant impacts on sensitive habitat or wetlands would occur in areas where alignment alternatives are available that would avoid or minimize the impact, such as tunneling or designing the alignment to avoid the sensitive area. In addition, potential noise impacts would occur in residential areas along the alignment alternatives where significant noise levels could be reduced to less than significant with implementation of mitigation measures such as noise walls between the train track or highway and the residential receptors. However, there are some unavoidable potentially significant impacts that could occur as a result of implementation of the HST Network Alternatives under consideration. Those impacts are discussed below.

9.1 Potentially Adverse Unavoidable Significant Impacts

9.1.1 Fuel Consumption and Energy Use

Potentially significant impacts of the No Project Alternative that cannot be mitigated or reduced to less than significant include consumption of an estimated 408 million barrels of oil per year under the No Project Alternative in 2030, over 63 million barrels of oil per year more than existing conditions.[1] The No Project Alternative would continue California's dependency on automobiles and airplanes for intercity travel. The statewide HST system would annually consume approximately 386 million barrels of oil. The proposed HST system would result in a savings of about 22 million barrels of oil (a 5% difference) over the 2030 No Project Alternative.

Operation of the proposed HST system would potentially increase the load on the statewide electric power system by an estimated 794 MW during the peak period in 2030. Overall, the HST electricity demand would represent about a 0.96% increase in 2030. During construction, energy consumption for the HST system is estimated to be approximately 128 MMBTUs, or 22 million barrels of oil.

9.1.2 Biological Resources and Wetlands, Agricultural Land, Section 4(f) and 6(f) Resources, Cultural and Paleontological Resources, and Visual Resources

The HST Network Alternatives would each commit the use of land and natural resources to a transportation right-of-way, even though much of the system would be constructed along existing transportation facilities. Some potentially significant unavoidable impacts on biological resources (wetlands and habitat for threatened and endangered species) might occur where the land required for

1 No Project Alternative energy consumption based on June 11, 2007, forecasts provided by Cambridge Systematics. See Chapter 2, "Alternatives."

right-of-way for the proposed HST alignment alternative contains wetlands or wildlife habitat for special-status species. Some potentially significant unavoidable impacts on agricultural land may occur where the land required for right-of-way is in agricultural use. Similarly, potential unavoidable impacts on Section 4(f) and 6(f), cultural, and visual (scenic landscapes) resources could occur where the HST alignment calls for tunnels, elevated alignments, or right-of-way adjustments. The proposed HST alignment would require relatively straight, flat, long linear features; moving or curving the alignment to avoid resources might not always be feasible and could result in impacts on other resources. Similar effects would occur from property acquisition and land use along the width and length of the proposed HST Network Alternatives.

Only general statements of potential impacts can be made at this program level of review because detailed field studies were not conducted and the study areas used for some of the analysis was many times larger than the actual right-of-way (direct impact areas) for the network alternatives under consideration in most instances. Potential impacts would need to be further studied and clarified in the next stage of project design and environmental review, when more specific information would be available on the right-of-way needed for proposed HST Network Alternatives alignments and station location options and on the specific properties potentially affected. The objective at the project-specific stage of analysis would be to identify design options (plans and profiles) that would avoid these sensitive resources to the extent feasible.

9.1.3 Construction Impacts

Construction of the HST Network Alternatives would result in the irreversible commitment of resources. Fossil fuels, labor, and construction materials would be expended as part of construction. Further, labor and natural resources would be used in the fabrication and preparation of construction materials. Once used or expended, these materials are generally not retrievable. However, these materials are not in short supply and their use would not have an adverse effect on the continued availability of resources. Any construction of the proposed HST Network Alternatives would also require the expenditure and allocation of local, state, and federal funds, which are not retrievable. Once used, these funds could not be used for other projects.

Short-term construction impacts related to earthwork (cut and fill and grading) that would result in dust (PM10 and PM2.5) and localized emissions and noise from construction equipment would occur under each of HST Network Alternatives. Other short-term construction impacts include impacts to already impaired waters. The construction of the San Francisco Bay crossings may include trench or bored tunnels for tubes; this type of construction is likely to disrupt Bay sediment and may disrupt any contaminants trapped in the sediment. These impacts would be in addition to the construction impacts associated with already planned projects included in the No Project Alternative. Because the construction period would last a number years and the length of the HST statewide system under construction at any one time would extend beyond just the Bay Area to Central Valley corridor, these physical impacts would potentially be significant. The potential impacts of this construction activity would be addressed in more detail during project-level analysis. This same construction activity would also have potential benefits to employment and to the California economy from construction jobs and contracts for the services and materials. The California High Speed Rail Authority's final business plan (Business Plan) (California High Speed Rail Authority 2000) describes that an estimated 300,000 job-years of employment would be created as a result of HST system construction.

9.2 Relationship Between Short-Term Uses of Environment and Enhancement of Long-Term Productivity

Any change to the Bay Area to Central Valley transportation system of the magnitude needed to meet the projected intercity travel demand by the year 2030 would have short-term effects on the human and physical environment, but it would enhance long-term productivity and reduce risks to health and safety.

Implementation of the proposed HST Network Alternatives would result in short-term population changes from relocations associated with potential property acquisitions and potential relocation of wildlife from habitat disturbance during construction and operation. These factors would be considered in more detail during project-level review. While some relocations associated with property acquisition are likely, long-term benefits would also result, including enhanced long-term productivity related to increased mobility and safety and the reduced travel time, air pollutant emissions, and energy use that an improved intercity transportation system would provide.

Short-term benefits of any of the HST Network Alternatives include employment opportunities during construction (spread over a number of years) and locally purchased materials and services.

As indicated in Chapter 1, "Purpose and Need and Objectives," the existing and programmed transportation improvements in California will not keep up with the currently projected rate of future population growth and the increased intercity travel demand projected for California. As described in Chapter 5, "Economic Growth and Related Impacts," the proposed HST system would provide user benefits (travel time savings, cost reductions, and accident reductions) and accessibility improvements for Bay Area and Central Valley citizens. The HST system would improve accessibility to labor and customer markets, thereby improving the competitiveness of industries and the overall local and regional economy. With this second effect, businesses that chose to locate in proximity to an HST station could operate more efficiently than businesses that locate elsewhere. The analysis shows that any of the HST Network Alternatives would be more efficient, compared to the No Project Alternative, in terms of the land consumed per new job and resident, and could provide an incremental development density that is about 4.0% more efficient.

9.3 California Environmental Quality Act Significance

This section describes those environmental effects identified in Chapter 3 that would be considered significant under CEQA. The potential for the proposed project and alternatives to stimulate unplanned growth is considered in Chapter 5, "Economic Growth and Related Impacts." Cumulative impacts are discussed in Section 3.17, "Cumulative Analysis."

Use of the term "significant" differs under NEPA and CEQA. While CEQA requires that the significance of impacts be discussed in an EIR, NEPA does not require such discussion in an EIS. Under NEPA, significance is used to determine whether an EIS or some other level of documentation is required, and once a decision to prepare an EIS is made, the EIS reports all impacts and discusses feasible mitigation. Under CEQA, significance is used to determine whether to prepare an EIR, and then to evaluate the severity of potential adverse environmental impacts in the EIR. The EIR must also discuss feasible mitigation measures that could reduce potentially significant effects. For this reason, CEQA significance criteria and the determination of significant impacts under CEQA have been addressed separately in this section.

NEPA anticipates that mitigation will be considered where feasible for the potential impacts of a project. Therefore, while consideration of some mitigation strategies described in this Program EIR/EIS and in this section is appropriate under NEPA, the potential impacts they address may not be considered significant under CEQA.

9.3.1 California Environmental Quality Act Significance Thresholds

CEQA requires that an EIR identify the potentially significant environmental effects of the project (CEQA Guidelines Section 15126), but does not promulgate specific thresholds for significance. Instead, CEQA Guidelines Section 15064(b) states "the determination…calls for careful judgment on the part of the public agency involved…" and that "an ironclad definition of significant effect is not possible because the significance of an activity may vary with the setting." The fundamental definition of significant effect

under CEQA is "a substantial adverse change in physical conditions." This criterion underlies the evaluation of environmental impacts for most of the impact issues identified in the CEQA Environmental Checklist Form (Guidelines Appendix G). CEQA encourages lead agencies to develop and publish their own thresholds of significance for the purpose of determining the significant effects of their projects. Given the planning-level impact analysis considered in this Program EIR/EIS, the Authority has not developed project-specific significance thresholds.

Some impact categories lend themselves to scientific or mathematical analysis, and therefore to quantification. Some categories have significance thresholds established by regulatory agencies, such as noise criteria or regional air pollutant criteria. For other impact categories that are more qualitative or are entirely dependent on the immediate setting, a hard-and-fast threshold is not generally feasible, and the "substantial adverse change in physical conditions" is applied as the significance criterion. In the current analysis, the CEQA checklist thresholds have been used to evaluate the significance of effects of the HST Alignment Alternatives.

CEQA states that economic and social changes resulting from a project shall not be treated as significant effects on the environment (CEQA Guidelines, 15064[e]). Economic or social changes may be used, however, to determine that a physical change should be regarded as a significant effect on the environment. Where a physical change is caused by economic or social effects of a project, it may be regarded as a significant effect in the same manner as any other physical change resulting from the project. If it causes adverse economic or social effects on people, those adverse effects may be used as a factor in determining whether the physical change is a significant effect on the environment. Where the HST Network Alternatives would involve widening or expanding existing transportation rights-of-way, the potential for adverse environmental impacts and for potential economic or social effects is limited because the transportation corridor and its associated impacts are already well established. However, where the HST Network Alternatives would involve new transportation facilities on new rights-of-way (e.g., stations or alignment) or would bring large numbers of people to new station areas, there is greater potential for significant effect.

9.3.2 Potentially Significant and Unavoidable Adverse Impacts

This section identifies those environmental categories that, given their potential for impact, would be those most likely to experience potentially significant unavoidable adverse effects at some locations along the alignment alternatives being considered for the proposed HST Network Alternatives between the Bay Area and Central Valley. The planning level of environmental review presented in this Program EIR/EIS does not seek to quantify impacts as would typically be done at a project level. Instead, this Program EIR/EIS evaluates the potential for significant effects for the HST Network Alternatives based on the amount or density of resources and/or sensitive receptors within the project vicinity and ranks the potential for impacts as high, medium, or low. This is an appropriate assessment of potential impacts at this stage of such a large undertaking. The Program EIR/EIS considers HST Network Alternatives, identifies the lesser-impact Network Alternative, and provides a basis for identifying mitigation strategies that is relevant to the decisions at hand.

Based on this planning level of analysis, potentially significant unavoidable impacts are only identified generally. With the scope of this project and the size and diversity of the geographic areas traversed by the potential HST alignment alternatives and station location options, it is likely not feasible to avoid or reduce all of the potentially significant impacts of the proposed HST system at every location under consideration through project modifications or to mitigate all these potential impacts to a less-than-significant level. Table 9.3-1 provides a summary list of the environmental categories, general mitigation strategies, potentially significant impacts, and potential levels of significance after mitigation. Depending on the Network Alternative (discussed in Chapter 7, "High Speed Train Network and Alignment Alternatives Comparisons") that may ultimately be selected, potentially significant unavoidable effects can be expected at some locations in the general environmental categories of agricultural lands, biological

resources and wetlands, hydrology and water resources, and cultural resources. However, neither the extent of such potential impacts nor the potential locations for such impacts can be determined at this level of analysis. For several of the environmental categories listed in the table below (including agricultural lands, wetlands, hydrology, and cultural resources), the quantities presented represent areas within which potential impacts might occur by including all the potentially affected resources or acreage in the study area for the resource topic listed. For example, the area of floodplains includes all floodplains within 25 ft (7.6 m) of either side of the centerline of the HST alignment where there are two tracks, whereas where there are four tracks and/or proposed new station facilities, the area analyzed for direct impacts measures 50 ft (15.2 m) of either side of the centerline or station perimeter. Therefore, the determination of significance is potential rather than absolute. The determination of a potentially significant or unavoidable impact would be used to focus attention at the next phase of planning and environmental review (project-specific, detailed analysis).

9.3.3 California Environmental Quality Act Environmentally Superior Alternative

The CEQA Guidelines state that where the No Project Alternative is the environmentally superior alternative, the EIR shall also identify the environmentally superior alternative from among the other alternatives (CEQA Guidelines 15126.6[e][2]). Based on the evaluations documented in Chapters 3, 7, and 8 of this Program EIR/EIS, the Pacheco Pass, San Francisco and San Jose Termini Network Alternative has been identified as the environmentally superior alternative.

Table 9.3-1
Summary of Key Environmental Impact/Benefits of Alternatives

Key Environmental Issues	Alternative		Mitigation Strategy for HST	Potential Significance for HST	
	No Project	HST Network Alternatives		Before Mitigation	After Mitigation
Traffic and Circulation	Capacity is insufficient to accommodate projected growth. 13 of the 18 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 Alternative. 15 of the 18 intercity highway segments would experience diversion of trips from vehicles to the HST system yielding improved V/C ratios. Reduce automobile travel in the state 61 billion miles annually. Localized traffic conditions around some stations would be adversely affected.	Encourage use of transit to stations. Work with transit providers to improve station connections.	Potentially significant	Potentially less than significant/ potentially significant/ unavoidable
Travel Conditions (travel time, reliability, safety, connectivity, sustainable capacity, passenger cost)	Longer travel times, more delay. Lower reliability due to dependence on the automobile. Increase in injuries and fatalities due to increase in highway travel. No net improvement to connectivity options. No significant increase in capacity for highway or air infrastructure, and significant worsening of congestion due to increased demand.	Travel time reduction compared to the No Project Alternative. 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. Decrease in injuries and fatalities due to diversion of trips from highways. Highest level of connectivity. New mode would add a variety of connections to existing modes, additional frequencies, and greater flexibility. HST system would provide sufficient capacity to meet representative demand and would provide substantial additional capacity with minimal additional infrastructure.	N/A	Beneficial	N/A

Key Environmental Issues	Alternative		Mitigation Strategy for HST	Potential Significance for HST	
	No Project	HST Network Alternatives		Before Mitigation	After Mitigation
		HST system would provide a release valve for the existing intercity modes. Overall savings in passenger costs of 22% to 87% on the HST compared to No Project, depending on city pair. HST passenger costs are competitive with the automobile travel and less expensive than air travel.			
Air Quality (Conformity Rule; Statewide tons of pollutants/year)	Statewide emissions predicted to decrease in 2030 due to low emission vehicles; CO_2 to increase statewide. Estimated CO 625,975 tons/year (79% decrease); PM10 25,185 tons/year (same as existing); PM2.5 17,155 tons/year (10% decrease); NO_x 174,470 tons/year (73% decrease); TOG 92,345 tons/year (73% decrease); CO_2 644 million tons/year (38% increase).	Air quality benefit. Pacheco Alternative - Annual decrease in pollutants compared to No Project: CO 32,120 tons/year; PM10 1,460 tons/year, PM2.5 1,095 tons/year, NO_x 7,665 tons/year; TOG 5,110 tons/year; CO_2 8.8 million tons/year (1.4% less than No Project). Altamont Alternative - Annual decrease in pollutants compared to No Project: CO 32,850 tons/year; PM10 1,460 tons/year, PM2.5 1,095 tons/year, NO_x 7,665 tons/year; TOG 5,110 tons/year; CO_2 5.9 million tons/year (0.9% less than No Project). Overall reduction of Greenhouse Gas Emissions compared to No Project.	Control of construction-related emissions.	Beneficial	N/A
Energy Use (Statewide)	Energy consumption of 408 million barrels of oil annually in California in 2030; 63 million over existing conditions.	Energy benefit. Lower statewide energy consumption compared to No Project. Operation of the statewide HST system would result in a savings of 22 million barrels (5%)	Develop and implement energy conservation plan for construction.	Beneficial	N/A

Key Environmental Issues	Alternative		Mitigation Strategy for HST	Potential Significance for HST	
	No Project	HST Network Alternatives		Before Mitigation	After Mitigation
		of oil in 2030. Increase in electric power demand/use of natural gas. Construction-related energy consumption of the HST system would result in a one-time, non-recoverable energy cost of about 22 million barrels of oil.			
Land Use (compatibility and property impacts)	Expansion of urban sprawl as population grows and congestion increases; development on open space and agricultural lands.	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. Impacts to adjoining land uses (residential and industrial) at select locations prior to mitigation. Environmental Justice impacts at select locations along alignments and stations prior to mitigation.	Continued coordination with local agencies. Explore opportunities for joint and mixed- use development at stations. Relocation assistance during future project-level review. Overall mitigation strategies for affected land uses and in EJ areas.	Potentially significant	Potentially less than significant
Visual Quality	No predictable change to existing landscape.	Low to high visual contrasts for elevated structures; low to 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.	Potentially significant	Potentially less than significant/ potentially significant/ unavoidable
Noise	More traffic and more air operations from growth in the intercity demand generate more noise.	0 to 20 mi (32.4 km) or 0% to 9% of network alternative length would have high impacts on noise-sensitive land use/populations. Noise increase attributable to HST frequencies. Noise reduction from existing conditions due to	Consider sound barriers along noise-sensitive corridors; track treatment for vibration.	Potentially significant	Potentially less than significant

Key Environmental Issues	Alternative		Mitigation Strategy for HST	Potential Significance for HST	
	No Project	HST Network Alternatives		Before Mitigation	After Mitigation
		elimination of horn and crossing gate noise resulting from grade separation of existing grade crossings. 0 to 52 mi (84.3 km) or 0% to 25% of network alternative length would have high impacts related to vibration. (Range based on HST Network Alternatives. See Chapter 7)			
Farmland (includes area within 25 ft [7.6 m] on each side of alignment centerline [50 ft or 15.2 m total], and station footprint area)	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 (20,100 ha) per year from population growth and urbanization (845,000 ac [341,960 ha] by 2020).	Right-of-way needs of the HST could potentially impact a total of 755–1,384 ac (306–560 ha) of farmlands. HST alignments along new corridors through farmlands could have potential severance impacts. (Range based on HST Network Alternatives. See Chapter 7)	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.	Potentially significant	Potentially significant/ unavoidable
Biological Resources and Wetlands (includes area within 50 ft [15 m] on each side of alignment centerline; 100 ft or 30 m total], and station footprint area)	No predictable change from existing conditions.	10.7 to 56.1 ac (4.3 to 22.7 ha) of wetland; 13,113 to 19,891 linear ft (3,997 to 6,063 linear m) of non-wetland waters; 38 to 71 special-status plant species, and 36 to 58 special-status wildlife species. (Range based on HST Network Alternatives. See Chapter 7)	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.	Potentially significant	Potentially significant/ unavoidable
Hydrology and Water Resources (includes area within 25 ft [7.6 m] on each side of alignment centerline for two tracks, 50 ft [15 m] on each side of centerline for four tracks and	No predictable change from existing conditions.	178 to 573 ac (72 to 232 ha) of floodplains; 14,400 to 30,300 linear ft. (4,389 to 9,235 m) of streams; 2 to 42 ac (0.8 to 17 ha) of lakes/San Francisco Bay; and 12 to 40 polluted 303(d) waters crossed by HST alignment. (Range based on HST Network Alternatives. See Chapter 7)	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.	Potentially significant	Potentially less than significant/ potentially significant/ unavoidable

Key Environmental Issues	Alternative		Mitigation Strategy for HST	Potential Significance for HST	
	No Project	HST Network Alternatives		Before Mitigation	After Mitigation
station footprint area)					
Section 4(f) and 6(f) (Public Parks, Recreation, Wildlife and Waterfowl Refuges) (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.	8 to 46 Section 4(f) and 6(f) properties potentially affected. HST Network Alternatives that extend across the Bay at Dumbarton Bridge would potentially impact Don Edwards San Francisco Bay National Wildlife Refuge, those that extend across Pacheco Pass would potentially impact Upper Cottonwood Creek Wildlife Area (Range based on HST Network Alternatives. See Chapter 7)	Consider design options to avoid parkland, wildlife refuges, and wildlife areas; identify potential site-specific mitigation measures.	Potentially significant	Potentially less than significant/ potentially significant/ unavoidable
Cultural Resources (including Section 4(f) historical resources) (includes area within 500 ft [152 m] on each side of alignment centerline for new routes, 100 ft [30 m] from centerline along existing transportation facilities, and 500 ft [152 m] around station locations)	Low ranking for impacts on archaeological resources and historic property.	78 to 222 known archaeological and cultural resources within Area of Potential Effect. Low 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). (Range based on HST Network Alternatives. See Chapter 7)	Develop procedures for fieldwork, identification, evaluation, and determination of effects for cultural resources in consultation with State Historic Preservation Office and Native American Tribes.	Potentially significant	Potentially significant/ unavoidable
Growth Potential (includes 11 county study area)	Study area population is expected to grow by about 44%, employment is expected to increase by 37%, and urbanized areas in the study area are expected grow by 39% between 2005 and 2030.	Compared to the No Project condition, the study area population in 2030 is expected to increase about 1.6% with the Pacheco Pass Network Alternatives to 2.2% with Altamont Pass (149,000 to 199,800), employment is expected to increase by 1.7% with Pacheco Pass to 1.8% with Altamont Pass (96,000 to 102,100 jobs), and	Work with local communities to prepare land use plans and policies that encourage higher density development around stations.	Potentially beneficial	N/A

Key Environmental Issues	Alternative		Mitigation Strategy for HST	Potential Significance for HST	
	No Project	HST Network Alternatives		Before Mitigation	After Mitigation
		urbanized areas are expected to increase by 0.1% with Pacheco Pass to 0.6% with Altamont Pass (9,650 ac [3,905 ha] to 14,500 ac [5,868 ha]). Highest growth rates in Madera and Merced Counties, plus Stanislaus for Altamont Pass Network Alternatives. Highest urbanization rates in Madera, Merced, and Fresno Counties, plus San Joaquin and Stanislaus for Altamont Pass Network Alternatives. HST would have similar growth inducement potential regardless of network alternative. Oakland and San Francisco termini options have similar overall growth potential, but spatial shift between East Bay and Peninsula. Service termination in San Jose would lower areawide growth inducement. HST station options have similar systemwide growth inducement potential. Downtown HST station options have lower urbanization rates for home county. (Range based on HST Network Alternatives. See Chapter 5)			
Public Utilities	No impact.	Potential conflicts with 33 to 126 identified utilities, depending on network alternative. (Range based on HST Network Alternatives.)	Relocate, reconstruct, or restore utility; consolidate several utilities underground into one conduit during relocation.	Potentially significant	Potentially less than significant
Geology	Potentially susceptible to seismic hazards.	Potential seismic hazards and slope stability in cut sections.	Use of ground motion data and instruments; routine maintenance of	Potentially significant	Potentially less than significant

Key Environmental Issues	Alternative		Mitigation Strategy for HST	Potential Significance for HST	
	No Project	HST Network Alternatives		Before Mitigation	After Mitigation
			track; slope reinforcement.		
Electromagnetic Fields (EMF) and Electromagnetic Interference (EMI)	General EMF levels may be increased from low-level radiofrequency and infrared for radar and radar-like purposes, and from wireless data transfer and advanced technologies; not likely to cause significant changes in EMF or EMI levels.	Various components of HST infrastructure and trains would be sources of extremely low frequency magnetic fields and radiofrequency EMFs; overall, HST would introduce additional EMF exposures or EMI at levels for which there are not established adverse impacts.	Design features that reduce fields at the source (overhead catenary system, substations, transmission lines; some shielding with metal panels or screens).	No significant impact	Less than significant
Hazardous Materials	Disposal, clean-up, or remediation of exposure to hazardous materials during construction	Estimated 0 to 18 additional hazardous materials/waste sites potentially affected by construction: Superfund (0 to 4 sites), SPL (0 to 6 sites), and SWLF (0 to 8 sites). (Range based on HST Network Alternatives.)	Detailed Initial Site Assessment, avoid known hazardous sites where practicable, sub-surface investigation where needed to characterize sites and identify remediation.	Potentially Significant	Potentially less than significant

ac = acres
CO = carbon monoxide
CO_2 = carbon dioxide
ha = hectares
m = meters
MMBtus = million British thermal units
N/A = not available.
NO_x = oxides of nitrogen
PM10 = particulate matter 10 microns in diameter or less
PM2.5 = particulate matter 2.5 microns in diameter or less
RTPs = regional transportation plans
TOG = total organic gases