S SUMMARY

S.1 Introduction and Background

The California High-Speed Rail Authority (Authority), a state governing board, was formed in 1996 with the responsibility of planning, designing, constructing, and operating a California High-Speed Rail (HSR) System that coordinates with the state's existing transportation network—intercity rail and bus lines, regional commuter rail lines, urban rail and bus transit lines, highways, and airports.

High-Speed Rail System

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

The California HSR System would provide intercity, high-speed service on more than 800 miles of track throughout California, connecting the major population centers of Sacramento, the San Francisco Bay Area (Bay Area), the Central Valley, Los Angeles, the Inland Empire,[1] Orange County, and San Diego. Figure S-1 illustrates this system. The system would use electrically powered, high-speed, steel-wheel-on-steel-rail technology, and incorporate state-of-the-art safety, signaling, and automatic train control systems to enable trains to travel up to 220 miles per hour (mph) over a dedicated track alignment. When completed, the system would provide new passenger rail service to more than 90 percent of the state's population, providing an estimated 176 weekday trains to serve the statewide intercity travel market.

According to the Authority's *2018 Business Plan: Connecting California, Expanding Economy, Transforming Travel* (2018 Business Plan) (Authority 2018), the Authority plans to implement the California HSR System in two phases. Phase 1 would connect the state's major metropolitan areas, extending from San Francisco and Merced to Los Angeles and Anaheim; the Bay Area and Los Angeles basin regions are considered the "bookends" of the HSR system. Phase 2 would complete HSR extensions to Sacramento and San Diego.

The San Francisco to San Jose Project Section (Project Section, or project) would provide HSR service from the Salesforce Transit Center (SFTC) in San Francisco to the San Jose Diridon Station. The Project Section includes approximately 49 miles of blended[2] system infrastructure extending through San Francisco, San Mateo, and Santa Clara Counties with Caltrain and HSR trains sharing tracks. HSR trains would stop at the 4th and King Street Station in San Francisco (an interim station until completion of the Downtown Extension Project), the Millbrae Bay Area Rapid Transit/Caltrain intermodal station, and the San Jose Diridon Station. Once the Transbay Joint Powers Authority's Downtown Extension Project extends the electrified peninsula rail corridor from the 4th and King Street Station to the SFTC, HSR trains would use the track built for the Downtown Extension Project to reach SFTC (the ultimate terminal station in San Francisco).[3] As illustrated on Figure S-2, two project alternatives are evaluated in this *Draft San Francisco to San Jose Project Section Environmental Impact Report (EIR)/Environmental Impact Statement (EIS)*.

[1] The Inland Empire is a metropolitan region in Southern California encompassing most of San Bernardino and Riverside Counties.

[2] *Blended* refers to operating the HSR trains with existing intercity and commuter and regional rail trains on common infrastructure.

[3] The Downtown Extension Project and SFTC projects were environmentally cleared in the *Transbay Terminal/Caltrain Downtown Extension/Redevelopment Project Final Environmental Impact Statement/Environmental Impact Report* (U.S. Department of Transportation [USDOT] et al. 2004) and adjustments to the tunnel design were subsequently environmentally cleared in the *Transbay Transit Center Program Final Supplemental EIS/EIR* (USDOT et al. 2018).

Figure S-1 California High-Speed Rail Statewide System

Sources: Authority 2019a, 2019b

NOVEMBER 2019

Figure S-2 San Francisco to San Jose Project Section

This summary presents an overview of the Draft EIR/EIS that describes:

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

The full text of the environmental analysis in the Draft EIR/EIS is available on the Authority's website at: www.hsr.ca.gov.

S.2 Tiered Environmental Review: Final Statewide Program EIR/EIS and San Francisco to San Jose Project Section

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

Sequence of California HSR Tiered Environmental Documents

Tier One/Program Documents

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

Tier Two/Project Documents

- San Jose to Merced Project Section Draft EIR/EIS (2020)
- San Francisco to San Jose Project Section Draft EIR/EIS (this document)

The San Francisco to San Jose Project Section EIR/EIS is a second-tier EIR/EIS that tiers off the first-tier program EIR/EIS documents, and provides project-level information for decision-making on this portion of the HSR system. The Authority and the Federal Railroad Administration (FRA) prepared the 2005 *Final Program Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for the Proposed California High-Speed Train System* (Statewide Program EIR/EIS) (Authority and FRA 2005), which provided a first-tier analysis of the general effects of implementing the HSR system across two-thirds of the state. The 2008 *Final Bay Area to Central*

Valley High-Speed Train (HST) Program Environmental Impact Report/Environmental Impact Statement (EIR/EIS) (Bay Area to Central Valley EIR/EIS) (Authority and FRA 2008) and the Authority's 2012 *Bay Area to Central Valley High-Speed Train Partially Revised Final Program Environmental Impact Report* (Partially Revised Final Program EIR) (Authority 2012) were also first-tier, programmatic documents, but they focused on the Bay Area to Central Valley region. These first-tier EIR/EIS documents provided the Authority and FRA with the environmental analysis necessary to evaluate the overall HSR system and make broad decisions about general HSR alignments and station locations for further study in the second-tier EIR/EISs. Tier 1 decisions established the broad framework for the HSR system that serves as the foundation for the Tier 2 environmental review of individual projects. Between San Francisco and San Jose, the existing Caltrain corridor was advanced for Tier 2 study. Consistent with Tier 1 decisions, the Project Section would provide HSR service from the SFTC in San Francisco to Diridon Station in San Jose. The station locations advanced for Tier 2 study included a station in downtown San Francisco, a potential mid-Peninsula station, a San Francisco International Airport (SFO) Station at Millbrae, and a station at the San Jose Diridon Station.

The Authority and FRA prepared the Tier 1 documents in coordination with the U.S. Environmental Protection Agency (USEPA) and the U.S. Army Corps of Engineers (USACE). The USEPA and USACE concurred that the corridors selected by the Authority and FRA in Tier 1 were most likely to yield the least environmentally damaging practicable alternative under Section 404 of the Clean Water Act (CWA).

Electronic copies of the Tier 1 documents are available on request by calling the Authority office at (800) 435-8670. The Tier 1 documents may also be reviewed at the Authority's offices during business hours at: the Authority's Northern California Regional Office 100 Paseo de San Antonio, Suite 300, San Jose, CA 95113 and the Authority's Headquarters at 770 L Street, Suite 620, Sacramento, CA 95814.

The San Francisco to San Jose Project Section Draft EIR/EIS analyzes the environmental impacts and benefits of implementing HSR in the more geographically limited area between San Francisco and San Jose and is based on more detailed project planning and engineering. This Draft EIR/EIS evaluates proposed alignments and stations in site-specific detail to provide a complete assessment of the direct, indirect, and cumulative impacts of the proposed project and considers public and agency participation in the screening process; and is developed in consultation with resource and regulatory agencies, including the USEPA and USACE. The Authority intends each Tier 2 EIR/EIS to be sufficient to support the USACE's permit decisions, where applicable.

Cooperating Agency

Any agency invited by the federal lead agency that has agreed to participate in the NEPA process, and has legal jurisdiction over, or technical expertise regarding, environmental impacts associated with a proposed action.

Pursuant to 23 U.S.C. Section 327, under the NEPA Assignment Memorandum of Understanding (NEPA Assignment MOU) between the FRA and the State of California, effective July 23, 2019, the Authority is the project sponsor and the federal lead agency for compliance with NEPA and other federal laws for the HSR System, including the San Francisco to San Jose Project Section (FRA and State of California 2019). Under the NEPA Assignment MOU, the FRA retains responsibility for certain activities including performing Clean Air Act conformity determinations and conducting formal government-to-government tribal consultations. The Authority is also the state lead agency under CEQA. There are two cooperating agencies included in the NEPA review process. The USACE agreed by letter, dated December 30, 2009, to be a cooperating agency under NEPA. The Surface Transportation Board (STB), by letter dated May 2, 2013, is also a cooperating agency under NEPA.

S.3 Issues Raised during the Scoping Process

Public scoping is an important element in the process of determining the focus and content of an EIR/EIS and provides an opportunity for public and agency involvement. Scoping helps identify the range of actions, alternatives, environmental effects, and mitigation measures to be analyzed

in depth. It also helps focus detailed study on those issues pertinent to the final decision on the project. The Authority initiated public scoping outreach activities for Tier 2 planning for a fully grade-separated four-track system in 2009, including the development of project information materials, establishment of a project information phone line, early engagement with interested parties, and media communications.

The Authority issued a Notice of Preparation (NOP) on December 22, 2008 and the FRA published a Notice of Intent (NOI) in the *Federal Register* on December 29, 2008 to begin the Tier 2 project-level environmental review process. On January 8, 2009, the Authority issued a revised NOP (SCH No. 2008122079) clarifying that the comment period would end on March 6, 2009. The comment period was later extended through April 6, 2009. The NOP and NOI stated the purpose of the project, the project limits, a description of alternatives to be considered, the need for agency input, potential environmental impacts of the project, points of contact for additional information, and the dates and locations of the scoping meetings.

The Authority held formal scoping period meetings for the Draft EIR/EIS in January 2009 in the cities of San Francisco, San Carlos, and Santa Clara. These scoping meetings were an important component of the scoping process for both state and federal environmental review and provided an opportunity for the public to provide input on the project and issues for consideration in the EIR/EIS.

In addition to these formal scoping meetings, public input on the scope of the environmental review was sought through presentations, briefings, and workshops. Section 9.2.1, Public and Agency Scoping (2009), summarizes the meetings held as part of the lead agencies' outreach effort. The scoping comments received from the public, agencies, and organizations are available in appendices to the *Draft Scoping Report for the San Francisco to San Jose High-Speed Train Project-Level EIR/EIS* (Authority and FRA 2009).

The environmental review of the Project Section continued, but the Authority ultimately halted that work in 2011. It subsequently commenced a new effort on a more limited proposal for the San Francisco to San Jose Project Section—a predominantly two-track blended system utilizing existing Caltrain track and remaining substantially within the existing Caltrain right-of-way—which reflects public and agency feedback received during the initial Tier 2 planning for a four-track system in 2009 and 2010, as well as subsequent planning work and legislation.

The Authority re-initiated public scoping outreach activities for the two-track blended system in April 2016 by publishing a new NOP and NOI. This round of public scoping included pre-scoping briefings, development of project information materials, establishment of a project information phone line, early engagement with interested parties, and media communications. As part of public outreach for the Draft EIR/EIS, three public and agency scoping meetings were held between May 23 and May 25, 2016, in San Francisco, San Mateo, and Mountain View. The scoping meetings and comments received on the NOI/NOP helped the lead agencies identify general environmental issues to be addressed in the Draft EIR/EIS. The scoping process identified issues with project elements and stations, as well as community, environmental, technical/engineering, and project costs/operations concerns. The scoping period for the environmental process lasted from May 9, 2016 to July 20, 2016. A total of 152 written and verbal comments were received.

The *Final Scoping Report for the San Francisco to San Jose High-Speed Rail Project Section EIR/EIS* (Authority and FRA 2016) is available by request via the Authority's website or by calling (800) 435-8670 and provides a more comprehensive discussion of the scoping comments. The issues raised in scoping comments addressed the following resource topics and other concerns:

- Project elements and stations, including grade separations, storage and maintenance facilities, train route alignment, and station concerns
- Community concerns including environmental justice, growth and socioeconomics, and community connectivity

- Environmental topics including:
  - Aesthetics and visual resources
  - Air quality and climate change
  - Biological resources and wetlands
  - Cultural resources
  - Hydrology and water resources
  - Land use and development
  - Noise and vibration
  - Parks and recreational areas and facilities
  - Public utilities and energy
  - Safety and security
  - Traffic and transportation
- Technical and engineering interests, including technology options and advancements
- Project cost, construction, and operations

Refer to Chapter 9, Public and Agency Involvement, for additional information regarding outreach, consultation, and alternatives development for the Draft EIR/EIS.

S.4 Purpose of and Need for the High-Speed Rail System and the San Francisco to San Jose Project Section

S.4.1 Purpose of the High-Speed Rail System

The purpose of the statewide HSR system is to provide a reliable high-speed electrified train service that links the major metropolitan areas of the state and delivers predictable and consistent travel times. A further objective is to provide an interface with commercial airports, mass transit, and the highway network and to relieve capacity constraints of the existing transportation system as increases in intercity travel demand in California occur, in a manner sensitive to and protective of California's unique natural resources.

S.4.2 Purpose of the San Francisco to San Jose Project Section

The project's purpose is to implement the California HSR system to provide the public with electric-powered HSR service that offers predictable and consistent travel times between San Francisco and San Jose, facilitates connectivity to SFO and Norman Y. Mineta San Jose International Airport, mass transit, the Bay Area highway network, and to the statewide HSR system to:

- Achieve HSR service that meets Proposition 1A travel time in the Caltrain corridor
- Provide blended system infrastructure that supports commercially feasible HSR, while also minimizing environmental impacts and maximizing compatibility with communities along the rail corridor
- Establish an HSR connection to the economic center of Northern California

A further purpose of the San Francisco to San Jose Project Section is to construct, maintain, and operate an electrified high-speed train system, which includes the construction, improvement, upgrade, operation, and maintenance of new and existing facilities and infrastructure necessary to support the system connecting the SFTC in San Francisco to Diridon Station in San Jose. Consistent with state law and to minimize environmental impacts by providing a reduced HSR footprint, the HSR system would "blend" with the existing Caltrain system through the primary use of a two-track configuration, incorporating "common-level"[4] boarding platforms at stations shared

[4] "Common-level" boarding platforms are level with the interior doors of trains such that a passenger transferring from one train to a second train is not required to climb up or down steps to gain access to the second train on the same platform.

with Caltrain,[5] and using existing transportation corridors and rights-of-way. The system would be designed and operated to provide consistent and predictable travel, capable of achieving a nonstop service travel time of 30 minutes between San Francisco and San Jose.

S.4.3 CEQA Project Objectives for the High-Speed Rail System in California and in the San Francisco to San Jose Project Section

The Authority's statutory mandate is to plan, build, and operate an HSR system coordinated with California's existing transportation network, particularly intercity rail and bus lines, commuter rail lines, urban rail lines, highways, and airports. As the CEQA lead agency, the Authority is preparing this project-level EIR/EIS consistent with specific CEQA EIR content and processing requirements. CEQA Guidelines Section 15124 requires an EIR to include a statement of objectives that will support the underlying purpose of the project. In response to its statutory mandate and CEQA requirements, the Authority has adopted the following objectives and policies for the proposed HSR system and the Project Section:

- Provide intercity travel capacity to supplement critically overused interstate highways and commercial airports consistent with the Passenger Rail Vision in the California State Rail Plan.
- Meet future intercity travel demand that would be unmet by current transportation systems and increase capacity for intercity mobility.
- Maximize intermodal transportation opportunities by locating stations to connect with local transit systems, airports, and highways.
- Improve the intercity travel experience for Californians by providing comfortable, safe, frequent, and reliable high-speed travel.
- Provide a sustainable reduction in travel time between major urban centers.
- Increase the efficiency of the intercity transportation system.
- Maximize the use of existing transportation corridors and rights-of-way, to the extent feasible.
- Develop a practical and economically viable transportation system that can be implemented in phases by 2040 and generate revenues in excess of operations and maintenance (O&M) costs.
- Provide intercity travel in a manner considerate and protective of the region's sensitive environmental resources and reduce emissions and vehicle miles traveled (VMT) for intercity trips.
- Provide blended system infrastructure that supports a viable operations plan for HSR, while also minimizing environmental impacts and maximizing compatibility with Peninsula[6] communities.

S.4.4 Statewide and Regional Need for the High-Speed Rail System in the San Francisco to San Jose Project Section

The approximately 49-mile-long Project Section is an essential component of the statewide HSR system. As the northern Bay Area terminus of the HSR system, it would provide access to a new transportation mode; contribute to increased mobility along the Caltrain corridor and throughout California; and connect the Bay Area to the rest of the statewide HSR system via three counties—San Francisco, San Mateo, and Santa Clara. As a major population and economic center for California, the Bay Area contributes significantly to the statewide need for a new

[5] Where the Draft EIR/EIS describes platforms at 4th and King Street, Millbrae, and San Jose Diridon Stations as "dedicated" for HSR, this refers to the current understanding of scheduling and timetabling at those stations. The schedules currently developed jointly with Caltrain enable HSR and Caltrain to use separate platforms at 4th and King Street, Millbrae, and San Jose Diridon Stations, which supports more reliable and resilient operations. However, in the event that Caltrain is unable to access its scheduled platforms, it would be able to share the high-level HSR platforms through the use of high-level doors fitted on new Caltrain trains.

[6] For the purpose of this Draft EIR/EIS, the *Peninsula* is San Mateo and northern Santa Clara Counties.

intercity transportation service that would connect San Francisco with Los Angeles and other regions of the state. Figure S-1 illustrates the location of the Project Section within California and the HSR system.

The capacity of California's intercity transportation system, including San Francisco, the Peninsula, and South Bay,[7] is insufficient to meet existing and future travel demand. The current and projected future congestion of the system will result in deteriorating air quality, reduced reliability, increased travel times, more accidents, and increasing greenhouse gas (GHG) emissions. The current statewide and regional transportation system has not kept pace with significant increases in population, economic activity, and tourism in the state, including in the Bay Area.

The interstate highway system, commercial airports, and conventional passenger rail system serving the intercity travel market are operating at or near capacity and will require large public investments for maintenance and expansion to meet existing demand and future growth over the next 25 years and beyond. Moreover, the feasibility of expanding many major highways and key airports is uncertain, as some needed expansions might be impractical or constrained by physical, regulatory, environmental, political, and other factors.

The need for improvements to intercity travel in California, including intercity travel between San Francisco, the Peninsula, and San Jose, relates to the following issues:

- Future growth in demand for intercity travel, including the growth in demand in the Bay Area
- Transportation system capacity constraints that will result in increasing congestion and travel delays, including those in the Bay Area, particularly in the Peninsula and South Bay
- Unreliability of travel modes stemming from congestion and delays, weather conditions, accidents, and other factors that affect the quality of life and economic well-being of residents, businesses, and tourists in California, including the Peninsula and South Bay
- Reduced mobility as a result of increasing demand on limited modal connections among major airports, transit systems, and passenger rail in the state, including the Peninsula and South Bay
- Poor and deteriorating air quality and pressure on natural resources as a result of expanded highways and airports and urban development pressures, including those in the Bay Area
- Legislative mandates to moderate the effects of transportation on climate change, including required reductions in GHG emissions caused by vehicles powered by the combustion of carbon-based fuels

Chapter 1, Project Purpose, Need, and Objectives, in the Draft EIR/EIS provides additional information about factors relevant to intercity travel between the Bay Area and Southern California, as well as Merced, Fresno, and the Sacramento Valley.

S.5 Alternatives

This section provides an overview of the project alternatives evaluated in the Draft EIR/EIS. Chapter 2, Alternatives, provides details on the identification of the project alternatives in the Draft EIR/EIS. All the alternatives have been subjected to a screening process that considered the impacts of the alternatives on the social, natural, and built environment. In addition to the two project alternatives, the Authority also evaluated a No Project Alternative.

S.5.1 No Project Alternative

The No Project Alternative is the basis for comparison of the project alternatives. The No Project Alternative represents the state's transportation system (highway, air, bus, conventional rail) as it is currently and as it would be after implementation of programs or projects that are currently

[7] *South Bay* refers to Santa Clara County.

projected in regional transportation plans, which have identified funds for implementation and are expected to be in place by 2040, as well as any major planned land use changes.

NEPA requires the evaluation of a "no action" alternative in an EIS (CEQ Regulations § 1502.14(d)). Similarly, CEQA requires that an EIR include the evaluation of a "no project" alternative (CEQA Guidelines § 15126.6(e)). The No Project Alternative considers the effects of current land use and transportation plans for the project area, including planned improvements to the highway, aviation, conventional passenger rail, freight rail, and port systems through the 2040 planning horizon for the environmental analysis. The No Project Alternative describes the circumstances that would exist if the Authority does not take the actions necessary to implement HSR service between San Francisco and San Jose. The No Project Alternative represents 2016 existing conditions in the Project Section resource study areas (RSA) and future conditions in 2040 based on projected growth, programmed and funded improvements to the intercity transportation system, and other reasonably foreseeable projects through the 2040 operation year. The No Project Alternative also considers the State Transportation Improvement Program, regional transportation plans for all modes of travel, airport plans, intercity passenger rail plans, and city and county planning documents. Under the No Project Alternative, the Caltrain Peninsula Corridor Electrification Project would be built and the Downtown Extension Project would extend existing Caltrain commuter service to the SFTC.

S.5.2 San Francisco to San Jose Project Section Alternatives

The Draft EIR/EIS evaluates two project alternatives—Alternative A and Alternative B—which are similar throughout most of the Project Section. The project would use existing and in-progress infrastructure improvements developed by Caltrain for its Caltrain Modernization Program, including the electrified Caltrain corridor, and would build additional infrastructure improvements to accommodate HSR service. To more clearly describe the location of environmental resources and project impacts, both alternatives are divided into five geographic subsections. Figure S-2 illustrates and Table S-1 summarizes the design features for the project alternatives.

Table S-1 Summary of Design Features for Project Alternatives[1]

Design Features	Project Alternative	
	Alternative A	Alternative B
Length of existing Caltrain track (miles)[2]	48.9	48.9
Length of modified track (miles)[2]	17.4	19.8/21.6
Length of track modification <1 foot (miles)[2]	5.7	4.5/5.3
Length of track modification >1 foot and <3 feet (miles)[1]	2.2	1.9/1.9
Length of track modification >3 feet (miles)[2]	9.5	13.4/14.4
Length of OCS pole relocation (miles)[2, 3]	11.7	15.3/16.3
Includes additional passing tracks	No	Yes
Maintenance facility	East Brisbane LMF	West Brisbane LMF
Modified stations		
Modifications to HSR stations	4th and King Street, Millbrae, San Jose Diridon	4th and King Street, Millbrae, San Jose Diridon
Modifications to Caltrain stations due to the LMF	Bayshore (relocated)	Bayshore (relocated)
Modifications to Caltrain stations due to track shifts	San Bruno, Hayward Park	San Bruno; Santa Clara (Alt B [Scott]); College Park (Alt B [I-880])
Modifications to Caltrain stations to remove hold-out rule	Broadway, Atherton, College Park	Broadway; Atherton

Design Features	Project Alternative	
	Alternative A	Alternative B
Modifications to Caltrain stations due to the passing tracks		Hayward Park; Hillsdale; Belmont; San Carlos (relocated)
Number of modified or new structures[4]	21	37/37
New structures	2	3/2
Modified structures	7	20/19
Replaced structures	9	8/10
Affected retaining walls	3	6/6
Number of at-grade crossings with safety modifications (e.g., four-quadrant gates, median barriers)	40	38/38
Length of new perimeter fencing (miles)	8.8	13.5/14.4
Communication radio towers	21	23/23

Sources: Authority 2019a, 2019b
I- = Interstate
LMF = light maintenance facility
OCS = overhead contact system
[1] Data are presented for Alternative B (Viaduct to I-880) first, followed by Alternative B (Viaduct to Scott Boulevard).
[2] Lengths shown are guideway mileages, rather than the length of the northbound and southbound track.
[3] OCS pole relocations are assumed for areas with track shifts greater than 1 foot.
[4] Structures include bridges, grade separations such as pedestrian underpasses and overpasses, tunnels, retaining walls, and culverts.

S.5.3 Common Design Features

Common design features include track modifications to support higher speeds while maintaining passenger comfort; station and platform modifications to accommodate HSR trains passing through or stopping at existing stations; safety and security improvements for at-grade roadway crossings and at existing Caltrain stations; continuous fencing along the corridor; and communication radio towers at approximately 2.5-mile intervals.

S.5.3.1 Track and Station Modifications

The project alternatives would modify between 9 (Alternative A) and 12 (Alternative B) of the existing 27 Caltrain stations between 4th and King Street in San Francisco and West Alma Avenue in San Jose to accommodate HSR trains passing through or stopping at the stations. HSR trains would stop at the 4th and King Street, Millbrae, and San Jose Diridon Stations, requiring dedicated HSR platforms and associated passenger services be provided at these stations. Other stations would be modified to accommodate track adjustments, remove the hold-out rule,[8] and build project features such as the Brisbane light maintenance facility (LMF) and passing track under Alternative B.

The blended system would require curve straightening, track center modifications, and superelevation[9] of existing Caltrain tracks along approximately 36 to 44 percent of the project corridor to support higher speeds of up to 110 mph. Where track modifications would occur at existing Caltrain stations, adjustments to existing platforms would be required.

Three existing Caltrain stations—Broadway and Atherton Stations (both alternatives) and the College Park Station (Alternative A only)—would be modified as part of the blended system

[8] The *hold-out rule* is the rule enforced at Caltrain stations that requires passengers to board and alight the train from between the active tracks. An oncoming train is detained outside of the station zone until the passengers are safely clear.

[9] *Superelevation* is the vertical distance between the height of the inner and outer rails at a curve. Superelevation is used to partially or fully counteract the centrifugal force acting radially outward on a train when it is traveling along the curve.

improvements to remove the existing hold-out rule. A new northbound outboard platform would be built at these stations to eliminate the need for passengers to cross between the tracks.

Project components such as the Brisbane LMF under both alternatives and the passing tracks under Alternative B would require station modifications or relocations. The Brisbane LMF would require modifying the station platforms and pedestrian overpass at the Bayshore Station in Brisbane. The passing tracks under Alternative B would require modifying the Hayward Park, Hillsdale, Belmont, and San Carlos Caltrain Stations.

S.5.3.2 Safety and Security Modifications to the Right-of-Way

Consistent with FRA safety guidelines for HSR systems with operating speeds of up to 110 mph, the blended system would implement safety improvements at the at-grade crossings to create a "sealed corridor" that would reduce conflicts with automobiles and pedestrians. Safety improvements would include installing four-quadrant gates extending across all lanes of travel and median separators to channelize and regulate paths of travel at all at-grade crossings. These gates would prevent drivers from traveling in opposing lanes to avoid the lowered gate arms. Pedestrian crossing gates also would be installed parallel to the tracks, and aligned with the vehicular gates on either side of the roadway.

Depending on the configuration of the existing at-grade crossing, one of six different four-quadrant gate applications would be installed at each of the 38 to 40 at-grade crossings in the Project Section. Table S-2 shows the number and locations of four-quadrant gate applications. These applications would specify the improvements at each at-grade crossing, including the number of vehicle and pedestrian gates, and the need for channelization or raised medians. The Authority would install fencing at the at-grade crossings and along the perimeter of the Caltrain corridor. Consistent with Caltrain's design standards, existing fencing would be extended to adjacent structures to close any gaps.

Table S-2 Number and Locations of Four-Quadrant Gate Applications in the Project Section

Application	Number of At-Grade Crossings	Location of At-Grade Crossings
A	7 to 9	Mission Bay Drive and 16th Street (San Francisco); 4th Avenue, 5th Avenue, and 9th Avenue (San Mateo); Oak Grove Avenue and Ravenswood Avenue (Menlo Park); Mary Avenue (Sunnyvale); Auzerais Avenue and W Virginia Street (San Jose, Alternative A only)
B	11	Center Street (Millbrae); Oak Grove Avenue, North Lane, Howard Avenue, Bayswater Avenue, and Peninsula Avenue (Burlingame); Villa Terrace and Bellevue Avenue (San Mateo); Chestnut Street (Redwood City); Encinal Avenue (Menlo Park); Alma Street (Palo Alto)
B1	2	Scott Street (San Bruno); Watkins Avenue (Atherton)
C	4	Broadway (Burlingame); Whipple Avenue (Redwood City); Rengstorff and Castro Street (Mountain View)
D	7	Linden Avenue (South San Francisco); Brewster Avenue and Broadway (Redwood City); Churchill Avenue, Meadow Drive and Charleston Road (Palo Alto); Sunnyvale Avenue (Sunnyvale)
E	7	1st Avenue, 2nd Avenue, 3rd Avenue, and 9th Avenue (San Mateo); Maple Street, Main Street (Redwood City); and Glenwood Avenue (Menlo Park)
Total	**38 to 40**	Alternative A: 40 crossings; Alternative B: 38 crossings

Sources: Authority 2019a, 2019b

S.5.3.3 Train Control and Communication Facilities

HSR would require the installation of a radio-based communications network to maintain communications and share data between the trains and the operations control center. Communications radio towers would consist of an 8-foot by 10-foot communications equipment shelter and a 6- to 8-foot-diameter communications tower extending 100 feet above top of rail at intervals of approximately 2.5 miles. Where possible, these facilities would be co-located at an existing Caltrain traction power substation, switching station, paralleling station, or Caltrain station. Where communications towers cannot be co-located with other Caltrain facilities, the communications facilities would be sited near the HSR corridor in a fenced area approximately 20 by 15 feet. Some but not all of the stand-alone locations have two options for environmental clearance.

S.5.4 Design Variations

Design variations between the project alternatives include location for the LMF, the presence of passing tracks between San Mateo and Redwood City, and the alignment and HSR station configuration in the San Jose Diridon Station Approach Subsection. Alternative A would build an LMF on the east side of the railroad tracks in Brisbane and would not build additional passing tracks. Alternative B would build an LMF on the west side of the railroad tracks in Brisbane and build a 6-mile-long four-track passing track through San Mateo, Belmont, San Carlos, and into the northern portion of Redwood City.

S.5.4.1 Light Maintenance Facility Options

The Project Section would include an approximately 100- to 110-acre LMF in the city of Brisbane, which would support the San Francisco terminal station operations by dispatching freshly inspected and serviced trains and crews to begin revenue service throughout the day. The LMF would also be the location for daily, monthly, and quarterly maintenance of HSR trainsets. Maintenance activities would include train washing, interior cleaning, wheel truing, testing, and inspections. These activities would occur between runs or as a pre-departure service at the start of the revenue day. Additionally, the LMF would be used as a service point for any trains in need of emergency services. The Draft EIR/EIS evaluates two LMF site options for the Brisbane LMF, east and west of the mainline Caltrain tracks, as part of the two project alternatives. Functionally, either of the LMF options could be combined with the elements of the other project alternative as part of the Preferred Alternative.

S.5.4.2 Passing Track Options

Since the framework for blended system operations was established in 2012, the Authority and the Peninsula Corridor Joint Powers Board (PCJPB)[10] have studied the feasibility of blended system operations, including the utility of passing tracks. Passing tracks allow faster-moving trains to bypass slower-moving trains, and have the potential to provide operational benefits associated with faster recovery times from incidents or perturbations (i.e., disruption events) on the railway. Based on operational analyses conducted in 2013 and 2016 and a preliminary evaluation of community impacts associated with construction, the no additional passing track option and the Short Middle Four-Track Passing Track option were carried forward for evaluation in the Draft EIR/EIS. These passing track options are consistent with operational service time objectives for HSR and Caltrain, and would minimize impacts on adjacent communities.

Alternative A would include the no additional passing track option, while Alternative B would build the approximately 6-mile-long passing track between Ninth Avenue in San Mateo and Whipple Avenue in Redwood City, in an area of the corridor that is already grade separated. Building the passing track would require modifying the Hayward Park, Hillsdale, and Belmont Stations and roadway underpasses to accommodate the additional tracks. The San Carlos Station and platforms would be relocated, and a pedestrian underpass would be constructed. Both

[10] PCJPB is the owner and managing authority for the Peninsula Corridor.

alternatives would use the existing areas along the Caltrain corridor with more than two tracks (South Terminal, Lawrence, North Fair Oaks, and Brisbane) that allow for passing.

S.5.4.3 San Jose Diridon Station Approach Subsection (Alignment and Station)

The two project alternatives would vary from one another in the San Jose Diridon Station Approach Subsection with respect to the alignment and HSR station configuration. Alternative A would continue within the Caltrain right-of-way in Santa Clara and San Jose towards the San Jose Diridon Station on a blended at-grade alignment. The San Jose Diridon Station would entail a four-track at-grade alignment through the center of the existing Diridon Station, with platforms centered between Santa Clara Street and Park Avenue. The existing historic train station would remain in place. A pedestrian concourse would be built above the yard to provide access to the platforms below. The concourse would consist of a pedestrian walkway above the existing Caltrain tracks and below the HSR platforms, with two entrances on the east side and one on the west. Continuing south from the San Jose Diridon Station, a new Union Pacific Railroad track would be built adjacent to the mainline tracks and the blended at-grade three-track alignment would remain in the Caltrain right-of-way through the Gardner neighborhood.

Alternative B would depart from the Caltrain right-of-way south of Interstate (I-) 880 (Viaduct to I-880) or south of Scott Boulevard (Viaduct to Scott Boulevard). Beginning at either I-880 or Scott Boulevard, dedicated HSR tracks would diverge from the mainline tracks and would rise on viaduct to an aerial HSR station, which would have the same design with both viaduct options. The San Jose Diridon HSR Station would entail a four-track aerial alignment approximately 60 feet above the existing station. The existing historic train station would remain in place. The primary HSR station building would be built north of the existing station building, but it would continue to the south, wrapping around the existing Caltrain station building. The concourse would consist of a mezzanine level above the existing Caltrain tracks and below the HSR platforms, with three east-west connections across the tracks at the north, south, and middle. The alignment would continue on viaduct south of the San Jose Diridon Station.

S.5.4.4 Diridon Design Variant

Within the San Jose Diridon Station Approach Subsection, the Authority developed a design variant intended to optimize speed, which would be applicable to Alternative A only. The Diridon Design Variant would alter the San Jose Diridon Station north and south approaches and modify the station platforms to increase the design speed from 15 mph to 40 mph. North of the station, the design alterations would change the horizontal placement of the freight and electrified passenger tracks up to 37 feet to the east between Santa Clara Street and Julian Street. From the south end of the station to San Carlos Street, the design alterations would adjust the horizontal placement of the electrified passenger tracks by up to 1 foot. The incremental differences in environmental impacts for Alternative A with the Diridon Design Variant compared to Alternative A without the Diridon Design Variant are summarized in Section 3.19, Design Variant to Optimize Speed, of the Draft EIR/EIS.

S.5.5 Station Area Development

As described in Section S.5.3.1, Track and Station Modifications, HSR trains would stop at the existing 4th and King Street, Millbrae, and San Jose Diridon Stations, requiring dedicated HSR platforms and associated passenger services at these stations. The station locations would be the same under both project alternatives, although the conceptual station plan and profile of the San Jose Diridon HSR Station would vary by alternative.

S.5.6 Maintenance Facilities

As described in Section S.5.4.1, Light Maintenance Facility Options, an LMF would be built in Brisbane to support the terminal station operations in downtown San Francisco. The LMF would be east of the mainline tracks under Alternative A or west of the mainline tracks under Alternative B.

S.6 Impact Avoidance and Minimization Features

The IAMFs are project features (e.g., standard engineering practices and specific training for construction workers) that have been incorporated into an alternative to avoid or minimize impacts. Table S-3 provides the available IAMFs for this project.

Table S-3 HSR Impact Avoidance and Minimization Features

Impact Avoidance and Minimization Features	
Air Quality	
AQ-IAMF#1	Fugitive Dust Emissions
AQ-IAMF#2	Selection of Coatings
AQ-IAMF#3	Renewable Diesel
AQ-IAMF#4	Reduce Criteria Exhaust Emissions from Construction Equipment
AQ-IAMF#5	Reduce Criteria Exhaust Emissions from On-Road Construction Equipment
Aesthetics and Visual Quality	
AVQ-IAMF#1	Aesthetic Options
AVQ-IAMF#2	Aesthetic Review Process
Biological and Aquatic Resources	
BIO-IAMF#1	Designate Project Biologist, Designated Biologists, Species-Specific Biological Monitors and General Biological Monitors
BIO-IAMF#2	Facilitate Agency Access
BIO-IAMF#3	Prepare WEAP Training Materials and Conduct Construction Period WEAP Training
BIO-IAMF#4	Conduct Operation and Maintenance Period WEAP Training
BIO-IAMF#5	Prepare and Implement a Biological Resources Management Plan
BIO-IAMF#6	Establish Monofilament Restrictions
BIO-IAMF#7	Prevent Entrapment in Construction Materials and Excavations
BIO-IAMF#8	Delineate Equipment Staging Areas and Traffic Routes
BIO-IAMF#9	Dispose of Construction Spoils and Waste
BIO-IAMF#10	Clean Construction Equipment
BIO-IAMF#11	Maintain Construction Sites
BIO-IAMF#12	Design the Project to be Bird Safe
Cultural Resources	
CUL-IAMF#1	Geospatial Data Layer and Archaeological Sensitivity Map
CUL-IAMF#2	WEAP Training Session
CUL-IAMF#3	Pre-Construction Cultural Resource Surveys
CUL-IAMF#4	Relocation of Project Features when Possible
CUL-IAMF#5	Archaeological Monitoring Plan and Implementation
CUL-IAMF#6	Pre-Construction Conditions Assessment, Plan for Protection of Historic Built Resources, and Repair of Inadvertent Damage

Impact Avoidance and Minimization Features	
CUL-IAMF#7	Built Environment Monitoring Plan
CUL-IAMF#8	Implement Protection and/or Stabilization Measures
EMF/EMI	
EMF/EMI-IAMF#1	Preventing Interference with Adjacent Railroads
EMF/EMI-IAMF#2	Controlling Electromagnetic Fields/Electromagnetic Interference
Geologic Resources	
GEO-IAMF#1	Geologic Hazards
GEO-IAMF#2	Slope Monitoring
GEO-IAMF#3	Gas Monitoring
GEO-IAMF#5	Hazardous Minerals
GEO-IAMF#6	Ground Rupture Early Warning Systems
GEO-IAMF#7	Evaluate and Design for Large Seismic Ground Shaking
GEO-IAMF#8	Suspension of Operations during an Earthquake
GEO-IAMF#9	Subsidence Monitoring
GEO-IAMF#10	Geology and Soils
GEO-IAMF#11	Engage a Qualified Paleontological Resources Specialist
GEO-IAMF#12	Perform Final Design Review and Triggers Evaluation
GEO-IAMF#13	Prepare and Implement Paleontological Resources Monitoring and Mitigation Plan
GEO-IAMF#14	Provide WEAP Training for Paleontological Resources
GEO-IAMF#15	Halt Construction, Evaluate, and Treat if Paleontological Resources Are Found
Hazardous Materials and Wastes	
HMW-IAMF#1	Property Acquisition Phase 1 and Phase 2 Environmental Site Assessments
HMW-IAMF#2	Landfill
HMW-IAMF#3	Work Barriers
HMW-IAMF#4	Undocumented Contamination
HMW-IAMF#5	Demolition Plans
HMW-IAMF#6	Spill Prevention
HMW-IAMF#7	Transport of Materials
HMW-IAMF#8	Permit Conditions
HMW-IAMF#9	Environmental Management System
HMW-IAMF#10	Hazardous Materials Plans
Hydrology and Water Resources	
HYD-IAMF#1	Stormwater Management
HYD-IAMF#2	Flood Protection
HYD-IAMF#3	Prepare and Implement a Construction Stormwater Pollution Prevention Plan

Impact Avoidance and Minimization Features	
HYD-IAMF#4	Prepare and Implement an Industrial Stormwater Pollution Prevention Plan
Station Planning, Land Use, and Development	
LU-IAMF#1	HSR Station Area Development: General Principles and Guidelines
LU-IAMF#2	Station Area Planning and Local Agency Coordination
LU-IAMF#3	Restoration of Land Used Temporarily during Construction
Noise and Vibration	
NV-IAMF#1	Noise and Vibration
Parks, Recreation, and Open Space	
PK-IAMF#1	Parks, Recreation, and Open Space
Public Utilities and Energy	
PUE-IAMF#1	Design Measures
PUE-IAMF#3	Public Notifications
PUE-IAMF#4	Utilities and Energy
Safety and Security	
SS-IAMF#1	Construction Safety Transportation Management Plan
SS-IAMF#2	Safety and Security Management Plan
SS-IAMF#3	Hazard Analyses
Socioeconomics and Communities	
SOCIO-IAMF#1	Construction Management Plan
SOCIO-IAMF#2	Compliance with Uniform Relocation Assistance and Real Property Acquisition Policies Act
SOCIO-IAMF#3	Relocation Mitigation Plan
Transportation	
TR-IAMF#1	Protection of Public Roadways during Construction
TR-IAMF#2	Construction Transportation Plan
TR-IAMF#3	Off-Street Parking for Construction-Related Vehicles
TR-IAMF#4	Maintenance of Pedestrian Access
TR-IAMF#5	Maintenance of Bicycle Access
TR-IAMF#6	Restriction on Construction Hours
TR-IAMF#7	Construction Truck Routes
TR-IAMF#8	Construction during Special Events
TR-IAMF#9	Protection of Freight and Passenger Rail during Construction
TR-IAMF#11	Maintenance of Transit Access
TR-IAMF#12	Pedestrian and Bicycle Safety

EMF = electromagnetic field
EMI = electromagnetic interference
HSR = high-speed rail
WEAP = worker environmental awareness program

The Authority has committed to integrating programmatic IAMFs consistent with the 2005 Statewide Program EIR/EIS (Authority and FRA 2005), the 2008 Bay Area to Central Valley Program EIR/EIS (Authority and FRA 2008), and the 2012 Partially Revised Final Program EIR (Authority 2012). Table S-3 provides the inventory of the features that are considered to be part of both project alternatives. The full text for each IAMF is provided in Appendix 2-E, Project Impact Avoidance and Minimization Features, in Volume 2, Technical Appendices, of the Draft EIR/EIS. Chapter 3, Affected Environment, Environmental Consequences, and Mitigation Measures, of the Draft EIR/EIS provides a description of each IAMF as well as its purpose in the context of each resource topic.

S.7 No Project Alternative Impacts

Under the No Project Alternative, the regional population would grow at a rate similar to the statewide average for California. General plans and other planning documents for cities and counties in the region project the locations and types of growth likely to occur under buildout of the plans. Between 2015 and 2040, population is projected to increase in San Francisco, San Mateo, and Santa Clara Counties by about 20 percent, 15 percent, and 22 percent per year, respectively, with an estimated population increase for all three counties totaling approximately 712,880 people by 2040 (California Department of Finance [CDOF] 2014, 2016). Housing demand in San Francisco, San Mateo, and Santa Clara Counties is projected to increase at an annual average growth rate of 0.8 percent, 0.8 percent, and 1.0 percent, respectively, with an estimated 1,646,900 housing units projected in the three-county region by 2040. With population growth and increased housing demand, the employment in all three counties is also expected to increase by an annual average growth rate of 0.84 percent in San Francisco County, 0.86 percent in San Mateo County, and 0.84 percent in Santa Clara County. Employment for the three-county region is projected to reach 2,573,200 jobs by 2040. This regional population growth would prompt higher-density development in urban areas and the concentration of uses around transit corridors, along with the infrastructure needed to support the added development.

Over the past decade the region has experienced a substantial increase in commuter traffic reflecting the increase in "reverse commute" trips[11] from San Francisco to Peninsula and South Bay locations and the increase in off-peak travel between the San Francisco, Peninsula, and South Bay locations (PCJPB 2015). With a growing Peninsula and South Bay population continuing to commute to increasing employment opportunities in San Francisco and, conversely, a growing San Francisco population commuting to increasing knowledge sector jobs in the South Bay, the existing regional transportation infrastructure between San Francisco and San Jose faces challenges in satisfying both regional and statewide travel demand. To accommodate this growth, transportation improvements would be completed to maintain or expand existing capacity. Appendix 3.18-A, Cumulative Nontransportation Plans and Projects List, and Appendix 3.18-B, Cumulative Transportation Plans and Projects Lists, in Volume 2 of the Draft EIR/EIS provide a full list of anticipated future development projects.

Development under the No Project Alternative would result in impacts (relative to existing conditions) on the following resources:

- **Transportation**—Future transportation and transit improvement projects would provide transportation benefits such as expanded capacity, improving safety, and reducing traffic volumes in the short term, although the programmed transportation network capacity improvements would not be enough to meet long-term future demand and population growth.
- **Air quality**—Development would lead to increases in emissions of sulfur dioxide, particulate matter smaller than or equal to 10 microns in diameter, and particulate matter smaller than or equal to 2.5 microns in diameter. These emissions are commonly generated from power plants and other industrial facilities or emitted from noncombustion processes, which are

[11] The *reverse commute* is a regularly taken round trip from an urban area (e.g., San Francisco) to a suburban area (e.g., Palo Alto or Mountain View) in the morning and returning in the evening. It typically applies to a trip to work in the suburbs from home in the city.

expected to increase along with population and economic growth. Total emissions for volatile organic compounds, carbon monoxide, and nitrogen oxides would decrease as a result of improvements in on-road vehicle engine technology, fuel efficiency, and turnover in older, more heavily polluting vehicles.

- **Noise**—Increases in freight and passenger train movements, as well as increases in existing traffic levels associated with development to accommodate population growth, would result in a corresponding increase in transportation-related noise.
- **Electromagnetic fields (EMF) and electromagnetic interference (EMI)**—The generation of EMF and EMI would increase, associated with additional electricity use and radio frequency communications.
- **Public utilities and energy**—Growing energy demands would require additional electricity generation and transmission capacity, and greater VMT would increase petroleum demands.
- **Biological and aquatic resources**—Habitat loss and degradation and potential mortality of individuals and populations of special-status plant and wildlife species population from changes in land use
- **Hydrology and water resources**—Development would potentially result in impacts on drainage patterns and stormwater runoff.
- **Geology, soils, and seismicity, and paleontological resources**—Construction and operation of infrastructure and development projects would pose risks to public safety by creating the potential for property damage caused by geologic and seismic hazards. Ground disturbance in the vicinity of paleontologically sensitive geologic units associated with planned projects would have the potential to result in the loss of significant paleontological resources and associated loss of scientific information.
- **Hazardous materials and wastes**—Development would continue to use or potentially disturb hazardous materials or wastes.
- **Safety and security**—The demand for law enforcement, fire, and emergency services would change and coincide with the anticipated population growth and the results of industrial, residential, and commercial development.
- **Socioeconomics and communities**—Planned projects would result in changes to the local economy and improvements to the highway, aviation, conventional passenger rail, freight rail, and port systems. Development and infrastructure projects could disrupt or divide established communities as a result of increase traffic congestion increased noise and vibration, degradation of visual quality, and increased health and safety risks.
- **Station planning, land use, and development**—Existing land uses would be converted for planned development, as well as for transportation infrastructure, to accommodate future growth, thereby placing potential pressures on existing land uses not subject to conversion. Most of the planned development projects would rely on infill development, minimizing the conversion of existing land uses and altered land use patterns, and would be consistent with applicable local land use plans and policies.
- **Parks, recreation, and open space**—The demand for parks, recreation, and open-space resources would increase as a result of increasing population. Future park and recreational improvements and expansion would help to relieve the strain on existing facilities and minimize impacts on parks, recreational facilities, and open-space resources.
- **Aesthetics and visual quality**—Planned projects would introduce new visual elements to the landscape and would result in changes to the natural, cultural, and project environments, but would be consistent with local plans and development standards such that visual quality would not be substantially adversely affected.

- **Cultural resources**—Changes in land use and ground disturbance from infrastructure improvements would have the potential to disturb unknown archaeological resources and result in the demolition, destruction, relocation, or alteration of historic architectural resources or their setting. Existing land would be converted for residential, commercial, and industrial development, as well as for transportation infrastructure, to accommodate future growth, potentially disturbing archaeological sites. Planned development projects would likely include various forms of mitigation to address impacts on archaeological and historic built resources.

S.8 HSR Alternatives Evaluation

This section provides an overview of the impacts, including benefits of the HSR system as well as those common to both project alternatives. It also provides an overview of the impacts of the project alternatives, summarizing CEQA significance determinations and mitigation measures. This section also compares the differences in capital costs between the alternatives. Table S-4 at the end of this section shows a detailed summary comparing construction impacts by alternative, Table S-5 shows a detailed summary comparing operations impacts by alternative, and Table S-6 shows a summary of resources subject to significant impacts and applicable mitigation measures. Table S-7 provides a summary of the total number of significant and unavoidable impacts under each project alternative after mitigation.

S.8.1 High-Speed Rail Benefits

The HSR system would accommodate anticipated population growth and associated travel needs by providing millions of people the option to travel by train rather than by automobile or airline. This document utilizes ridership forecasts consistent with the Authority's 2018 Business Plan (Authority 2018). Projected growth rates in the Bay Area and the three counties through which the project would travel are similar to statewide projected growth. The CDOF projects the population in the Bay Area and the three counties to increase by approximately 28 percent by 2040 (CDOF 2014). The smallest and largest percent growth in population through 2040 are expected in San Mateo and Santa Clara Counties, respectively. As a result, there will be a need for additional transit to accommodate this population growth. Along with addressing the capacity constraints of automobile and airline travel, the HSR would improve air quality, reduce congestion, and improve transportation safety and travel time.

While the HSR project would increase electricity consumption in comparison to the No Project Alternative, the HSR project would reduce carbon emissions by providing a cleaner means of travel than auto transportation. Emissions reductions are projected to start at almost 120,000 metric tons of carbon dioxide equivalent (CO_2e) with operation of the initial Silicon Valley to Central Valley line. With buildout of the Phase 1 system through 2040, average annual emissions reductions are projected to be over 1 million metric tons of CO_2e (Authority 2016). Not only would the HSR project create fewer carbon emissions than the same trips under the No Project Alternative, but it would also be more energy efficient.

As described in Section S.7, No Project Alternative Impacts, the existing regional transportation infrastructure between San Francisco and San Jose faces challenges in satisfying both regional and statewide travel demand. The HSR system is designed to provide additional capacity for regional and statewide travel.

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

areas. In this way, the HSR system would seek to reduce the displacement or loss of valuable agricultural land.

Construction of the project alternatives would result in a number of benefits to communities, members of the public, infrastructure, the environment, and the economy, which would not occur under the No Project Alternative. The design of the project alternatives includes safety improvements at at-grade crossings (e.g., four-quadrant gates and median barriers) and completion of perimeter fencing of the Caltrain right-of-way, which would reduce the potential for train conflicts with motor vehicles, pedestrians, and cyclists and discourage trespassing. The project would also build new outboard platforms at the Broadway, Atherton, and College Park (under Alternative A) Caltrain Stations to eliminate the need for passengers to board and alight from the train between the active tracks, improving the safety of passengers during train operations.

The HSR system would provide a safe and reliable means of intercity travel, operating on a partially grade-separated track using positive train control (PTC). The project alternatives, as part of the HSR system, would decrease GHG emissions, improve regional access, and result in a net savings in energy. In addition, the project alternatives would benefit the regional economy by creating jobs during construction and generating new sales tax revenues for the region through project spending on O&M. The project alternatives would also result in local and regional benefits including improved regional mobility, improved traffic conditions on freeways as people increasingly use HSR, improved safety, and declines in regional air quality emissions.

S.8.2 Adverse Effects Common to All Alternatives

As described in Section S.5.3, Common Design Features, Alternatives A and B share the same design along most of their alignment, with differences only occurring in the location of the LMF (east or west of the Caltrain corridor), the passing tracks (under Alternative B), and the alignment through downtown San Jose. As a result, there are many impacts that are common to both project alternatives. This is illustrated in Section S.8.3, Comparison of Impacts for the Project Alternatives, which provides a comparative description of all constructions and operations impacts across both project alternatives (see Tables S-4 and S-5).

S.8.3 Comparison of Impacts for the Project Alternatives

This section describes the impacts that would occur under construction and operations of each project alternative. Tables S-4 and S-5 (provided at the end of this section) compare the differences in construction impacts and operations impacts, respectively, between the two project alternatives, prior to mitigation. For detailed discussion of the impacts of each of the project alternatives, see the resource sections in Chapter 3. Chapter 3 also includes a discussion of impacts that would occur under the No Project Alternative in comparison to the project alternatives in each resource section. Section S.8.6, CEQA Summary of Impacts and Mitigation, presents a summary of impact determinations under CEQA as well as mitigation applied to avoid or reduce significant impacts under CEQA, where applicable.

Many regulations require standard measures to avoid and minimize environmental impacts. The Authority will comply with these regulations, and therefore these measures are not summarized here. Table S-6 presents all of the mitigation measures that would be applied to each project alternative to address significant impacts under CEQA. In addition, the Authority would strive to avoid and minimize impacts further as design progresses to final plans and specifications for construction. Table S-7 provides a summary of the total number of significant and unavoidable impacts for each of the project alternatives.

Methods for NEPA and CEQA Impact Analysis

Under NEPA, impacts are described in terms of their *context* (the environment in which a proposed project impact occurs) and *intensity* (the severity of the impact). The analysis of intensity encompasses the type (direct/indirect), extent (local, regional), and duration (temporary or permanent) of the impact. NEPA's approach compares the context and intensity of impacts between alternatives under consideration.

Under CEQA, thresholds are established for each resource to determine the level of significance of impacts. If a threshold is exceeded, the impact is considered significant under CEQA.

Section S.8.7, Capital and Operations Costs, compares the differences in capital costs for each of the project alternatives. Section S.9, Section 4(f) and Section 6(f), describes Section 4(f) and Section 6(f) properties and any incurred uses on these properties as a result of the project alternatives. Section S.10, Environmental Justice, describes adverse and beneficial effects on environmental justice populations from the project alternatives.

S.8.3.1 Alternative A

Alternative A would modify approximately 17.4 miles of existing Caltrain track, predominantly within the existing Caltrain right-of-way, build the East Brisbane LMF, modify nine existing stations or platforms to accommodate HSR, and install safety improvements and communication radio towers. Caltrain has several locations of four-track segments where trains can pass; no additional passing tracks would be built under Alternative A.

Alternative A would result in fewer temporary road closures, and fewer permanent modifications to the roadway network than Alternative B. Alternative A would also result in fewer temporary impacts on emergency response times than Alternative B. Under this alternative, approximately 14 residential units and 48 commercial or industrial businesses would be displaced. It is estimated that the displacement of residential units would affect a total of 15 school-aged children (grades K–12). Temporary noise impacts at noise-sensitive locations would exceed the residential nighttime 8-hour equivalent sound level criterion of 70 A-weighted decibels for typical track construction activities up to 500 feet from excavation work, 792 feet from earthwork and retaining-wall work, and as far as 706 feet from track construction. In addition, Alternative A would expose 117 schools within 1,000 feet of project construction activities to construction-related noise, vibration, and fugitive dust emissions. Construction of the modified track alignment, modification of Caltrain stations, and construction of the East Brisbane LMF under Alternative A would result in the permanent conversion of 238.8 acres to transportation uses, most of which is associated with the East Brisbane LMF. However, this conversion of existing land uses would not prevent the continued use of adjacent properties or introduce conditions incompatible with adjacent uses.

Alternative A would have fewer overall direct impacts on jurisdictional aquatic resources relative to Alternative B, which is primarily due to the smaller extent of aquatic resources in the East Brisbane LMF footprint. Alternative A would affect a greater amount of habitat for special-status plant species, but would have slightly fewer impacts on special-status wildlife species. While Alternative A would result in less disturbance to surface water hydrology and a lower potential for water quality impacts, it would require mitigation to maintain the 100-year surface water elevation of the Guadalupe River floodplain in San Jose; this mitigation is not required for Alternative B.

S.8.3.2 Alternative B

Alternative B would modify approximately 19.8 to 21.6 miles of existing Caltrain track, predominantly within the existing Caltrain right-of-way, build the West Brisbane LMF and the passing track, modify 12 existing stations or platforms to accommodate HSR, and install safety improvements and communication radio towers. This alternative would result in greater impacts from temporary road closures and realignments than Alternative A, and corresponding delays to emergency vehicle access and response times because the passing track construction would require modification of nine underpasses. Greater disruptions to freight rail service would also result under Alternative B from construction of the passing track. Under Alternative B, approximately 42 (Viaduct to I-880) or 62 (Viaduct to Scott Boulevard) residential units, and 171 (Viaduct to I-880) or 202 (Viaduct to Scott Boulevard) commercial or industrial businesses would be displaced, resulting in substantially greater impacts than Alternative A. It is estimated that the displacement of residential units under Alternative B would affect a total of 30 (Viaduct to I-880) or 40 (Viaduct to Scott Boulevard) school-aged children (grades K–12). Noise impacts would be similar to but greater than those described for Alternative A because of a greater amount and longer duration of construction associated with the passing track under Alternative B. Alternative B would expose 122 schools within 1,000 feet of project construction activities to construction-related noise, vibration, and fugitive dust emissions. Construction of modified and passing tracks, modification of Caltrain stations, and construction of the West Brisbane LMF under Alternative B

would result in the permanent conversion of 276.7 acres (Viaduct to I-880) or 271.9 acres (Viaduct to Scott Boulevard) to transportation uses. Of this total, most of the land is associated with the West Brisbane LMF, the passing tracks, and aerial viaducts through downtown San Jose. However, this conversion of existing land uses would not prevent the continued use of adjacent properties or introduce conditions incompatible with adjacent uses.

Alternative B would have greater direct impacts on jurisdictional aquatic resources due primarily to the greater extent of freshwater emergent wetland in the West Brisbane LMF project footprint. Alternative B would affect less habitat for special-status plant species than Alternative A, but would result in slightly greater impacts on special-status wildlife species. In general, Alternative B would result in greater disturbance to surface water hydrology, increased potential for water quality impacts, and more development within floodplains than Alternative A.

Table S-4 Comparison of Construction Impacts by Alternative

Resource Category	Construction Impacts	
	Alternative A	Alternative B
Transportation		
Intersections		
Impact TR#2: Temporary Congestion/Delay Consequences on Intersections from Temporary Road Closures, Relocations, and Modifications	Temporary road closures and realignments would result in increases in travel times, delays, and inconvenience to the traveling public in all subsections. The CTP would maintain traffic flow on major roadways and intersections.	Increases in travel time, delays, and inconvenience to the traveling public associated with temporary road closures and realignments would be greater under Alternative B. Although there would be fewer effects in the San Francisco to South San Francisco Subsection, effects would be greater in the San Mateo to Palo Alto Subsection due to construction of the passing track and in the San Jose Diridon Station Approach Subsection due to construction of aerial viaducts and the San Jose Diridon Station. The CTP would maintain traffic flow on major roadways and intersections.
Impact TR#3: Temporary Congestion/Delay Consequences on Major Roadways and Intersections from Construction Vehicles	Temporary construction vehicle trips would result in increases in travel times and delays in all subsections. Project features such as the CTP and establishment of designated construction truck routes would control and manage construction vehicle traffic to minimize effects on local vehicle circulation, operations hazards, or loss of access to residences and community facilities.	Temporary construction vehicle trip effects would be greater under Alternative B, particularly in the San Mateo to Palo Alto Subsection where construction or modification of nine underpasses would occur to accommodate the passing track. Project features such as the CTP and establishment of designated construction truck routes would control and manage construction vehicle traffic to minimize effects on local vehicle circulation, operations hazards, or loss of access to residences and community facilities.
Impact TR#4: Permanent Congestion/Delay Consequences on Intersections from Permanent Road Closures and Relocations	One permanent road closure, two road extensions, one road realignment, one overpass relocation, and two overpass reconstructions would not change the capacity of the roadway network or result in a permanent construction effect on vehicle traffic or LOS.	Three permanent road closures, three road extensions, nine underpass modifications, one overpass relocation, three grade-separation changes from an overcrossing to undercrossing configuration, one reconstruction of an overcrossing, and one road extension and lane conversion to transit-only lanes would not change the capacity of the roadway network or result in a permanent construction effect on vehicle traffic or LOS.

Resource Category	Construction Impacts	
	Alternative A	Alternative B
Parking		
Impact TR#6: Temporary Construction-Related Effects on Parking	Some parking space displacement would occur along the Caltrain corridor and at Caltrain stations during construction. An estimated 379 parking spaces at the San Jose Diridon Station and SAP Center would be temporarily displaced during construction. Project features would limit effects on public parking by providing parking for construction vehicles, minimizing the time parking facilities are inoperable, and providing temporary replacement of displaced special event parking for the SAP Center on a 1:1 basis.	Alternative B would result in displacement of some additional parking beyond Alternative A at the San Carlos, Belmont, Hillsdale and Hayward Park Caltrain Stations during passing track construction. Alternative B would also result in greater number of parking spaces (2,083 spaces) at the San Jose Diridon Station and SAP Center being displaced during construction. The same project features described under Alternative A would apply to Alternative B.
Transit		
Impact TR#8: Temporary Impacts on Bus Transit	Construction vehicles or temporary roadway closures would result in interference with bus routes and bus stops.	Same as Alternative A
Impact TR#9: Permanent Impacts on Bus Transit	No high-frequency bus routes would experience delays from permanent changes in the road network.	Same as Alternative A
Impact TR#10: Temporary Impacts on Passenger Rail Operations	Station construction in San Francisco, Millbrae, and San Jose Diridon, construction of the LMF, station modifications at other stations, and track relocations would result in temporary disruptions to Caltrain service.	Alternative B would result in all of the effects identified for Alternative A except along the passing track and viaduct. Alternative B would result in substantial disruption to Caltrain operations greater than Alternative A for up to 2 years because of single-tracking near the passing track, construction of the viaduct, and Caltrain station modifications.
Nonmotorized Travel		
Impact TR#15: Temporary Impacts on Pedestrian and Bicycle Access	Pedestrian and bicycle access would be temporarily impeded, but safe and adequate access would be maintained during construction.	Same as Alternative A
Impact TR#16: Permanent Impacts on Pedestrian and Bicycle Access	At train stations or on streets where existing pedestrian or bicycle facilities are modified as a result of the project, they would be replaced with new safe and accessible facilities.	Same as Alternative A

Resource Category	Construction Impacts	
	Alternative A	Alternative B
Freight Rail Service		
Impact TR#18: Temporary Impacts on Freight Rail Operations	Station construction and modification, construction of new tracks, and realignment of tracks would result in temporary disruptions of freight rail service.	Alternative B would result in all of the effects identified for Alternative A except along the passing track. Alternative B would result in substantial disruption to freight operations greater than Alternative A for up to 2 years because of single-tracking in the passing track vicinity.
Air Quality and Greenhouse Gases		
Air Quality		
Impact AQ#1: Temporary Direct and Indirect Impacts on Air Quality in the SFBAAB	Temporary construction activity would generate emissions of criteria pollutants. Construction-related NO_X emissions would exceed BAAQMD significance threshold and the General Conformity threshold.	Emissions would be greater than Alternative A primarily because of construction of the passing tracks. Construction-related VOC and NO_X emissions would exceed BAAQMD significance thresholds and NO_X emissions would exceed the General Conformity threshold. Alternative B (Viaduct to Scott Boulevard) would have slightly greater emissions (except for NO_X and fugitive particulate matter) than Alternative B (Viaduct to I-880) because of additional construction activity required for the longer viaduct.
Impact AQ#2: Temporary Direct Impacts on Implementation of an Applicable Air Quality Plan	Emissions of NO_X from temporary construction activity in excess of the BAAQMD significance threshold and the General Conformity *de minimis* threshold could impede implementation of O_3 plans in the SFBAAB.	Emissions of VOC and NO_X from temporary construction activity in excess of the BAAQMD significance thresholds, and emissions of NO_X in excess of the General Conformity *de minimis* threshold could impede implementation of O_3 plans in the SFBAAB.
Impact AQ#3: Temporary Direct Impacts on Localized Air Quality—Criteria Pollutants	Construction-related PM_{10} concentrations would contribute to existing exceedances of the PM_{10} CAAQS. Construction-related criteria pollutant concentrations would lead to new exceedances of the $PM_{2.5}$ CAAQS and NAAQS.	Similar to Alternative A. Emissions would be greater than Alternative A primarily because of construction of the passing tracks. Alternative B (Viaduct to Scott Boulevard) would have slightly greater emissions than Alternative B (Viaduct to I-880) because of additional construction activity required for the longer viaduct.
Impact AQ#4: Temporary Direct Impacts on Localized Air Quality—Exposure to Diesel Particulate Matter and $PM_{2.5}$ (Health Risk)	Temporary construction activity would not generate DPM or $PM_{2.5}$ concentrations in excess of BAAQMD health risk thresholds. The maximum increase in potential cancer risk (5.5 per million) and an acute Hazard Index of 0.1 would occur in the San Jose Diridon Station Approach Subsection.	Similar to Alternative A. The maximum increase in potential cancer risk (3.8 per million under Alternative B [Viaduct to I-880] and 3.9 per million under the Alternative B [Viaduct to Scott Boulevard]) would occur in the San Jose Diridon Station Approach Subsection and would be less than that under Alternative A. The acute Hazard Index of 0.2 under Alternative B (both viaduct options) would be slightly greater than Alternative A.

Resource Category	Construction Impacts	
	Alternative A	Alternative B
Impact AQ#5: Temporary Direct Impacts on Localized Air Quality—Exposure to Asbestos and Lead-Based Paint	Project design and compliance with existing asbestos and LBP handling and disposal standards would prevent exposure of sensitive receptors to substantial pollutant concentrations. There would be limited potential for exposure of sensitive receptors to asbestos or LBP associated with demolition of approximately 817,000 square feet.	Similar to Alternative A. Greater potential for exposure than Alternative A because of additional demolition associated with construction of passing tracks and aerial viaducts in San Jose. There would be limited potential for exposure of sensitive receptors to asbestos or LBP associated with demolition of approximately 1,678,000 square feet for Alternative B (Viaduct to I-880) and 1,866,000 square feet for Alternative B (Viaduct to Scott Boulevard).
Impact AQ#6: Temporary Direct Impacts on Localized Air Quality—Exposure to Odors	There would be limited potential for odors generated by construction to affect sensitive receptors or result in nuisance complaints.	Same as Alternative A
Greenhouse Gases		
Impact AQ#14: Temporary Direct and Indirect Impacts on Global Climate Change—Greenhouse Gas Emissions	GHG emissions generated during temporary construction of 8,036 MT CO_2e per amortized year would be offset by reductions achieved through project operations within 1 to 6 months (relative to No Project conditions).	GHG emissions generated during temporary construction of 9,419 MT CO_2e per amortized year for Alternative B (Viaduct to I-880) and 9,363 MT CO_2e per amortized year for Alternative B (Viaduct to Scott Boulevard) would be offset by reductions achieved through project operations within 2 to 7 months (relative to No Project conditions).
Noise and Vibration		
Noise		
Impact NV#1: Temporary Exposure of Sensitive Receptors to Construction Noise	Temporary noise impacts at noise-sensitive locations would exceed the residential nighttime 8-hour L_{eq} criterion of 70 dBA for typical track construction activities up to 500 feet from excavation work, 792 feet from earthwork and retaining wall work, and as far as 706 feet from at-grade track construction. For stations and ancillary structures, excavation and foundation work would generate temporary nighttime impacts at residential areas out to 446 feet for non-pile-driving work; impacts from pile driving would extend out to 706 feet. Superstructure, building shell, and landscaping work would cause impacts out to 354 feet.	Temporary noise impacts at noise sensitive locations would be similar to Alternative A with the exception of the passing track area, where construction would require more and longer durations of nighttime construction activity near noise-sensitive receptors in San Mateo, Belmont, San Carlos, and Redwood City. The duration of construction would also be greater in the San Jose Diridon Station Approach Subsection, where viaduct structures and an aerial station would be built for Alternative B. Temporary noise impacts at noise-sensitive locations would exceed the residential nighttime 8-hour L_{eq} criterion of 70 dBA for typical track construction activities up to 774 feet for viaduct construction.

Resource Category	Construction Impacts	
	Alternative A	Alternative B
Vibration		
Impact NV#8: Temporary Exposure of Sensitive Receptors and Buildings to Construction Vibration	During nighttime work, potential human annoyance to construction vibration within 160 feet of mechanical equipment for infrequent construction activities, and within 300 feet of frequent, repetitive equipment such as pile driving, vibratory compaction, and ongoing demolition work with jackhammers or hoe-rams. Potential building damage from impact pile driving within 55 feet of structures.	Temporary vibration impacts at vibration-sensitive locations would be the same as Alternative A with the exception of the passing track area, where construction would require more and longer durations of nighttime construction activity near vibration-sensitive receptors in San Mateo, Belmont, San Carlos, and Redwood City. Additionally, there would be differences in construction duration and nighttime construction in the San Jose Diridon Station Approach Subsection.
Electromagnetic Fields/Electromagnetic Interference		
Impact EMF/EMI#1: Temporary Impacts from Use of Construction Equipment	Temporary construction activity would cause fluctuations in EMF levels, although the practical effects would be limited to within 50 feet of the project footprint and would comply with FCC regulations. No individuals would be exposed to EMF levels that exceed human health standards.	Similar to Alternative A
Public Utilities and Energy		
Public Utilities		
Impact PUE#1: Planned and Accidental Temporary Interruption of Utility Service	Planned and accidental interruptions to utility services would be temporary and for short durations. There are 259 major utility lines in the RSA for Alternative A.	Same as Alternative A, except there are 239 major utility lines in the RSA for Alternative B (Viaduct to I-880) and 233 major utility lines in the RSA for Alternative B (Viaduct to Scott Boulevard).

Resource Category	Construction Impacts	
	Alternative A	Alternative B
Impact PUE#2: Existing Major Utilities Requiring Relocation or Removal	Both project alternatives would minimize permanent conflicts between major utilities because existing major utility lines would be permanently relocated or protected in place through agreements between the Authority and utility service providers. Alternative A would require the following: ▪ Relocation of 53 major utilities ▪ Protection in place of 199 major utilities ▪ Extension of 6 major utilities ▪ Unknown action (relocation, protection in place, or extension) to be taken on 1 major utility	Same as Alternative A, except Alternative B (Viaduct to I-880) would result in the following: ▪ Relocation of 76 major utilities ▪ Protection in place of 151 major utilities ▪ Extension of 11 major utilities ▪ Unknown action (relocation, protection in place, or extension) to be taken on 1 major utility Alternative B (Viaduct to Scott Boulevard) would result in the following: ▪ Relocation of 72 major utilities ▪ Protection in place of 150 major utilities ▪ Extension of 11 major utilities
Impact PUE#3: Reduced Access to Existing Utilities in the HSR Right-of-Way	Access to utilities would be provided during and after construction.	Same as Alternative A
Impact PUE#4: Temporary Impacts from Construction of New Utility Infrastructure	Alternative A includes the construction of an electrical substation at the Brisbane LMF.	Alternative B (both viaduct options) includes the construction of an electrical substation at the Brisbane LMF, a traction power substation and overhead contact system infrastructure on viaduct structures in the San Jose Diridon Station Approach Subsection.
Impact PUE#5: Temporary Impacts from Water Use	Construction would require 0.24 million gallons of daily water use, which is 0.15% of the water used by local jurisdictions within the RSA in 2015.	Construction of Alternative B (Viaduct to I-880) would require 0.26 million gallons of daily water use, which is 0.16% of the water used by local jurisdictions in the RSA in 2015. Construction of Alternative B (Viaduct to Scott Boulevard) would require 0.34 million gallons of daily water use, which is 0.22% of the water used by local jurisdictions in the RSA in 2015.

Resource Category	Construction Impacts	
	Alternative A	Alternative B
Impact PUE#6: Temporary Impacts from Wastewater and Stormwater Generation	Construction would require treatment of up to 0.24 mgd, which is less than 0.1% of the total wastewater treatment capacity in the RSA. Additionally, project features would minimize generation of stormwater from project construction, such that the capacity of existing stormwater management systems would not be exceeded.	Construction of Alternative B (Viaduct to I-880) would require treatment of up to 0.26 mgd, which is less than 0.1% of the total wastewater treatment capacity in the RSA. Construction of Alternative B (Viaduct to Scott Boulevard) would require treatment of up to 0.34 mgd, which is less than 0.2% of the total wastewater treatment capacity in the RSA. Additionally, project features would minimize generation of stormwater from project construction, such that the capacity of existing stormwater management systems would not be exceeded.
Impact PUE#7: Temporary Generation of Solid Waste and Hazardous Wastes	Construction would result in 2,262,800 cubic yards of surplus excavation material, 74% of which, or 1,674,472 cubic yards would be considered solid waste requiring disposal. Construction would generate approximately 75,170 cubic yards of C&D debris from the demolition of existing buildings. It is currently unknown how much of the demolition debris would be considered hazardous; however, the amount of hazardous waste generation from building demolition activities is assumed to be no greater than the amount of nonhazardous solid waste (C&D debris) generation from building demolition activities for the purposes of comparison to available hazardous waste disposal capacity. Based on the estimated solid and hazardous waste landfill capacity at the available landfills, there would be sufficient capacity for the solid and hazardous waste generated from the construction of Alternative A.	Construction would result in 1,623,700 million cubic yards of surplus excavation material, 100% of which would be reused and would not require disposal at a landfill. In addition, 432,000 cubic yards, generated during earthwork at the Brisbane LMF, may be contaminated and require special disposal as hazardous waste. Construction would generate approximately 154,380 cubic yards of C&D debris from the demolition of existing buildings for Alternative B (Viaduct to I-880) and approximately 171,700 cubic yards of C&D debris for Alternative B (Viaduct to Scott Boulevard). It is currently unknown how much of the demolition debris would be considered hazardous; however, the amount of hazardous waste generation from building demolition activities is assumed to be no greater than the amount of nonhazardous solid waste (C&D debris) generation from building demolition activities for the purposes of comparison to available hazardous waste disposal capacity Based on the estimated solid and hazardous waste landfill capacity at the available landfills, there would be sufficient capacity for the solid and hazardous waste generated from the construction of Alternative B (both viaduct options).
Energy		
Impact PUE#12: Temporary Consumption of Energy during Construction	Construction would require 9,977 billion Btu.	Construction would require 10,911 billion Btu for Alternative B (Viaduct to I-880) and 10,778 billion Btu for Alternative B (Viaduct to Scott Boulevard).

Resource Category	Construction Impacts	
	Alternative A	Alternative B
Biological and Aquatic Resources (acres)[1, 2]		
Impact BIO#1: Permanent Conversion or Degradation of Habitat for Special-Status Plant Species	Construction activities would remove or disturb habitat for eight special-status plant species, one of which is listed under FESA (California seablite), and could degrade habitat outside of but adjacent to the project footprint.	
Habitat for bent-flowered fiddleneck	94.1	43.8
Habitat for bristly sedge	3.7	9.5
Habitat for California seablite	1.7	1.7
Habitat for coastal marsh milkvetch	1.7	1.7
Habitat for Congdon's tarplant	92.6	38.7/39.4
Habitat for pappose tarplant	1.7	1.7
Habitat for saline clover	1.7	1.7
Habitat for Point Reyes salty bird's-beak	1.7	1.7
Impact BIO#2: Permanent Conversion of Habitat for and Direct Mortality of Listed Butterfly Species	Construction activities would not remove habitat for listed butterfly species at Icehouse Hill in Brisbane because the Brisbane LMF would be built east of the existing Caltrain tracks and would not require grading of Icehouse Hill.	Construction activities would remove habitat for listed butterfly species at Icehouse Hill in Brisbane, and could result in direct mortality of individuals, if present in affected habitat.
Habitat for Bay checkerspot butterfly, callippe silverspot butterfly, and Mission blue butterfly	0.0	8.0

Resource Category	Construction Impacts	
	Alternative A	Alternative B
Impact BIO#3: Permanent Conversion or Degradation of Habitat for and Central California Coast Steelhead, Pacific Lamprey, and Green Sturgeon, and Permanent Conversion or Degradation of Essential Fish Habitat	Construction of the East Brisbane LMF would remove potential habitat in Visitacion Creek for CCC steelhead and green sturgeon and designated EFH for Pacific Coast salmon. Modification of the existing bridge and culvert at Guadalupe Valley Creek would affect a small amount of habitat for these same species. Trimming or removal of riparian vegetation could degrade freshwater migration habitat for CCC steelhead and Pacific lamprey. In-water activities at Sanchez Creek would affect designated EFH for Pacific Coast Salmon and Pacific Coast groundfish. In-water activities at Guadalupe Valley Creek and the Guadalupe River could generate underwater sound levels that result in injury or mortality of individual fish.	Modification of the existing bridge and culvert at Guadalupe Valley Creek would affect a small amount of habitat for CCC steelhead and green sturgeon and designated EFH for Pacific Coast salmon. Trimming or removal of riparian vegetation could degrade freshwater migration habitat for CCC steelhead and Pacific lamprey. In-water activities at Sanchez Creek would affect designated EFH for Pacific Coast Salmon and Pacific Coast groundfish. In-water activities at Guadalupe Valley Creek and the Guadalupe River could generate underwater sound levels that result in injury or mortality of individual fish.
Habitat for central California coast steelhead	3.0	2.0
Habitat for green sturgeon	1.9	1.2
Habitat for Pacific lamprey	2.4	3.0
Essential Fish Habitat for Pacific Coast salmon	5.3	4.0
Essential Fish Habitat for Pacific Coast Groundfish	2.2	1.4
Impact BIO#4: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Red-Legged Frog and Western Pond Turtle	Construction activities would remove or disturb habitat for California red-legged frog and western pond turtle, and could degrade habitat outside of but adjacent to the project footprint. Activities could also result in mortality of individuals, if present in affected habitat.	
Habitat for California red-legged frog	13.6	15.3
Habitat for western pond turtle	45.6	73.7/72.9

Resource Category	Construction Impacts	
	Alternative A	Alternative B
Impact BIO#5: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Francisco Garter Snake	Construction activities would remove or disturb habitat for San Francisco garter snake, and could degrade habitat outside of but adjacent to the project footprint. Activities could also result in mortality of individuals, if present in affected habitat.	
Habitat for San Francisco garter snake	6.5	6.5
Impact BIO#6: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Burrowing Owl	Construction in the San Jose Diridon Station Approach Subsection would convert and temporarily disturb habitat and could result in injury and mortality of individual owls and eggs, as well as nest abandonment.	
Habitat for burrowing owl	128.0	96.0/96.9
Impact BIO#7: Removal or Disturbance of Active Alameda Song Sparrow and Saltmarsh Common Yellowthroat Nests	Construction activities would remove or disturb nesting habitat for Alameda song sparrow and saltmarsh common yellowthroat. Activities during the breeding season (February 1 to August 31) could result in injury and mortality of individual birds and eggs, as well as nest abandonment.	
Habitat for Alameda song sparrow	1.7	1.7
Habitat for saltmarsh common yellowthroat	4.8	10.0
Impact BIO#8: Permanent Conversion and Degradation of Habitat for and Direct Mortality or Disturbance of Least Bell's Vireo, Yellow Warbler, and Tricolored Blackbird	Construction activities in the San Jose Diridon Station Approach Subsection would remove or disturb habitat for least Bell's vireo, yellow warbler, and tricolored blackbird along Los Gatos Creek and the Guadalupe River. Activities during the breeding season (February 1 to August 31) could result in injury and mortality of individual birds and eggs, as well as nest abandonment.	
Habitat for least Bell's vireo	2.1	3.6
Habitat for yellow warbler	0.8	2.6

Resource Category	Construction Impacts	
	Alternative A	Alternative B
Habitat for tricolored blackbird	11.7	4.7/5.6
Impact BIO#9: Removal or Disturbance of Active White-Tailed Kite Nests	Construction activities would remove or disturb nesting habitat for white-tailed kite. Activities during the breeding season (February 1 to August 31) could result in injury and mortality of individual birds and eggs, as well as nest abandonment.	
Nesting habitat for white-tailed kite	23.2	20.5/28.2
Impact BIO#10: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Francisco Dusky-Footed Woodrat and Ringtail	Construction activities in the San Jose Diridon Station Approach Subsection would remove or disturb habitat for San Francisco dusky-footed woodrat and ringtail along Los Gatos Creek and the Guadalupe River. Activities could also result in mortality of individuals, if present in affected habitat.	
Habitat for San Francisco dusky-footed woodrat and ringtail	0.8	2.7/10.4
Impact BIO#11: Removal of Roost Sites for and Direct Mortality or Disturbance of Special-Status Bats	Construction activities would remove or disturb roosting habitat for special-status bats. Modification of bridges and culverts and tree removals could destroy or cause abandonment of active roost sites, if present in affected habitat.	
Roosting habitat for pallid bat	1.5	1.3
Roosting habitat for Townsend's big-eared bat	1.5	1.3
Roosting habitat for western red bat	11.0	14.0/21.6
Impact BIO#14: Mortality of Non-Special-Status Terrestrial Wildlife	Construction activities would take place in habitat for non-special-status terrestrial wildlife species and could result in mortality of individuals of such species. Project features to prepare a BRMP, provide training for all workers, and avoid entrapment of small animals would reduce mortality risk for terrestrial wildlife.	Same as Alternative A, except for slightly higher potential for effects at Borel, Belmont, and Cordilleras Creeks because of culvert modification activities associated with construction of passing track.

Resource Category	Construction Impacts	
	Alternative A	Alternative B
Impact BIO#15: Removal of Active Non-Special-Status Bird Nests	Construction activities would remove or disturb nesting habitat for native birds. Activities during the breeding season (February 1 to August 31) could result in injury and mortality of individual birds and eggs, as well as nest abandonment.	Same as Alternative A, with slightly lower likelihood of effects due to less coyote brush scrub affected by the West Brisbane LMF.
Impact BIO#17: Permanent Conversion or Degradation of Special-Status Plant Communities	Construction activities would remove or disturb land cover types potentially supporting special-status plant communities, and could degrade such communities outside of but adjacent to the project footprint.	
Riparian and scrub/shrub wetland potentially supporting arroyo willow thickets	2.5	2.1
Saline emergent wetland potentially supporting pickleweed mats	1.7	1.7
Impact BIO#19: Permanent Conversion or Degradation of Aquatic Resources Considered Jurisdictional under Section 404 of the Federal Clean Water Act and the State Porter-Cologne Act, or under Section 10 of the Rivers and Harbors Act	Construction activities would remove or disturb aquatic resources considered jurisdictional under Section 404 of the CWA and the State Porter-Cologne Act, or navigable waters considered jurisdictional under Section 10 of the RHA.	
Wetlands	6.1	11.4
Nonwetlands	7.1	6.7
Total aquatic resources	13.2	18.1

Resource Category	Construction Impacts	
	Alternative A	Alternative B
Impact BIO#20: Permanent Conversion or Degradation of Aquatic Resources, including Riparian Communities, Subject to Notification under California Fish and Game Code Section 1600 et seq.	Construction activities would remove or disturb resources considered jurisdictional under the California Fish and Game Code Section 1600 et seq.	
Riparian habitat	2.4	3.7
Rivers, lakes, and streams	6.6	6.2
Total aquatic resources	9.0	9.9
Impact BIO#22: Removal of Trees Protected under Municipal Tree Ordinances	Construction activities may remove or disturb trees protected under municipal ordinances.	
Impact BIO#24: Temporary Disruption of Wildlife Movement	Construction activities in or near 8 of the 18 watercourses that facilitate local wildlife movement under the Caltrain right-of-way (Guadalupe Valley Creek, Borel Creek, Belmont Creek, Cordilleras Creek, San Francisquito Creek, Stevens Creek, Los Gatos Creek, and Guadalupe River) may temporarily disrupt such movement by creating temporary barriers and disturbance that causes animals to delay or alter movements.	Same as Alternative A, except for slightly higher potential for effects at Borel, Belmont, Cordilleras, and Los Gatos Creeks because of culvert modification activities at the first three creeks associated with construction of the passing track and construction of a new free-span viaduct over Los Gatos Creek.
Impact BIO#26: Conflict with Pacific Gas and Electric Company Bay Area Operations & Maintenance Habitat Conservation Plan	Construction and operational activities would not conflict with the provisions of an adopted HCP.	

Resource Category	Construction Impacts	
	Alternative A	Alternative B
Hydrology and Water Resources		
Surface Water Hydrology		
Impact HYD#1: Temporary Impacts on Drainage Patterns and Stormwater Runoff during Construction	The project would avoid substantial changes in drainage patterns and stormwater runoff. Thirty-six aquatic resources would have minor disturbances, and 10 aquatic resources would be temporarily diverted during construction. Maintaining drainage patterns to the extent feasible, temporary drainage systems in a staging plan or drainage report, SWPPP under the CGP, and adhering to regulatory permits would avoid substantial potential impacts on surface water hydrology.	Impacts under Alternative B would be similar to Alternative A; however, eight fewer aquatic resources would have minor disturbances and seven more aquatic resources would be temporarily diverted.
Impact HYD#2: Permanent Impacts on Drainage Patterns and Stormwater Runoff	Grading, cut-and-fill slopes, impervious surfaces, new bridges and culverts, and realigned or modified aquatic resources would avoid substantial changes in drainage patterns and stormwater runoff. New rail and roadway crossings would be required for nine aquatic resources, seven aquatic resources would be realigned or filled, there would be 3,618,800 cubic yards of cut and fill, and 106.9 acres of impervious surface would be built. Maintaining drainage and pre-construction flow rates, a drainage report, a stormwater management and treatment plan, and the design of realigned or modified aquatic resources would avoid substantial permanent construction impacts on surface water hydrology.	Impacts under Alternative B would be similar to Alternative A; however, nine more aquatic resources would have new railroad and roadway crossings and five more aquatic resources would be realigned or filled. Additionally, there would be 2,582,300 more cubic yards of cut and fill and more new or replaced impervious surface (61.4 more acres for Viaduct to I-880 or 82.0 more acres for Viaduct to Scott Boulevard).
Surface Water Quality		
Impact HYD#4: Temporary Impacts on Surface Water Quality during Construction	Soil disturbances and construction site materials, runoff, and waste would result in minimal impacts on surface water quality. Runoff from 981 acres of disturbed soil would be controlled to avoid substantial increases in turbidity and sedimentation in receiving waters. However, construction activities that take place in aquatic resources would create elevated sediment concentrations and turbidity in 14 aquatic resources, 9 of which would be temporarily diverted and dewatered.	Impacts under Alternative B would be similar to Alternative A; however, construction would disturb a larger area of soil (116 more acres for Viaduct to I-880 and 146 more acres for Viaduct to Scott Boulevard), occur in 12 more aquatic resources, and require temporarily diverting and dewatering of 8 more aquatic resources under Alternative B.

Resource Category	Construction Impacts	
	Alternative A	Alternative B
Impact HYD#5: Permanent Impacts on Surface Water Quality	Impervious surfaces and realigned or filled aquatic resources would result in minimal impacts on surface water quality. Alternative A would add 106.9 acres of impervious surfaces. Implementing a stormwater management and treatment plan would manage the quality and quantity of runoff generated by impervious surfaces. However, seven aquatic resources would be realigned or filled, resulting in substantial impacts on water quality from loss of aquatic resources and riparian vegetation.	Impacts under Alternative B would be similar to Alternative A; however, Alternative B would result in more impervious surfaces (61.4 more acres for Viaduct to I-880 or 82.0 more acres for Viaduct to Scott Boulevard) and the realignment or filling of five more aquatic resources.
Groundwater		
Impact HYD#8: Temporary Impacts on Groundwater Quality and Volume during Construction	Dewatering, excavations, and accidental leaks and spills of materials and waste would avoid substantial impacts on groundwater quality and volume. Contaminated groundwater encountered during dewatering operations would be contained and disposed properly. Construction of Alternative A would require dewatering nine aquatic resources, which would avoid substantial impacts on the groundwater table. Substantial impacts would be avoided by adhering to a construction management plan and implementing BMPs and project features regarding the management, transport, and disposal of construction waste and materials.	Impacts under Alternative B would be similar to Alternative A; however, Alternative B is anticipated to require dewatering eight more aquatic resources, which would also avoid substantial impacts on the groundwater table.
Impact HYD#9: Permanent Impacts on Groundwater Quality and Volume	New impervious surfaces built in the Westside Groundwater Basin's recharge zones (0.2 acre) would not substantially affect groundwater quality and volume. Permanent stormwater BMPs and coordination with the RWQCB would substantially avoid impacts on groundwater quality and volume.	Impacts under Alternative B would be the same as Alternative A, because the same area of impervious surface would be built in the Westside Groundwater Basin's recharge zones.

Resource Category	Construction Impacts	
	Alternative A	Alternative B
Floodplains		
Impact HYD#12: Temporary Impacts on Floodplain Hydraulics during Construction	Construction would require temporary fill in seven floodplains. Temporary impacts on 100-year floodplains would be avoided or minimized by not working in streams and creeks when flood conditions are forecast, removing all temporary fill from aquatic resources when flooding may occur or designing temporary fill to withstand flood flows, removing all temporary fill from overland floodplains or installing temporary drainage systems to reroute overland flood flows, and coordinating with water and irrigation districts regarding planned releases from dams.	Impacts under Alternative B would be similar to Alternative A; however, these impacts would occur in six more floodplains.
Impact HYD#13: Permanent Impacts on Floodplain Hydraulics	Construction would require cut and fill in floodplains, including new or modified widened bridges and culverts or realigned and modified aquatic resources. These impacts would occur in seven aquatic resources with 100-year floodplains. The development and implementation of a flood protection plan that includes hydraulic analysis of all permanent improvements in regulated 100-year floodplains would minimize permanent impacts on floodplains. However, the proposed Guadalupe River bridge in San Jose would increase the 100-year water surface elevation of the floodplain by more than 0.2 foot.	Impacts under Alternative B would be similar to Alternative A. However, the proposed Guadalupe River bridge in San Jose would increase the 100-year water surface elevation of the floodplain by less than 0.1 foot. The development and implementation of a flood protection plan would avoid substantial impacts on floodplains except for those on Guadalupe River.
Geology, Soils, Seismicity, and Paleontology		
Geology, Soils, and Seismicity		
Impact GEO#1: Construction on Unstable Soils	The project would minimize the potential for loss of life and structural damage from exposure to ground subsidence, landslides, and soft soil by controlling the amount of groundwater withdrawal and stabilizing landslides and soft soil during construction.	Same as Alternative A
Impact GEO#2: Construction on Expansive Soils	The project would minimize the potential for loss of life and structural damage from exposure to expansive soil by treating the soil with additives to reduce shrink-swell potential or excavating and replacing the soil.	Same as Alternative A

Resource Category	Construction Impacts	
	Alternative A	Alternative B
Impact GEO#3: Exposure of Concrete and Steel to Corrosive Soils	The project would excavate and replace corrosive soil with noncorrosive soil or use corrosion-resistant materials or coatings, which would minimize the potential for loss of life and structural damage.	Same as Alternative A
Impact GEO#4: Excavation and Grading Impacts on Soil Erosion	Construction of Alternative A would require soil disturbance of 981 acres. The project would require a SWPPP, erosion control measures (stabilizers, mulches, revegetation, and cover exposed work areas with biodegradable geotextiles) during construction, and design that reduces surface water runoff which would minimize soil erosion and the loss of topsoil.	Construction of Alternative B (Viaduct to I-880) would require soil disturbance of 1,097 acres, and construction of Alternative B (Viaduct to Scott Boulevard) would require soil disturbance of 1,127 acres. The project would implement the same measures as described for Alternative A.
Impact GEO#5: Difficult Excavations due to Shallow Bedrock or Shallow Groundwater	The project would minimize the potential for loss of life and structural damage from excavating in areas with shallow bedrock or shallow groundwater by assessing geotechnical conditions prior to construction and employing appropriate and safe excavation methods.	Same as Alternative A
Impact GEO#6: Construction on Landfills	Construction of the East Brisbane LMF would occur on the site of the former Brisbane Landfill. The project would minimize the potential for injury, loss of life, and structural damage from landfill hazards, including migration and exposure of landfill gas, by using safe construction methods, monitoring for gases, preloading structural areas, and using deep foundations.	The West Brisbane LMF would be constructed approximately 450 feet west of the former Brisbane Landfill. The project would minimize the potential for injury, loss of life, and structural damage from subsurface migration of landfill gases by monitoring for gases and following regulatory requirements for construction in an area of potential vapor intrusion.
Impact GEO#7: Primary Seismic Hazards during Construction	The project would include design and construction practices to minimize risk from primary seismic hazards. These project features include seismic studies, the implementation of a CMP that includes worker safety protocols for seismic events that could occur during construction, and compliance with guidelines and standards specified by relevant transportation and building agencies. These actions would minimize the potential for loss of life and structural damage from exposure to surface fault rupture during construction.	Same as Alternative A

Resource Category	Construction Impacts	
	Alternative A	Alternative B
Impact GEO#8: Secondary Seismic Hazards during Construction	The project would assess geotechnical conditions and employ ground improvement methods and slope reinforcement, which would minimize the potential for loss of life and structural damage from exposure to secondary seismic hazards. The project would also implement a CMP that would address worker safety in the event of an earthquake that triggers flooding.	Same as Alternative A
Paleontological Resources		
Impact GEO#11: Destruction of Paleontological Resources during Construction	Construction could affect four paleontologically sensitive geologic units with the potential to contain previously unknown paleontological resources at the surface or at depth.	Similar to Alternative A; however, more ground disturbance would be required in areas mapped at the surface as having undetermined to high paleontological potential, resulting in increased potential for permanent impacts. Alternative B (Viaduct to Scott Boulevard) would require more ground disturbance than Alternative B (Viaduct to I-880) in areas mapped at the surface as having undetermined to high paleontological potential in the subsurface, resulting in increased potential for permanent impacts.
Hazardous Materials and Wastes		
Hazardous Material and Waste Sources		
Impact HMW#1: Temporary and Intermittent Direct and Indirect Impacts from the Transport, Use, Storage, and Disposal of Hazardous Materials and Wastes during Construction	The project would not increase the risk of injury or death to the public, workers, or the environment during construction, because project features would require compliance with regulations that control the transport, use, and storage of hazardous materials; proper permitting; and the implementation of written hazard communication and spill prevention plans to avoid worker and public exposure to hazardous materials.	Same as Alternative A
Impact HMW#2: Temporary Direct Impacts from Construction on or near Potential Environmental Concern Sites	Construction of the project could affect 114 medium- and high-risk PEC sites within 0.25 mile of the project footprint. Project features would include characterizing contamination before it is disturbed, managing required disturbances, stopping work if undocumented contamination is discovered, and implementing engineering controls to limit spread and exposure to hazardous materials.	Construction of the project could affect 114 medium- and high-risk PEC sites within 0.25 mile of the project footprint. While the number of medium- and high-risk PEC sites is the same for both viaduct options, Alternative B (Viaduct to Scott Boulevard) has the potential for greater impacts due to the additional ground disturbance for the construction of the longer viaduct, which could disturb high-risk PEC sites. Project features would be the same as Alternative A.

Resource Category	Construction Impacts	
	Alternative A	Alternative B
Impact HMW#3: Temporary Direct Impacts from Inadvertent Disturbance of Railways during Construction	Alternative A would require approximately 17.4 miles of track modifications. The inadvertent disturbance of soils adjacent and underlying to former or current railways during construction is not anticipated to increase the risk of significant hazards to the public or environment because potential effects would likely be surficial and localized because project features include methods for managing undocumented contamination.	The potential for inadvertent disturbance of railway-related contamination would be slightly greater under Alternative B, which would require additional track modifications and ground disturbance. Alternative B would require 19.8 miles (Viaduct to I-880) or 21.6 miles (Viaduct to Scott Boulevard) of track modifications. As with Alternative A, potential effects would likely be surficial and localized because project features would apply to reduce risks associated with disturbance of undocumented contamination.
Impact HMW#4: Temporary Direct Impacts from Inadvertent Disturbance of Lead-Based Paint during Construction	Construction of Alternative A would demolish approximately 817,000 square feet of buildings. Demolition of buildings and roadways would be conducted in accordance with a hazardous materials and waste plan and demolition plan with specific provisions for lead abatement. As a result, the potential exposure of the public and construction workers to LBP during construction would be minimized.	Construction of Alternative B (Viaduct to I-880) would demolish 1,678,000 square feet of buildings and Alternative B (Viaduct to Scott Boulevard) would demolish 1,866,000 square feet of buildings. Alternative B (Viaduct to Scott Boulevard) has the potential for slightly greater impacts due to the additional ground disturbance for the construction of the longer viaduct. Project features would be the same as Alternative A and would minimize exposure of the public and construction workers to LBP during construction.
Impact HMW#5: Temporary Direct Impacts from Inadvertent Disturbance of Asbestos-Containing Materials during Construction	Construction of Alternative A would demolish approximately 817,000 square feet of buildings and require 17.4 miles of track modification. Building demolition would take place in accordance with a hazardous materials and waste plan and demolition plan with specific provisions for asbestos abatement. Plans would require handling of materials be done by licensed asbestos contractors. As a result, the potential exposure of the public and construction workers to asbestos during construction would be minimized.	Construction of Alternative B (Viaduct to I-880) would demolish 1,678,000 square feet of buildings and Alternative B (Viaduct to Scott Boulevard) would demolish 1,866,000 square feet of buildings and would require 19.8 miles (Viaduct to I-880) or 21.6 miles (Viaduct to Scott Boulevard) of track modifications. Alternative B (Viaduct to Scott Boulevard) has the potential for slightly greater impacts due to the additional ground disturbance for the construction of the longer viaduct. Project features would be the same as Alternative A and would minimize exposure of the public and construction workers to asbestos during construction.

Resource Category	Construction Impacts	
	Alternative A	Alternative B
Impact HMW#6: Temporary Direct Impacts from Inadvertent Disturbance of Pesticides in Soil from Historical Agricultural Use during Construction	The risk assessment determined that the risk of encountering pesticides is medium in the San Mateo to Palo Alto and Mountain View to Santa Clara Subsections and low in the remaining subsections. The inadvertent disturbance of pesticides during construction is not anticipated to increase the risk of significant hazards to the public or environment because pesticides are a relatively confined contaminant with a low likelihood of mobilization, and because the project includes features to minimize impacts of undocumented contaminants encountered during ground-disturbing activities.	Same as Alternative A
Impact HMW#7: Temporary Direct Impacts from Inadvertent Disturbance of Polychlorinated Biphenyls during Construction	The inadvertent disturbance of pole-mounted transformers within the project footprint would not present a hazard to the public or the environment because potential impacts would likely be surficial and localized, and because project features include methods for managing undocumented contamination. These features include preparation of a CMP for disturbances of undocumented contamination, stopping of work until a contaminant can be characterized, and implementation of appropriate controls to limit exposure to PCBs and development of a hazardous materials and waste plan describing responsible parties and procedures for transport, containment, and storage of contaminated materials.	Same as Alternative A
Impact HMW#8: Temporary Direct Impacts from Inadvertent Disturbance of Aerially Deposited Lead during Construction	Temporary disturbance of ADL during construction would not result in a significant hazard to the public or environment because ADL is usually confined to surface soils with low likelihood of mobilization, and because the project includes features to address undocumented contaminants encountered during earth-disturbing activities. These project features include identification and characterization of areas potentially contaminated with ADL prior to construction, restricting handling of contaminated soils to those personnel trained in their management, and wetting of soils during construction and the provision of a hazardous materials and waste plan describing responsible parties and procedures for transport, containment, and storage of contaminated materials.	The risk of ADL exposure would be slightly greater under Alternative B, which would require more ground-disturbing activities for construction of the passing track and the aerial viaduct. Alternative B (Viaduct to Scott Boulevard) has the potential for slightly greater impacts due to the additional ground disturbance for the construction of the longer viaduct. Project features would be the same as Alternative A and would address undocumented contaminants encountered during earth-disturbing activities.

Resource Category	Construction Impacts	
	Alternative A	Alternative B
Impact HMW#9: Temporary Direct Impacts from Soil-Disturbing Activities in Areas of Naturally Occurring Asbestos during Construction	Project construction would not involve major excavation in asbestos-containing bedrock; therefore, airborne NOA would not pose a significant hazard to the public or environment. Further, project features would include testing for NOA, controlling for dust, having a geologist or other trained professional on-site when working in areas with potential for NOA, and stopping work when an NOA deposit is encountered until a management plan has been prepared and implemented.	Same as Alternative A
Impact HMW#10: Temporary Direct Impacts from Soil-Disturbing Activities near Landfills during Construction	The East Brisbane LMF under Alternative A would be built on the former Brisbane Landfill. Proposed excavations would require the preparation of a removal action plan to determine appropriate methods for removal, transportation, and disposal of excavated materials. Regular testing for gases and the installation of gas monitoring and venting systems would be required. These project features would minimize risks associated with construction on a former landfill under Alternative A.	Construction of the West Brisbane LMF under Alternative B would occur within 1,000 feet west of the former landfill. Therefore, the risk of exposure to landfill hazards during construction would be less than that of Alternative A. Project features such as methane monitoring would also apply to construction of Alternative B because of its location within 1,000 feet of the former landfill.
Impact HMW#11: Temporary Direct and Indirect Impacts from Inadvertent Disturbance of Undocumented Hazardous Materials or Waste during Construction	Construction of the project could inadvertently disturb undocumented subsurface contamination, such as groundwater plumes, contaminated soils, and underground tanks. However, project features that call for a stop to work upon discovery of undocumented contamination and implementation of a CMP, as well as barriers and hazard controls, would limit the spread of contamination to the immediate vicinity of its area of discovery, thereby minimizing potential impacts on workers, the public, and the environment.	Same as Alternative A. Impacts could potentially differ between the viaduct options, as Alternative B (Viaduct to Scott Boulevard) has greater potential to inadvertently disturb undocumented hazardous materials or waste during construction due to the additional ground disturbance associated with the construction of the longer viaduct. However, since the material is undocumented, there is difficulty predicting if a particular option or alternative is more at risk than another.
Hazardous Material and Waste Impacts on Sensitive Receptors		
Impact HMW#13: Intermittent Direct Impacts from Hazardous Material and Waste Activities near Schools during Construction	Project construction would occur within 0.25 mile of 66 schools under Alternative A. The impact on schools of hazardous materials released to the environment in the unlikely event of a leak or spill as the result of an accident or collision during construction would be minimal because of the relatively small quantities of materials transported or used at any given time and because of the precautions required by regulations.	A greater level of construction activity, including additional building demolition and railway disturbance, would occur within 0.25 mile of 66 schools under Alternative B.

Resource Category	Construction Impacts	
	Alternative A	Alternative B
Safety and Security		
Emergency Response and Services		
Impact S&S#1: Temporary Impacts on Emergency Access and Response Times from Temporary Road Closures, Relocations, and Modifications	Construction activity would temporarily close and relocate roads, resulting in delays in emergency vehicle access and response times.	Construction activity under Alternative B would result in more temporary road closures than Alternative A because construction of the passing track would require construction or modification of 10 underpasses in San Mateo, San Carlos, and Redwood City. Delays in emergency vehicle access and response times would occur and would be greater than those experienced under Alternative A.
Impact S&S#2: Temporary Impacts on Emergency Access and Response Times from Construction Vehicles	Project features would manage construction vehicle traffic and the project would not affect emergency vehicle access and response.	Same as Alternative A
Impact S&S#3: Permanent Impacts on Emergency Access and Response Times Caused by Construction	The permanent relocation and realignment of the Tunnel Avenue overpass would provide equivalent emergency vehicle access to existing conditions and would not add delay to response times or other performance objectives.	The permanent relocation and realignment of the Tunnel Avenue overpass would remove the Brisbane Fire Station's exclusive access to the signalized Bayshore Boulevard/Valley Drive intersection and replace it with a single driveway that would have unsignalized right-in, right-out access to Bayshore Boulevard, such that additional delay for exiting fire trucks and delays in response times for fire trucks exiting the Brisbane Fire Station would occur.
Community Safety and Security		
Impact S&S#7: Temporary Exposure to Criminal Activity at Construction Sites	Construction sites would not lead to criminal activity risks that would interfere with emergency services. The risk of injury arising from exposure to hazardous machinery or materials or an emergency during criminal activity or emergency service support being required on construction sites would be minimized by storing equipment and materials in secured areas and using security personnel and security lighting to monitor equipment after work hours.	Same as Alternative A
Impact S&S#8: Temporary Exposure to Construction Site Hazards	Construction equipment, construction activities, and high-risk facilities would not lead to safety hazards. The project would comply with all legal requirements and include an SSMP to reduce the potential of construction site hazards and accidents.	Same as Alternative A

Resource Category	Construction Impacts	
	Alternative A	Alternative B
Impact S&S#9: Temporary Exposure to Traffic Hazards	Alternative A would require fewer temporary roadway and lane closures than would Alternative B (both viaduct options). Temporary road closures and detours that could result in an increased exposure of motor vehicle drivers, pedestrians, and bicyclists to traffic hazards would be minimized through coordination with local jurisdictions, emergency vehicle access procedures and a traffic control plan, staggered road closures, and vehicle and bicycle traffic and pedestrian safety project features.	Alternative B would require more temporary roadway and lane closures because of the additional track and station modifications associated with construction of the passing track. As a result, the risk to safety from potential temporary exposure to traffic hazards from temporary roadway and lane closures would be greater under Alternative B (both viaduct options) than Alternative A. Increased exposure of motor vehicle drivers, pedestrians, and bicyclists to traffic hazards would be minimized in the same manner as Alternative A.
Impact S&S#10: Permanent Exposure to Traffic Hazards	One permanent road closure (Serra Avenue) would be required for Alternative A. The project would implement roadway modifications that would improve traffic flow and safety improvements to reduce traffic hazards by minimizing the potential for conflicts between trains and motor vehicles, pedestrians, and bicycles, resulting in a beneficial effect on community safety.	Five permanent road closures would be required for Alternative B (Viaduct to I-880) and four permanent road closures would be required for Alternative B (Viaduct to Scott Boulevard). Potential permanent exposure to traffic hazards from permanent road closures would be greater for Alternative B (both viaduct options) than for Alternative A. Improvements to traffic flow and safety that would reduce traffic hazards would be achieved in the same manner as Alternative A.
Impact S&S#11: Permanent Interference with Airport Safety	Project structures, including nine proposed radio towers, would exceed FAR Part 77 height limits and therefore notification to FAA would be required for these structures. The Authority expects the aeronautical studies that FAA would conduct under the FAR Part 77 notification process would not identify any safety hazards that would result in FAA recommending the relocation of a proposed communications radio tower. The Authority expects that in some cases the FAA may recommend some form of mitigation (e.g., attaching specific types of lighting or other visual markings to the communications tower poles), which could be implemented without affecting the location or the function of the communications tower. The Authority would work with the FAA to implement FAA-proposed mitigation measures (if any) for FAR Part 77 notification structures. Nine radio towers would require notification to FAA under FAR Part 77 for Alternative A.	Similar to Alternative A. A total of 11 radio towers would require notification under Part 77 for Alternative B (Viaduct to I-880) and 9 radio towers would require notification for Alternative B (Viaduct to Scott Boulevard).

Resource Category	Construction Impacts	
	Alternative A	Alternative B
Impact S&S#12: Temporary Exposure to Valley Fever	Construction would not lead to increased risk of exposure to Valley fever. The fugitive dust control plan and SSMP would minimize the exposure of the public or construction workers to Valley fever.	Same as Alternative A
Impact S&S#13: Temporary Exposure to High-Risk Facilities and High-Risk Utilities	There are 166 high-risk facilities within 2 miles of the project footprint, as well as 146 high-risk utilities (i.e., including electrical lines, potable water lines, stormwater lines, and petroleum or natural gas lines) within the RSA. Of the 146 high-risk utilities, 96 would be protected in place, 44 would be relocated, 1 would be abandoned, and 4 would be extended. The disposition of one other high-risk utility for Alternative A would be determined prior to construction. The SSMP would identify high-risk facilities that could be affected by construction and remove, relocate, or protect in place pipelines, electrical systems, and other buried and overhead high-risk facilities within the project footprint.	There are 168 high-risk facilities within 2 miles of the project footprint under Alternative B (both viaduct options), as well as 99 high-risk utilities within the RSA. Of the 99 high-risk utilities, 39 would be protected in place, 48 would be relocated, and 9 would be extended. The disposition of three other high-risk utilities for Alternative B (both viaduct options) would be determined prior to construction.
Wildfire Hazards		
Impact S&S#18: Temporary Exposure to Wildfire Hazards	Alternatives would not be built in any fire hazard severity zone within state responsibility areas, any very high fire hazard severity zone within local responsibility areas, or any wildland-urban interface fire area. The risk of fire would not be elevated during construction because all construction activities would comply with required and recommended fire safety measures as per California Public Resources Code Title 14 and Title 19 and alignments would be built in accordance with all requirements established by local jurisdictions and all other applicable fire code regulations.	Same as Alternative A

Resource Category	Construction Impacts	
	Alternative A	Alternative B
Socioeconomics and Communities		
Communities and Neighborhoods		
Impact SOCIO#1: Temporary Disruption or Division of Established Communities from Project Construction	The construction transportation plan would maintain traffic flow on major roadways and intersections. Temporary roadway closures, lane closures, and detours would disrupt existing circulation and access patterns in all corridor subsections.	Similar to Alternative A, except disruption of existing circulation and access patterns would be slightly less in the San Francisco to South San Francisco Subsection and substantially greater in the San Mateo to Palo Alto and San Jose Diridon Station Approach Subsections due to construction of the passing track and viaduct.
	New temporary sources of noise and vibration during construction that could exceed established noise thresholds, which could restrict outdoor activities or interfere with student learning, as well as disrupt patients in healthcare facilities in the communities and neighborhoods RSA.	Similar to Alternative A, except in the: ▪ San Mateo to Palo Alto Subsection, where construction of the passing track under Alternative B would generate more temporary noise and vibration in the communities of San Mateo, Belmont, San Carlos, and Redwood City ▪ San Jose Diridon Station Approach Subsection, where pile driving for viaduct structures would expose more sensitive receptors to temporary noise and vibration impacts
	Construction activities could degrade residential views in some locations; however, because these activities would be temporary and would occur within an existing rail corridor, they would not affect visual unity and intactness to the extent that the sense of community character would be reduced or community interactions would be limited.	Similar to Alternative A, except in the: ▪ San Mateo to Palo Alto Subsection where construction of the passing track under Alternative B would require greater levels of construction activity and an expansion of the existing right-of-way in San Mateo, Belmont, and San Carlos ▪ San Jose Diridon Station Approach Subsection, where viaduct construction would require more construction activities and an expansion of the existing right-of-way in Santa Clara and San Jose These changes would not affect visual unity and intactness to the extent that the sense of community character would be reduced or community interactions would be limited.

Resource Category	Construction Impacts	
	Alternative A	Alternative B
Impact SOCIO#2: Permanent Disruption or Division of Established Communities from Project Construction	Permanent changes to circulation and access include: ▪ Permanent closure of Serra Avenue ▪ Realignment of Tunnel Avenue for the East Brisbane LMF ▪ Reconfiguration of the Tunnel Avenue overpass and Lagoon Road ▪ Relocation of Bayshore Station ▪ Safety improvements at 41 at-grade crossings The permanent transportation features associated with Alternative A would not physically divide an established community.	Permanent changes to circulation and access would be the same as Alternative A except: ▪ No realignment of Tunnel Avenue ▪ Relocation of San Carlos Station ▪ Permanent closures of 4 roads ▪ Safety improvements at 39 at-grade crossings The permanent transportation features associated with Alternative B would not physically divide an established community.
	Alternative A would displace 14 residential units, 48 businesses, and 3 community and public facilities. It is anticipated that there are sufficient residential relocation resources in the specific communities where displacements would occur for displaced residents to relocate within the same community, which would prevent the loss of community character and cohesion.	Alternative B (Viaduct to I-880) would displace 42 residential units, 171 businesses, and 6 community and public facilities and Alternative B (Viaduct to Scott Boulevard) would displace 62 residential units, 202 businesses, and 7 community and public facilities. Although there would be a greater number of residential relocations under Alternative B, it is anticipated that there are sufficient residential relocation resources in the specific communities where displacements would occur for displaced residents to relocate within the same community, which would prevent the loss of community character and cohesion.
	Alteration of the visual environment from new rail infrastructure would not affect visual unity and intactness to the extent that the sense of community character would be reduced or community interactions would be limited.	Similar to Alternative A, except in the: ▪ San Mateo to Palo Alto Subsection where construction of the passing track under Alternative B would require an expansion of the existing right-of-way, resulting in the acquisition and demolition of residences and businesses in San Mateo, Belmont, and San Carlos ▪ San Jose Diridon Station Approach Subsection, where viaduct construction would require an expansion of the existing right-of-way, resulting in the acquisition and demolition of residences and businesses in Santa Clara and San Jose These changes would not affect visual unity and intactness to the extent that the sense of community character would be reduced or community interactions would be limited.

Resource Category	Construction Impacts	
	Alternative A	Alternative B
Children's Health and Safety		
Impact SOCIO#4: Temporary Impacts on Children's Health and Safety from Project Construction	Construction of the project would: ▪ Expose the 117 schools/childcare facilities within 1,000 feet of project construction activities for Alternative A to construction-related noise, vibration, and construction emissions. ▪ Result in construction emissions below local air district health risk thresholds and therefore would not pose increased risks to sensitive receptors, including children ▪ Generate electromagnetic interference during construction that would not result in exposure of children to a documented health risk ▪ Use hazardous materials in a manner that would comply with state and federal regulations that would prevent the use of extremely hazardous substances in a quantity equal to or greater than the state threshold quantity within 0.25 mile of a school, which would minimize the risks of accidental spills or releases near schools No disproportionate impacts on children's health and safety would occur.	Similar to Alternative A, except: ▪ Expose the 122 schools/childcare facilities within 1,000 feet of project construction activities for Alternative B to construction-related noise, vibration, and construction emissions ▪ Construction emissions would be somewhat greater under Alternative B due to the greater levels of construction required for the passing track and the viaduct, but emissions would remain below local air district health risk thresholds No disproportionate impacts on children's health and safety would occur.
Impact SOCIO#5: Permanent Impacts on Children's Health and Safety from Project Construction	Project construction would: ▪ Not require the acquisition of any community facilities where children congregate ▪ Modify 40 at-grade crossings for safety No disproportionate impacts on children's health and safety would occur.	Similar to Alternative A, except: ▪ Would require the acquisition of the Universe of Colors Preschool in San Mateo and a storage building at Bellarmine College Preparatory in San Jose ▪ Modify 38 at-grade crossings for safety improvements No disproportionate impacts on children's health and safety would occur.

Resource Category	Construction Impacts	
	Alternative A	Alternative B
Property Displacements and Relocations		
Impact SOCIO#7: Displacements and Relocations of Residences from Project Construction	▪ 14 residential units displaced ▪ Sufficient available relocation properties exist, so residents could relocate within same communities	Similar to Alternative A, except: ▪ 42 residential units displaced under Alternative B (Viaduct to I-880) ▪ 62 residential units displaced under Alternative B (Viaduct to Scott Boulevard) Sufficient available relocation properties exist, so residents could relocate within same communities.
Impact SOCIO#8: Displacements and Relocations of Commercial and Industrial Businesses from Project Construction	▪ 48 commercial and industrial businesses displaced ▪ Sufficient available relocation properties exist in the region, but some businesses in Millbrae and Belmont may be unable to relocate within same community	Similar to Alternative A except: ▪ 171 commercial and industrial businesses displaced under Alternative B (Viaduct to I-880) ▪ 202 commercial and industrial businesses displaced under Alternative B (Viaduct to Scott Boulevard) Sufficient available relocation properties exist in the region, but some businesses in Millbrae and Belmont may be unable to relocate within same community
Impact SOCIO#9: Displacements and Relocation of Community and Public Facilities from Project Construction	Three community/public facilities displaced: ▪ Brisbane Fire Station ▪ Millbrae Station Historic Depot ▪ Templo La Hermosa	Similar to Alternative A, except also: ▪ Preschool in San Mateo ▪ Animal shelter in Belmont ▪ San Jose Taiko Conservatory ▪ Storage building at Bellarmine College Preparatory (Viaduct to Scott Boulevard only)
Economic Impacts		
Impact SOCIO#10: Temporary Impacts on Employment from Project Construction	4,620 direct and indirect jobs, representing a small increase in employment demand for the region.	6,950 (Viaduct to I-880) or 8,110 (Viaduct to Scott Boulevard) direct and indirect jobs, representing a small increase in employment demand for the region.

Resource Category	Construction Impacts	
	Alternative A	Alternative B
Impact SOCIO#11: Permanent Impacts on School District Funding from Project Construction	Approximately 15 school-aged children (ages 5–18) displaced under Alternative A, representing less than 0.1% of the total enrollment overall and would not materially affect school district funding	Approximately 30 (Viaduct to I-880) or 40 (Viaduct to Scott Boulevard) school-aged children (ages 5–18) displaced under Alternative B, representing less than 0.1% of the total enrollment overall and would not materially affect school district funding
	Decrease in property tax revenues from displacements and a maximum of 15 student relocations would represent 0.128% of total annual school funding sources.	Decrease in property tax revenues from displacements and a maximum of 30 student relocations under Alternative B (Viaduct to I-880) and 40 student relocations under Alternative B (Viaduct to Scott Boulevard) would represent 0.299% of total annual school funding sources.
	Permanent road closures could divert school buses to alternate routes; however, these diversions would not result in long detours that could substantially affect school bus transportation costs.	Similar to Alternative A with regard to bus transportation costs.
Impact SOCIO#12: Permanent Impacts on Property Tax Revenues from Property Acquisition from Project Construction	▪ Property tax revenues reduced by 0.0003% ▪ Construction may reduce property values in areas near the Brisbane LMF but may increase property values in the station areas	▪ Property tax revenues reduced by 0.0006% under Alternative B (Viaduct to I-880) and 0.0009% under Alternative B (Viaduct to Scott Boulevard) ▪ Construction impacts similar to Alternative A, except it may also reduce property values near the passing track and viaduct construction
Impact SOCIO#13: Temporary Impacts on Sales Tax Revenues	$8.3 million increase in sales tax revenues to the RSA.	$12.5 million (Viaduct to I-880) or $14.6 million (Viaduct to Scott Boulevard) increase in sales tax revenues to the RSA.
Station Planning, Land Use, and Development		
Alteration of Land Use Patterns		
Impact LU#1: Temporary Alteration of Land Use Patterns from Land Use Conversion and Introduction of Incompatible Land Uses	Construction of the project would temporarily convert 112.6 acres. Lands would be restored to their pre-construction condition, and land use patterns would not be substantially altered.	Similar to Alternative A, construction of the project would temporarily convert 99.8 acres under Alternative B (Viaduct to I-880) and 117.8 acres under Alternative B (Viaduct to Scott Boulevard).

Resource Category	Construction Impacts	
	Alternative A	Alternative B
Impact LU#2: Temporary Alteration of Land Use Patterns from Increased Traffic, Noise, Air Quality Emissions, and Visual Changes	Construction would result in temporarily increased noise levels, dust and other air pollutants, traffic, temporary visual changes that would affect adjacent land uses. Project features would provide continuous property access by maintaining traffic flow; managing fugitive dust emissions, noise, and vibration; and restoring construction staging areas to their original condition. Therefore, construction would not prevent the continued use of adjacent properties or introduce conditions incompatible with adjacent uses that would trigger temporary or permanent relocations or conversions that would result in substantial changes to land use patterns.	Temporarily increased noise levels, dust and other air pollutants, traffic, and visual changes associated with construction of Alternative B would be greater than those experienced under Alternative A because the West Brisbane LMF would be closer to the Schlage Lock project (under construction), and because of the greater levels of construction activity required for construction of the passing tracks and the viaduct. Similar to Alternative A, project features would provide continuous property access by maintaining traffic flow; managing fugitive dust emissions, noise, and vibration; and restoring construction staging areas to their original condition. Therefore, no substantial changes to land use patterns would occur.
Impact LU#3: Permanent Alteration of Land Use Patterns from Land Use Conversion and Introduction of Incompatible Land Uses along Track Alignment	Construction would result in the permanent conversion of 84.0 acres. Land use conversion would not cause an inherent incompatibility in land use, and existing adjacent land uses would continue, avoiding altered land use patterns.	Construction would result in the permanent conversion of 98.0 acres under Alternative B (Viaduct to I-880) and 93.1 acres under Alternative B (Viaduct to Scott Boulevard). Land use conversion would not cause an inherent incompatibility in land use, and existing adjacent land uses would continue, avoiding altered land use patterns.
Impact LU#4: Permanent Alteration of Land Use Patterns from Land Use Conversion and Introduction of Incompatible Uses at Stations	The 4th and King Street Station modifications would be in an area with existing and planned transportation land uses and would not impede existing or planned land use patterns. Construction would result in the permanent conversion of 1.9 acres for the HSR modifications to the 4th and King Street Station and 7.8 acres for the HSR modifications to Millbrae Station. Construction of the Millbrae Station modification would result in the permanent alteration of existing land use patterns from conversion of commercial buildings to transportation uses. Also, construction of the Millbrae Station modifications would result in the permanent alteration of planned land use patterns because the Millbrae Station modifications would conflict with the planned Millbrae Serra Station Development project. Construction would result in the permanent conversion of 45.5 acres for the HSR modifications to the San Jose Diridon Station. The San Jose Diridon Station modifications would be at the urbanized site of an existing transit facility and would not impede existing or planned land use patterns.	Same as Alternative A for the 4th and King Street and Millbrae Stations. Modifications to the San Jose Diridon Station would require the permanent conversion of 56.4 acres.

Resource Category	Construction Impacts	
	Alternative A	Alternative B
Impact LU#5: Permanent Alteration of Land Use Patterns from Land Use Conversion at the Brisbane Light Maintenance Facility	Construction of the East Brisbane LMF would not result in an impact on existing land use patterns because the East Brisbane LMF would be in an area that is predominantly vacant and industrial and would not permanently alter existing commercial, industrial, development under construction (Schlage Lock project), public facilities, parks/open space, and transportation land uses. Construction of the East Brisbane LMF would result in an impact on planned land use patterns because the East Brisbane LMF would result in the permanent acquisition of 93.3 acres of land planned for planned development (residential prohibited).	Construction of the West Brisbane LMF would result in a potential permanent alteration of existing land use patterns, due to the permanent alteration of Icehouse Hill. Construction of the West Brisbane LMF would result in an impact on planned land use patterns because the West Brisbane LMF would result in the permanent acquisition of 90.1 acres of land planned for planned development (residential prohibited) and 20.7 acres of land planned development (residential permitted).
Conflict with BCDC Bay Plan Shoreline Band Policies		
Impact LU#7: Conflict with BCDC Shoreline Band Policies	The realignment of Lagoon Road would result in a substantial change in land uses designated in the BCDC Bay Plan for this priority use area because the project would introduce a roadway in an area identified for a waterfront park. Development within the Brisbane Lagoon, Guadalupe Valley Creek, and Visitacion Creek shoreline bands (outside of a priority use area) would be inconsistent with BCDC Bay Plan policies, because the project would not provide maximum feasible public access to the Bay and the shoreline.	Similar to Alternative A, except Alternative B would not affect the shoreline band of Visitacion Creek.
Inducement of Population Growth beyond Planned Levels		
Impact LU#8: Temporary Induced Population Growth	Population growth that might be induced by increased employment opportunities for construction would not exceed planned levels.	Population growth that might be induced by increased employment opportunities for construction would not exceed planned levels.
Parks, Recreation, and Open Space		
Parks, Recreation, and Open-Space Resources		
Impact PK#1: Temporary Changes from Noise, Vibration, and Construction Emissions on Use and User Experience of Parks, Recreational Facilities, and Open-Space Resources	The use and user experience at 95 resources would be affected by noise, vibration, and air emissions.	Same as Alternative A

Resource Category	Construction Impacts	
	Alternative A	Alternative B
Impact PK#2: Temporary Changes to Access or Use of Parks	Access to 21 resources would be limited during construction because of TCEs and placement of equipment.	Viaduct to I-880: Access to up to 24 resources would be limited during construction because of TCEs and placement of equipment. Viaduct to Scott Boulevard: Access to up to 26 resources would be limited during construction because of TCEs and placement of equipment.
Impact PK#3: Temporary Visual Changes that Could Create a Perceived Barrier to Access or Continued Use of Parks, Recreational Facilities, and Open-Space Resources	Depending on construction activity and duration as well as location, viewers at 36 resources could see staging areas, worker parking, and equipment and materials storage areas. Visual changes would last longer near major project components (stations, LMF). Construction of the project would not prevent use of the 36 resources.	Depending on construction activity and duration as well as location, viewers at 39 resources could see staging areas, worker parking, and equipment and materials storage areas. Visual changes would last longer near major project components (stations, LMF, passing tracks, aerial viaduct). Construction of the project would not prevent use of the 39 resources.
Impact PK#4: Permanent Changes Affecting Access to or Circulation in Parks, Recreational Facilities, and Open-Space Resources	There would be no permanent changes affecting access or circulation.	Access and circulation would be affected at Trinta Park.
Impact PK#5: Permanent Visual Changes That Could Create a Perceived Barrier to Access or Continued Use of Parks, Recreational Facilities, and Open-Space Resources	There would be no permanent visual changes that would create an actual or perceived barrier to access or use.	Same as Alternative A
Impact PK#6: Permanent Acquisition of Parks, Recreation, and Open-Space Resources	Construction would result in permanent acquisition of portions of three resources. All parks and trails would remain useable with implementation of project features.	Construction would result in permanent acquisition of portions of four resources (Viaduct to I-880) or five resources (Viaduct to Scott Boulevard). All parks and trails would remain useable with incorporation of project features and mitigation measures.
School District Play Areas		
Impact PK#9: Temporary Changes from Exposure to Noise, Vibration, and Construction Emissions on Use and User Experience of School District Play Areas	The use and user experience at 14 resources would be affected by noise, vibration, and air emissions.	Same as Alternative A

Resource Category	Construction Impacts	
	Alternative A	Alternative B
Impact PK#10: Temporary Changes to Access or Use of School District Play Areas	Access to two resources would be limited to one lane during construction because of TCEs needed for installation of four-quadrant gates for up to 4 weeks.	Same as Alternative A
Impact PK#11: Temporary Visual Changes That Could Create a Perceived Barrier to Access or Continued Use of School Play Areas	Depending on construction activity and duration as well as location, viewers at four resources could see staging areas, worker parking, and equipment and materials storage areas. Visual changes would last longer near major project components (e.g., stations, LMF, passing tracks). Construction of the project would not create a perceived barrier to use.	Same as Alternative A
Impact PK#12: Permanent Changes Affecting Access to School District Play Areas	Construction would not result in permanent changes in access to or circulation at any school district play areas.	Same as Alternative A
Impact PK#13: Permanent Visual Changes That Could Create a Perceived Barrier to Access or Continued Use of School Play Areas	There would be no permanent visual changes that would create a perceived barrier to access or use.	Same as Alternative A
Aesthetics and Visual Quality		
Visual Quality		
Impact AVQ#1: Temporary Direct Impacts on Visual Quality and Scenic Vistas	Construction activities would temporarily degrade visual quality where HSR construction occurs outside the existing Caltrain right-of-way. Project features would minimize impacts where sensitive viewers are found.	Same as Alternative A, except in the San Mateo–Redwood City Landscape Unit, where a greater level of construction activity would be required for construction of the passing track, and the Santa Clara, Diridon Station, and San Jose Station Approach Landscape Units, where aerial structures would be built under Alternative B.
Impact AVQ#2: Permanent Direct Impacts on Visual Quality—Mission Bay Landscape Unit	Track shifts, station modifications, and other modifications in and adjacent to existing railway facilities would conform to the existing character of the area, and would not change the existing visual quality.	Same as Alternative A
Impact AVQ#3: Permanent Direct Impacts on Visual Quality—Southeast San Francisco Landscape Unit	Track shifts and other modifications within and adjacent to existing railway facilities would conform to the existing character of the area and would not change the existing visual quality.	Same as Alternative A

Resource Category	Construction Impacts	
	Alternative A	Alternative B
Impact AVQ#4: Permanent Direct Impacts on Visual Quality—Brisbane Landscape Unit	Track shifts and other modifications within and adjacent to existing railway facilities would conform to the existing character of the area. Although the East Brisbane LMF would decrease the visual quality for residential viewers on San Bruno Mountain, there would be no change in the visual quality for the landscape unit as a whole.	Similar to Alternative A. Although the West Brisbane LMF would decrease the visual quality for residential viewers on San Bruno Mountain, there would be no change in the visual quality for the landscape unit as a whole.
Impact AVQ#5: Permanent Direct Impacts on Visual Quality—South San Francisco Landscape Unit	Track shifts and radio tower installation would conform to the existing character of the area and would not change the existing visual quality.	Same as Alternative A
Impact AVQ#6: Permanent Direct Impacts on Visual Quality—San Bruno–Millbrae Landscape Unit	Track shifts and other modifications within and adjacent to existing railway facilities would conform to the existing character of the area. Although the expansion of the tracks and station facilities at the Millbrae Station would decrease the visual quality for travelers along El Camino Real and travelers or residential viewers along California Drive, there would be no change in the visual quality for the landscape unit as a whole.	Same as Alternative A
Impact AVQ#7: Permanent Direct Impacts on Visual Quality—Burlingame Landscape Unit	Track shifts, reconstruction of Broadway Caltrain Station platforms, and radio tower installation would conform to the existing character of the area and would not change the existing visual quality.	Same as Alternative A
Impact AVQ#8: Permanent Direct Impacts on Visual Quality—San Mateo–Redwood City Landscape Unit	Track shifts, new radio towers, and other alterations to the existing railway infrastructure would conform to the existing character of the area and would not change the existing visual quality.	Expansion of the railway from two to four tracks would affect visual quality at specific locations where the expanded railway would intrude on adjacent land uses and contrast with the residential character of the area or the historic San Carlos Depot building. Outside of these locations, track shifts and other modifications within and adjacent to existing railway facilities would conform to the existing character of the area, such that the visual quality would not change.
Impact AVQ#9: Permanent Direct Impacts on Visual Quality—Atherton–Mountain View Landscape Unit	Track shifts, platform modifications at the Atherton Caltrain Station, and radio tower installation would conform to the existing character of the area and would not change the existing visual quality.	Same as Alternative A

Resource Category	Construction Impacts	
	Alternative A	Alternative B
Impact AVQ#10: Permanent Direct Impacts on Visual Quality—Sunnyvale Landscape Unit	Track shifts and radio tower installation would conform to the existing character of the area and would not change the existing visual quality.	Same as Alternative A
Impact AVQ#11: Permanent Direct Impacts on Visual Quality—Santa Clara Landscape Unit	The alignment would be at grade, and the additional rail infrastructure would be within and adjacent to existing railway facilities, such that the visual quality would not change.	Alternative B (Viaduct to I-880): Same as Alternative A Alternative B (Viaduct to Scott Boulevard): The construction of an elevated viaduct and other structures would change the baseline visual character and block or change locally important views for residents, such that the visual quality of the landscape unit would be reduced from moderately high to moderate.
Impact AVQ#12: Permanent Direct Impacts on Visual Quality—Diridon Station Landscape Unit	Track shifts and platform modifications to allow for HSR service to be blended with Caltrain service would not change the visual quality of the landscape unit.	HSR infrastructure, including aerial structures rising up to 60 feet, would introduce permanent changes to the visual character of the landscape unit, reducing visual quality from moderate to moderately low, predominantly affecting travelers and commercial viewer groups (moderate sensitivity).
Impact AVQ#13: Permanent Direct Impacts on Visual Quality—San Jose Station Approach Landscape Unit	Track shifts and reconstruction or modification of existing grade separations to allow addition of a third track to permit HSR service to be blended with Caltrain service would not change the visual quality of the landscape unit.	HSR infrastructure, including a viaduct rising up to 60 feet, would introduce permanent changes to the existing visual character of the landscape unit (moderately high visual quality) which includes the Gardner neighborhood (moderately high sensitivity), by adding a view of transportation infrastructure, such that the existing visual quality of the landscape unit would be degraded.
State Scenic Highways		
Impact AVQ#15: Impacts on State and Local Scenic Highways	Construction of the project alternatives near state scenic highway I-280, the 49-Mile Drive, and local street network in Atherton would have no impact on visual quality from state and local scenic roadways.	Same as Alternative A
Light and Glare		
Impact AVQ#16: Temporary Direct Impacts on Nighttime Light Levels	Construction-related nighttime light would be minimized through visually sensitive lighting design.	Similar to Alternative A except in the San Mateo–Redwood City Landscape Unit, where addition of passing tracks would require temporary lighting at more locations under Alternative B.

Resource Category	Construction Impacts	
	Alternative A	Alternative B
Cultural Resources		
Archaeological Resources		
Impact CUL#1: Permanent Disturbance of Unknown Archaeological Resources	Possible as-yet undocumented resources damaged or destroyed. Because of limited access to private lands within the APE, both alternatives have the potential to damage previously unidentified archaeological resources prior to construction, or buried resources found during construction. The total acreage of historic-period and pre-contact archaeological sensitivity for Alternative A is 418.8 acres of the project footprint.	Similar to Alternative A, but the total acreage of historic-period and pre-contact archaeological sensitivity for Alternative B is 606.8 acres of the project footprint.
Impact CUL#2: Permanent Disturbance of Known Archaeological Resources	25 archaeological resources would be adversely affected. Of these, 10 completely or mostly encompassed; 15 narrow rights-of-way acquisitions.	25 archaeological resources would be adversely affected. Of these, 8 completely or mostly encompassed; 17 narrow rights-of-way acquisitions.
Impact CUL#3: Temporary Public Access and Disturbance of Archaeological resources	None anticipated	Same as Alternative A
Historic Built Resources		
Impact CUL#4: Permanent Demolition, Destruction, Relocation, or Alteration of Built Resources or Setting	1 built resource adversely affected: ID#0497	3 built resources adversely affected by Alternative B (Viaduct to I-880): ID#0497; ID#0522; ID#0585 4 built resources adversely affected by Alternative B (Viaduct to Scott Boulevard): ID#0141; ID#0497; ID#0522; ID#0585
Impact CUL#5: Noise and Vibration Impacts on Built Resources Caused by Construction Activities	0 built resources adversely affected	Same as Alternative A

ADL = aerially deposited lead
APE = area of potential effect
Authority = California High-Speed Rail Authority
BAAQMD = Bay Area Air Quality Management District
BCDC = San Francisco Bay Conservation and Development Commission
BMP = best management practice
BRMP = biological resources management plan
Btu = British thermal unit
C&D = construction and demolition
CAAQS = California ambient air quality standards
CCC = central California coast
CGP = Construction General Permit
CMP = construction management plan
CO_2e = carbon dioxide equivalent
CTP = construction transportation plan
CWA = Clean Water Act
dBA = A-weighted decibel
DPM = diesel particulate matter
EFH = essential fish habitat
EMF = electromagnetic field

FAA = Federal Aviation Administration
FAR = Federal Aviation Regulation
FCC = Federal Communications Commission
FESA = federal Endangered Species Act
GHG = greenhouse gas
HCP = habitat conservation plan
HSR = high-speed rail
I- = Interstate
LBP = lead-based paint
L_{eq} = equivalent sound level
LMF = light maintenance facility
LOS = level of service
mgd = million gallons per day
MT = metric ton
NAAQS = national ambient air quality standards
NOA = naturally occurring asbestos
NO_X = nitrogen oxides
O_3 = ozone
PCB = polychlorinated biphenyls
PEC = potential environmental concern
PM_{10} = particulate matter smaller than or equal to 10 microns in diameter
$PM_{2.5}$ = particulate matter smaller than or equal to 2.5 microns in diameter
RHA = Rivers and Harbors Act
RSA = resource study area
RWQCB = Regional Water Quality Control Board
SFBAAB = San Francisco Bay Area Air Basin
SSMP = safety and security management plan
SWPPP = stormwater pollution prevention plan
TCE = temporary construction easement
VOC = volatile organic compound

[1] Where presented, acreages represent estimates of direct (temporary and permanent) impacts on a given resource.
[2] Where applicable, values are presented for Alternative B (Viaduct to I-880) first, followed by Alternative B (Viaduct to Scott Boulevard). If only one value is presented, the affected acreage would be identical under the Viaduct to I-880 and Viaduct to Scott Boulevard options.

Table S-5 Comparison of Operations Impacts by Alternative

Resource Category	Operations Impacts	
	Alternative A	Alternative B
Transportation		
Intersections		
Impact TR#1: Continuous Permanent Impacts on Vehicle Miles Traveled	By 2040, the project would reduce overall VMT from 2.720 to 2.697 billion miles in San Francisco County, from 4.963 to 4.873 billion miles in San Mateo County, and from 13.202 to 12.972 billion miles in Santa Clara County.	Same as Alternative A
Impact TR#5: Continuous Permanent Congestion/Delay Consequences on Intersection Operations	Project circulation improvements for the Millbrae Station on the west side of the existing Caltrain corridor would improve access to the Millbrae Station by all modes and intersection LOS on this portion of El Camino Real. LOS conditions would improve at the intersection of Bayshore Boulevard/Old County Road due to the relocation of the Tunnel Avenue overpass. Increased traffic in the Project Section and increased gate-down events at the at-grade crossings would affect 9 intersections operating at LOS E or F in 2029 (relative to the 4th and King Street Station) and 86 intersections in 2040 in the five subsections.	Same as Alternative A, except that increased traffic in the Project Section and increased gate-down events at the at-grade crossings would affect an additional five intersections (total of 91 affected intersections) in 2040 in the five subsections.
Parking		
Impact TR#7: Permanent Effects Related to Parking	At the Millbrae Station, station modifications would entail displacement of 288 existing parking spaces on both the east and west sides of the station. The project design includes construction of a total of 325 parking spaces, most of which would be in surface lots on the west side of the station. The removed spaces and the new spaces would result in a net change of 37 additional parking spaces. An estimated 278 parking spaces near the San Jose Diridon Station and SAP Center would be permanently displaced and would be replaced on a 1:1 basis. Parking demands related to the San Jose Diridon Station and SAP Center can be met by existing facilities, project facilities, and the offsetting effects of increased transit service.	Same as Alternative A relative to the Millbrae Station. A greater number of parking spaces (473 spaces) near the San Jose Diridon Station and SAP Center would be permanently displaced and would be replaced on a 1:1 basis. Parking demands related to the San Jose Diridon Station and SAP Center can be met by existing facilities, project facilities, and the offsetting effects of increased transit service.

Resource Category	Operations Impacts	
	Alternative A	Alternative B
Transit		
Impact TR#11: Continuous Permanent Impacts on Bus Services	Nine high-frequency bus routes would be delayed by added vehicle trips at HSR stations or increased gate-down events resulting from added HSR trains.	Same as Alternative A
Impact TR#12: Continuous Permanent Impacts on Passenger Rail and Bus Access	Passenger rail and bus access would be accommodated by project design and features and would not affect the performance of these services.	Same as Alternative A
Impact TR#13: Continuous Permanent Impacts on Transit Ridership	Transit ridership would increase but would not hinder service by other transit providers. The project would not be inconsistent with transit plans and policies.	Same as Alternative A
Impact TR#14: Continuous Permanent Impacts on Passenger Rail System Capacity	Caltrain average service times would increase slightly because of the blending of service, but a regular interval schedule could be maintained. The project would not materially decrease the performance of passenger rail services.	Caltrain average service times would increase slightly (and more than Alternative A) because of the blending of service, but a regular interval schedule could be maintained. The project would not materially decrease the performance of passenger rail services.
Nonmotorized Travel		
Impact TR#17: Continuous Permanent Impacts on Pedestrian and Bicycle Access	Operations would introduce nonmotorized trips around station areas, exacerbating pedestrian access concerns at the 4th and King Street Station due to limited sidewalk capacity along the 4th Street frontage between Townsend Street and King Street.	Same as Alternative A
Freight Rail Service		
Impact TR#19: Continuous Permanent Impacts on Freight Rail Capacity	Shared track could result in some inconveniences to freight service during the early evening but would not likely divert freight rail service to other modes.	Same as Alternative A
Impact TR#20: Continuous Permanent Impacts on Freight Rail Operations	The project design and the HSR OCS installation would accommodate required freight height clearances where tracks are shared.	Same as Alternative A
Aviation		
Impact TR#21: Continuous Permanent Changes in Air Travel Demand	The HSR system is expected to reduce airline flights by 29% statewide and 35% in the Bay Area.	Same as Alternative A

Resource Category	Operations Impacts	
	Alternative A	Alternative B
Air Quality and Greenhouse Gases		
Air Quality		
Impact AQ#7: Continuous Permanent Direct Impacts on Air Quality in the SFBAAB	Long-term operation of the HSR system would reduce criteria pollutant emissions, relative to the No Project conditions, resulting in a regional and local air quality benefit. Annual reductions in regional emissions would range from 24 to 52 tons of VOC, 298 to 560 tons of CO, 213 to 452 tons of NO_X, 23 to 49 tons of SO_2, 2 to 34 tons of PM_{10}, and 6 to 18 tons of $PM_{2.5}$, depending on the year and ridership scenario.	Same as Alternative A
Impact AQ#8: Continuous Permanent Direct Impacts on Implementation of an Applicable Air Quality Plan	Emissions reductions from project operations would support implementation of air quality plans and attainment of regional air quality goals.	Same as Alternative A
Impact AQ#9: Continuous Permanent Direct Impacts on Localized Air Quality—Carbon Monoxide Hot Spots (NAAQS Compliance)	Increased station traffic would not result in localized CO hot spots or exceedances of the CO NAAQS or CAAQS.	Same as Alternative A
Impact AQ#10: Continuous Permanent Direct Impacts on Localized Air Quality—Exposure to Mobile Source Air Toxics	Operations of the HSR system would result in a regional MSAT reduction and benefit. Increased station traffic would have a low potential for meaningful localized MSAT effects.	Same as Alternative A
Impact AQ#11: Continuous Permanent Direct Impacts on Localized Air Quality—Particulate Matter Hot Spots (NAAQS Compliance)	The project is not considered a project of air quality concern, based on the descriptions as indicated in 40 C.F.R. Section 93.123(b)(1).	Same as Alternative A
Impact AQ#12: Continuous Permanent Direct Impacts on Localized Air Quality—Exposure to Diesel Particulate Matter and $PM_{2.5}$ (Health Risk)	Emissions of DPM and $PM_{2.5}$ from freight trains on shifted tracks, and station and LMF operation, would not expose sensitive receptors to excessive pollutant concentrations because health risks would not exceed BAAQMD's thresholds.	Same as Alternative A

Resource Category	Operations Impacts	
	Alternative A	Alternative B
Impact AQ#13: Continuous Permanent Direct Impacts on Localized Air Quality—Exposure to Odors	Emissions-generated odors would be limited and would not be expected to affect a substantial number of people.	Same as Alternative A
Greenhouse Gases		
Impact AQ#15: Continuous Permanent Direct and Indirect Impacts on Global Climate Change—Greenhouse Gas Emissions	Long-term operations of the HSR system would reduce GHG emissions, relative to the No Project conditions, resulting in a statewide and regional GHG benefit. Statewide annual reductions would range from 0.4 million MT CO_2e to 1.7 million MT CO_2e, depending on the year and ridership scenario.	Same as Alternative A
Noise and Vibration		
Noise		
Impact NV#2: Intermittent Permanent Exposure of Sensitive Receptors to Noise from Operations	Permanent noise impacts from 2029 Plus Project condition at 4th and King Street Station and approach: ▪ none Permanent noise impacts from 2040 Plus Project condition: ▪ 4,296 moderate noise impacts ▪ 1,758 severe noise impacts	Permanent noise impacts from 2029 Plus Project condition at 4th and King Street Station and approach: ▪ none Permanent noise impacts from 2040 Plus Project condition: Viaduct to I-880: ▪ 4,186 moderate noise impacts ▪ 1,648 severe noise impacts Viaduct to Scott Boulevard: ▪ 4,141 moderate noise impacts ▪ 1,628 severe noise impacts
Impact NV#3: Intermittent Permanent Exposure of Sensitive Receptors to Noise from HSR Passenger Station Parking	Noise contribution from parking facilities: ▪ No new parking at 4th and King Street Station ▪ 37 dBA L_{dn} at the Millbrae Station ▪ 29 dBA L_{dn} at the San Jose Diridon Station This additional noise would be substantially lower than noise from HSR trains. No additional impact is projected.	Same as Alternative A

Resource Category	Operations Impacts	
	Alternative A	Alternative B
Impact NV#4: Intermittent Permanent Exposure of Sensitive Receptors to Noise from the Brisbane Light Maintenance Facility	Noise contribution from LMF: ▪ 36 dBA L_{dn} contribution from train movements at the East Brisbane LMF This additional noise would be substantially lower than noise from HSR trains. No additional impact is projected.	Noise contribution from LMF: ▪ 40 dBA L_{dn} contribution from train movements at the West Brisbane LMF This additional noise would be substantially lower than noise from HSR trains. No additional impact is projected.
Impact NV#5: Intermittent Permanent Human Annoyance from Noise Onset of Passing HSR Trains	Advance warnings of trains would be provided at stations and at-grade crossings to avoid startling receptors. No sensitive receptors outside of these areas were identified within the distance where rapid onset noise exposure would exceed the FTA threshold.	Same as Alternative A
Impact NV#6: Permanent Exposure of Sensitive Receptors to Vehicular Traffic Noise Increases	Roadway segments with an anticipated increase in traffic noise of ≥3 dB compared to existing conditions include: 2029 Plus Project conditions at 4th and King Street Station and approach: ▪ 2 segments near 4th and King Street Station 2040 Plus Project conditions: ▪ 4 segments near Diridon Station	Similar to Alternative A 2029 Plus Project conditions at 4th and King Street Station and approach: ▪ 2 segments near 4th and King Street Station 2040 Plus Project conditions: ▪ 5 segments near Diridon Station
Impact NV#7: Traction Power Facility Noise	The installation of additional equipment at PCEP TPFs would generate noise, but would not cause additional noise impacts beyond those from trains and horns.	Same as Alternative A in regard to the addition of equipment at PCEP TPFs. Regarding the new traction power substation, for Alternative B, no noise sensitive receptors lie within the screening distance and no noise impacts were determined.
Vibration		
Impact NV#9: Intermittent Permanent Exposure of Sensitive Receptors to Vibration from Operations	Permanent vibration impacts from 2029 Plus Project conditions at 4th and King Street Station and approach: ▪ none Permanent vibration impacts from 2040 Plus Project: ▪ 2,493 ground-borne vibration impacts Permanent ground-borne noise impacts from 2029 Plus Project conditions at 4th and King Street Station and approach: ▪ none Permanent ground-borne noise impacts from 2040 Plus Project: ▪ 18 ground-borne noise impacts	Permanent vibration impacts from 2029 Plus Project conditions at 4th and King Street Station and approach: ▪ none Permanent vibration impacts from 2040 Plus Project: Viaduct to I-880: ▪ 2,307 ground-borne vibration impacts Viaduct to Scott Boulevard: ▪ 2,366 ground-borne vibration impacts Same as Alternative A with respect to ground-borne noise impacts.

Resource Category	Operations Impacts	
	Alternative A	Alternative B
Electromagnetic Fields/Electromagnetic Interference		
Impact EMF/EMI#2: Permanent Human Exposure to Electromagnetic Fields	HSR operations would expose the general public and HSR employees to EMF inside and outside the system right-of-way. Inside the right-of-way, EMF exposure levels would be below the most restrictive MPE limits. Outside the right-of-way, EMF levels would not exceed the MPE thresholds for humans.	Same as Alternative A
Impact EMF/EMI#3: Exposure of People with Implanted Medical Devices to Electromagnetic Fields	EMF levels generated inside traction power distribution and interconnection facilities that serve the blended system, and produced by emergency standby generators would be above the recommended limits for people with implanted medical devices. EMF/EMI-IAMF#2: Controlling Electromagnetic Fields/Electromagnetic Interference, through the ISEP would avoid impacts by restricting the public and workers with implanted medical devices from accessing these facilities.	Same as Alternative A
Impact EMF/EMI#4: Interference with Sensitive Equipment	The RSA includes six medical or industrial/research facilities with sensitive equipment, five of which would be exposed to a magnetic shift of greater than 2 mG. As part of EMF/EMI-IAMF#2, the Authority would coordinate with third parties to identify sensitive equipment at the known receptors with sensitive equipment. Procedures and project design measures included in the EMCPP, ISEP, and HSR Design Criteria Manual, including performing tests to confirm equipment is not adversely affected, would avoid impacts.	The RSA includes seven facilities with sensitive equipment, five of which would be exposed to a magnetic shift of greater than 2 mG. Coordination with third parties would be the same as Alternative A.
Impact EMF/EMI#5: Electromagnetic Interference with Schools	Dedicated frequency blocks for the HSR system and compliance with FCC regulations for all HSR equipment would not generate interference at the 25 schools within the RSA of Alternative A.	Same as Alternative A
Impact EMF/EMI#6: Potential for Corrosion of Underground Pipelines, Cables, and Adjoining Rail	The project would ground adjacent ungrounded linear metal structures or insulate metallic pipes to prevent current flow that could result in corrosion.	Same as Alternative A
Impact EMF/EMI#7: Potential for Nuisance Shocks	The project would ground nearby ungrounded linear metal structures or insulate purposely electrified fences to prevent current flow.	Same as Alternative A

Resource Category	Operations Impacts	
	Alternative A	Alternative B
Impact EMF/EMI#8: Impacts on Adjacent Existing Rail Lines	PCJPB is replacing all track circuit types on adjoining rail lines such that adjacent rail signaling systems will not be susceptible to EMI. As specified in EMF/EMI-IAMF#1: Preventing Interference with Adjacent Railroads, project features include working with the engineering departments of adjacent parallel railroads to prevent interference from HSR-generated EMI.	Same as Alternative A
Impact EMF/EMI#9: Electromagnetic Interference with Airports	The project alternatives would pass within 1,000 feet of San Francisco International Airport and 1,600 feet of the Norman Y. Mineta San Jose International Airport. HSR communications equipment would use dedicated frequency allocations and relevant FAA engineering offices would be consulted during project design to confirm no interference.	Same as Alternative A
Public Utilities and Energy		
Public Utilities		
Impact PUE#8: Continuous Permanent Impacts from Water Use	Operation of the 4th and King Street Station, Millbrae Station, San Jose Diridon Station, and LMF would increase the water demand by up to 132,500 gallons per day. Project features would effectively recycle and reuse water where possible and reduce overall consumption.	Same as Alternative A
Impact PUE#9: Continuous Permanent Impacts from Wastewater Generation	Operation of the 4th and King Street Station, Millbrae Station, San Jose Diridon Station, and LMF would increase the amount of water that would be treated by up to 132,500 gallons per day. Wastewater would be disposed of properly and handled safely and would not exceed the available treatment capacity of local wastewater treatment plants.	Same as Alternative A
Impact PUE#10: Permanent Impacts on Storm Drainage Facilities	Operation of the project would include effective measures to manage and treat stormwater through the installation of infiltration or detention facilities and incorporation of permeable vegetated surfaces to accommodate increased rates and amount of runoff, and to increase infiltration and groundwater recharge.	Same as Alternative A

Resource Category	Operations Impacts	
	Alternative A	Alternative B
Impact PUE#11: Continuous Permanent Generation of Solid Waste and Hazardous Waste	Operation of the 4th and King Street Station, Millbrae Station, San Jose Diridon Station, and LMF would generate an additional 3,092 cubic yards per year of solid waste. The amount of hazardous waste generated from operation of the stations and the LMF would be less than the amount of nonhazardous solid waste generated from these facilities (3,092 cubic yards per year). Solid waste and hazardous waste generation from operations would not exceed available disposal capacity.	Same as Alternative A
Energy		
Impact PUE#13: Continuous Permanent Impacts from Energy Consumption during Operations	Operations would result in a net decrease in regional energy consumption of 6,188,240 MMBtu per year for the medium ridership scenario and a net decrease of 6,088,470 MMBtu per year for the high ridership scenario in 2040. It would take approximately 3.3 and 2.9 years of regional energy reductions to recoup the energy consumed during construction under the medium and high ridership scenarios, respectively. Operations would result in a net decrease in statewide energy consumption of 19,281,610 MMBtu per year for the medium ridership scenario and a net decrease of 28,108,780 MMBtu per year for the high ridership scenario in 2040. It would take approximately 0.85 and 1.0 year of statewide energy reductions to recoup the energy consumed during construction under the medium and high ridership scenarios, respectively.	Same as Alternative A, with the exception of the payback period for construction energy. It would take approximately 3.6 years of regional energy reductions to recoup the energy consumed during construction under the medium ridership scenario for Alternative B (both viaduct options). It would take approximately 3.2 and 3.1 years of regional energy consumption to recoup the energy consumed during construction under the high ridership scenarios, respectively for Alternative B (Viaduct to I-880) and Alternative B (Viaduct to Scott Boulevard). The payback period for statewide energy reductions would be 0.92 year for the medium ridership scenario and 1.1 years for the high ridership scenario for Alternative B (Viaduct to I-880) and would be 0.93 year for the medium ridership scenario and 1.1 years for the high ridership scenario for Alternative B (Viaduct to Scott Boulevard).
Biological and Aquatic Resources		
Impact BIO#12: Intermittent Disturbance of Habitat for Special-Status Plants during Operations	Operations activities would be a continuation of existing inspection and maintenance activities by Caltrain and are not expected to cause any new effects on habitat for special-status plants in and adjacent to the project footprint. Annual environmental awareness training for maintenance personnel would further reduce the likelihood of intermittent direct effects on special-status plants.	
Impact BIO#13: Intermittent Disturbance of Habitat for and Direct Mortality of Special-Status Wildlife during Operations	Operations activities would be a continuation of existing inspection and maintenance activities by Caltrain and are not expected to cause any new effects on habitat for special-status wildlife. The addition of HSR trains operating at speeds up to 110 mph would increase the mortality risk for special-status wildlife individuals with small body sizes that may still be able to access the project footprint. Annual environmental awareness training for maintenance personnel would reduce but not eliminate the likelihood of intermittent direct effects on special-status wildlife.	

Resource Category	Operations Impacts	
	Alternative A	Alternative B
Impact BIO#16: Intermittent Disturbance of Habitat for and Direct Mortality of Non-Special-Status Wildlife during Operations	Operations activities would be a continuation of existing inspection and maintenance activities by Caltrain and are not expected to introduce new mortality sources for non-special-status wildlife individuals in and adjacent to the project footprint. Annual environmental awareness training for maintenance personnel would further reduce the likelihood of intermittent direct effects on non-special-status wildlife.	
Impact BIO#18: Intermittent Disturbance of Special-Status Plant Communities during Operations	Operations activities would be a continuation of existing inspection and maintenance activities by Caltrain or conducted in areas that had already been subject to construction impacts and are expected to cause minor effects on special-status plant communities in and adjacent to the project footprint (trimming of arroyo willow thickets). Annual environmental awareness training for maintenance personnel would further reduce the likelihood of intermittent direct effects on special-status plant communities.	
Impact BIO#21: Intermittent Disturbance or Degradation of Aquatic Resources during Operations	Operations activities would be a continuation of existing inspection and maintenance activities by Caltrain. Permanently affected aquatic features in the project footprint would have been eliminated during construction, and therefore would not be affected further. Aquatic resources inside the project footprint that were avoided during construction (e.g., natural watercourses spanned by bridges) and outside but adjacent to the project footprint would remain and could potentially be affected by these activities. In addition, construction would result in the creation of new aquatic resources (e.g., constructed basins and watercourses for drainage) in some portions of the project footprint, and these features could also be affected.	
Impact BIO#23: Disturbance of Trees Protected under Municipal Tree Ordinances during Operations	Ongoing vegetation management within the electrical safety zone could result in temporary impacts (i.e., occasional trimming). Any protected trees requiring removal would have been removed during construction. The Authority would require that all workers attend WEAP training about sensitive biological resources, including protected trees.	
Impact BIO#25: Permanent Disruption of Wildlife Movement	Operations activities would have minimal impacts on wildlife corridors because any wildlife that use these corridors have adapted to these activities by becoming habituated to the regular occurrence of train traffic and O&M activities or by timing their movement outside peak activity periods.	
Hydrology and Water Resources		
Surface Water Hydrology		
Impact HYD#3: Intermittent Impacts on Drainage Patterns and Stormwater Runoff from Maintenance Activities during Operations	O&M activities would avoid substantial intermittent changes to drainage patterns and stormwater runoff. Approximately 56 aquatic resources would be intermittently affected during operations. The application of BMPs, a SWPPP under the IGP, and an O&M plan under the Phase II MS4 permit would avoid substantial potential impacts.	Impacts under Alternative B would be similar to Alternative A; however, O&M activities would occur in one more aquatic resource.

Resource Category	Operations Impacts	
	Alternative A	Alternative B
Surface Water Quality		
Impact HYD#6: Intermittent Impacts on Surface Water Quality from Maintenance Activities during Operations	Station and LMF activities, including mechanical train maintenance and the storage of chemicals, would avoid substantial changes in surface water quality. Materials storage areas at the LMF and TPFs would also be protected from flooding, as would materials storage areas at the LMF and TPFs. Bridge and culvert maintenance and vegetation management would result in minimal intermittent impacts on surface water quality during operation. These activities would occur in 56 aquatic resources. The design of stations and the LMF, a SWPPP under the IGP, and an O&M plan under the Phase II MS4 permit would avoid substantial impacts under Alternative A.	Impacts under Alternative B would be similar to Alternative A; however, O&M activities would occur in one more aquatic resource under Alternative B.
Impact HYD#7: Continuous Impacts on Surface Water Quality during Operations	Incremental increases in brake dust and PAHs released by trains during ongoing operation of the rail are anticipated to be deposited in 62 aquatic resources. Permanent stormwater treatment BMPs installed per the Phase II MS4 permit would avoid substantial impacts by implementing these measures to the maximum extent practicable using the best available technology.	Impacts under Alternative B would be similar to Alternative A; the same number of aquatic resources would be affected by brake dust and PAHs under Alternative A, but these impacts would occur in different aquatic resources.
Groundwater		
Impact HYD#10: Intermittent Impacts on Groundwater Quality and Volume from Maintenance Activities during Operations	Maintenance activities at the East Brisbane LMF as well as maintenance activities requiring dewatering would not substantially affect groundwater quality and volume. An industrial SWPPP, source control BMPs, an O&M plan that complies with the Phase II MS4 permit, and project features regarding the management, transport, and disposal of waste and materials would avoid substantial impacts on groundwater quality and volume.	Impacts under Alternative B would be the same as Alternative A, because maintenance activities at the West Brisbane LMF would occur in the same groundwater basins and subbasins.
Impact HYD#11: Continuous Impacts on Groundwater Quality and Volume during Operations	Brake dust and PAHs emitted by trains during operations would minimally affect groundwater quality during operations. Permanent stormwater treatment BMPs installed per the Phase II MS4 permit would avoid substantial impacts on groundwater quality and volume.	Impacts under Alternative B would be the same as Alternative A, because brake dust and PAHs would be deposited in the same groundwater basins and subbasins.

Resource Category	Operations Impacts	
	Alternative A	Alternative B
Floodplains		
Impact HYD#14: Intermittent Impacts on Floodplain Hydraulics from Maintenance Activities during Operations	O&M activities would require intermittent activities in floodplains delineated by FEMA. However, these activities would not be scheduled when flooding is predicted to occur. Therefore, intermittent impacts on floodplains would be avoided.	Same as Alternative A
Geology, Soils, Seismicity, and Paleontology		
Geology, Soils, and Seismicity		
Impact GEO#9: Primary Seismic Hazards during Operations	The project would apply seismic design standards in the structural design, use early warning systems triggered by strong ground motion, and shut down train operations during or after an earthquake, if necessary. These actions would minimize the potential for loss of life and structural damage from exposure to surface fault rupture.	Same as Alternative A
Impact GEO#10: Secondary Seismic Hazards during Operations	The project would assess geotechnical conditions and employ ground improvement methods and slope reinforcement, which would minimize the potential for loss of life and structural damage from exposure to secondary seismic hazards. The project would also employ an earthquake early warning system to stop operations, if necessary.	Same as Alternative A
Hazardous Materials and Wastes		
Hazardous Material and Waste Sources		
Impact HMW#12: Temporary and Intermittent Direct and Indirect Impacts from the Transport, Use, Storage, and Disposal of Hazardous Materials and Wastes during Operations	Because HSR is a passenger train system, it is anticipated that only small quantities of hazardous materials would be used and small quantities of hazardous wastes would be generated during operations. Accordingly, the storage, usage, and generation of hazardous materials and wastes would occur primarily at the LMF, which would have relevant BMPs in place to contain all hazardous materials and wastes within the Brisbane LMF.	Same as Alternative A

Resource Category	Operations Impacts	
	Alternative A	Alternative B
Hazardous Material and Waste Impacts on Sensitive Receptors		
Impact HMW#14: Intermittent Direct Impacts from Hazardous Material and Wastes Activities near Schools during Operations	Because HSR is a passenger train system, it is anticipated that only small quantities of hazardous materials would be used and small quantities of hazardous wastes would be generated during operations. The 66 school receptors within the RSA would not be exposed to diesel or fuel emissions from the passenger train operations itself. Accordingly, the storage, usage, and generation of hazardous materials and wastes would occur primarily at the Brisbane LMF, which would have relevant BMPs in place to contain all hazardous materials and wastes within the LMF.	Same as Alternative A
Safety and Security		
Emergency Response and Services		
Impact S&S#4: Need for Expansion of Existing Fire, Rescue, and Emergency Services Facilities	There would be no need for expansion of existing fire, rescue, and emergency service facilities because the project would include effective measures to minimize the incidence and potential consequences of incidents to which local emergency responders could be required to respond.	Same as Alternative A
Impact S&S#5: Continuous Permanent Direct Impacts on Emergency Access and Response Time Related to the HSR System	The project would not introduce new elevated viaducts or additional lengths of tunnel that would limit access of emergency service provided to the right-of-way, stations, or Brisbane LMF in the event of an incident. Project design features would include emergency operating procedures, SSP, SEPP, a fire and life safety program, and coordination with local emergency response providers, which would minimize potential impacts on emergency access by providing coordinated access to access-controlled areas and emergency operating procedures in the event of an emergency or evacuation.	Same as Alternative A

Resource Category	Operations Impacts	
	Alternative A	Alternative B
Impact S&S#6: Continuous Permanent Impacts on Emergency Access and Response Times Due to Station Traffic and Increased Gate-Down Time	The additional traffic at the 4th and King Street Station, the Millbrae Station, and the San Jose Diridon Station would result in potential delays in emergency vehicle response times for fire stations/first responders. The increase in gate-down time from added HSR trains would result in potential delays in emergency vehicle response times for fire stations/first responders in San Francisco, Millbrae, Burlingame, Redwood City, Menlo Park, Palo Alto, and Mountain View.	Same as Alternative A
Community Safety and Security		
Impact S&S#14: Permanent Exposure to Rail-Related Hazards	The project would increase the number, frequency, and speeds of trainsets operating within the Caltrain corridor. Alternative A would involve greater operation of the trains on 49 miles of blended track and would include 40 at-grade crossings. This would result in potentially slightly greater exposure to rail-related hazards for Alternative A than for Alternative B (both viaduct options). However, the design of the project would include safety elements, including an intrusion detection system for dedicated HSR facilities, to maximize operational safety and prevent train-to-train collisions or derailments, collisions between trains and objects, and at-grade crossing incidents involving vehicles, pedestrians, or bicyclists.	Alternative B would operate on blended system track within the Caltrain corridor for a shorter distance than Alternative A. Alternative B (Viaduct to I-880) would involve operation of trains on 45.6 miles of blended track, while Alternative B (Viaduct to Scott Boulevard) would involve operation of trains on 43 miles of blended track. Alternative B (both viaduct options) would include 38 at-grade crossings. This would result in potentially slightly lower exposure to rail-related hazards for Alternative B (both viaduct options) than Alternative A. The design of the project would include the same safety elements as Alternative A, and would also include an intrusion detection system for the dedicated HSR track in the San Jose Diridon Station Approach Subsection.
Impact S&S#15: Continuous Permanent Exposure to High-Risk Facilities and Fall Hazards	There would be 166 high-risk facilities within 2 miles of the project footprint and 79 tall structures within the RSA after completion of construction that could pose hazards to project operations for Alternative A. Based on the number of high-risk facilities and tall structures the exposure to high-risk facilities would be approximately the same for both alternatives, while the exposure to tall structures would be greater for Alternative A than Alternative B. The project would conduct a PHA and include the SSMP to minimize the potential for exposure to high-risk facilities and tall structures including bridges.	For Alternative B (both viaduct options) there would be 168 high-risk facilities and 71 tall structures within the RSA after completion of construction that could pose hazards to project operations. Based on the number of high-risk facilities and tall structures the exposure to high-risk facilities would be approximately the same for both alternatives, while the exposure to tall structures would be less for Alternative B (both viaduct options) than Alternative A. As per Alternative A, the project would conduct a PHA and include the SSMP.

Resource Category	Operations Impacts	
	Alternative A	Alternative B
Impact S&S#16: Continuous Permanent Exposure to Criminal and Terrorist Activity	The location of the East Brisbane LMF would not lead to heightened exposure to criminal or terrorist activity for this alternative. Operations would not lead to increased exposure to criminal or terrorist activity. A system security plan and SEPP would be implemented prior to commencing operations that would address deterrence and detection systems, and design standards and guidelines to accommodate emergency response access and provide for safe evacuation in the event of a criminal or terrorist act.	The location of the West Brisbane LMF and the passing track would not lead to heightened exposure to criminal or terrorist activity for this alternative. Operations would not lead to increased exposure to criminal or terrorist activity. A system security plan and SEPP would be implemented prior to commencing operations that would address deterrence and detection systems, and design standards and guidelines to accommodate emergency response access and provide for safe evacuation in the event of a criminal or terrorist act.
Impact S&S#17: Continuous Permanent Safety Hazards to Schools	The signal train control system, inspection and maintenance programs, and intrusion detection systems for dedicated HSR facilities, would minimize the safety risk at the 66 schools in the RSA for Alternative A.	Safety elements would be similar to Alternative A but would also include an intrusion detection system for the dedicated HSR track in the San Jose Diridon Station Approach Subsection.
Wildfire Hazards		
Impact S&S#19: Permanent Exposure to Wildfire Hazards	Alternative A would not be operated in any fire hazard severity zone within state responsibility areas, any very high fire hazard severity zone within local responsibility areas, or any wildland-urban interface fire area. The risk of fires during operations would be further minimized with the low use of flammable materials, and risks that could result in fire safety hazards would be effectively minimized through fire and life safety programs during operation of the project.	Same as Alternative A

Resource Category	Operations Impacts	
	Alternative A	Alternative B
Socioeconomics and Communities		
Communities and Neighborhoods		
Impact SOCIO#3: Permanent Disruption or Division of Established Communities from Project Operations	Overall, the HSR system in the long term would: ▪ Improve regional access, reduce travel times and VMT, and could reduce interregional traffic on regional roadways ▪ Cause localized increases in vehicle congestion and delay at intersections within all five subsections from increased traffic generated by project trips at the 4th and King Street Station, Millbrae Station, San Jose Diridon Station, and Brisbane LMF and increased total duration of gate-down events at at-grade crossings	Same as Alternative A
	Operation of the project in existing transportation corridors would result in: ▪ 1,758 severe and 4,296 moderate impacts in 2040, which would weaken community cohesion ▪ Some additional noise from parking facilities at HSR stations (Millbrae and San Jose Diridon), but it would be substantially lower than noise from HSR trains	Similar to Alternative A, except: ▪ 1,648 severe and 4,186 moderate impacts in 2040 under Alternative B (Viaduct to I-880) ▪ 1,628 severe and 4,141 moderate impacts in 2040 under Alternative B (Viaduct to Scott Boulevard)
	Operations would not degrade the visual environment because the project alternatives would operate in an existing rail corridor.	Similar to Alternative A, except: ▪ Different site of the LMF and passing track ▪ Operation of the viaduct through urban areas
Children's Health and Safety		
Impact SOCIO#6: Permanent Impacts on Children's Health and Safety from Project Operations	Project operations would: ▪ Not result in adverse long-term impacts on children's health and safety ▪ Subject facilities where children congregate to severe, intermittent noise effects of short duration ▪ Result in beneficial regional effects on air quality and would provide a safety benefit through the installation of four-quadrant gates to create a "sealed corridor" at at-grade crossings No disproportionate impacts on children's health and safety would occur.	Same as Alternative A

Resource Category	Operations Impacts	
	Alternative A	Alternative B
Economic Impacts		
Impact SOCIO#14: Permanent Impacts on Regional Employment	▪ 910 direct and indirect jobs annually would be provided ▪ 2,530 accessibility-based jobs would be located in the RSA ▪ 3,440 total jobs during operations	Same as Alternative A
Impact SOCIO#15: Permanent Impacts on Property Tax and Sales Tax Revenues	▪ Property values could decrease in some locations, particularly the more suburban areas, and increase in the more dense urban areas, particularly around the existing rail stations, given cities' desire for TOD. ▪ Residential areas, particularly in the vicinity of the LMF, could experience reduction in property values from increased light and noise and a perceived degradation of the visual character of the environment. ▪ Industrial properties are not anticipated to experience impacts on property values from HSR operations.	Same as Alternative A
	Sales taxes would increase in the RSA from materials being purchased by HSR riders and employees.	Same as Alternative A
Station Planning, Land Use, and Development		
Alteration of Land Use Patterns		
Impact LU#6: Permanent Alteration of Land Use Patterns from Increased Noise, Light and Glare	Project operations along the guideway and at stations would not generate substantial increases in noise or light and glare that would result in the alteration of existing land use patterns. Increased train service in Brisbane would result in noise levels that exceed Brisbane General Plan noise compatibility standards and could result in substantial change in planned land use patterns by moving development further from the mainline tracks. Operation of the Brisbane LMF would not substantially change planned land use patterns because project light and glare from the LMF would be minimized by lighting design features.	Same as Alternative A

Resource Category	Operations Impacts	
	Alternative A	Alternative B
Inducement of Population Growth beyond Planned Levels		
Impact LU#9: Permanent Induced Population Growth	Project operation is anticipated to generate 910 jobs (direct, indirect, and induced jobs), equivalent to a population increase of 1,660 people. Taking into consideration population growth associated with both increased accessibility and O&M employment, project operations are anticipated to generate induced growth of approximately 6,560 people within the three-county region by 2040. This would add about 0.15% to the region's population. Because the adopted station area and specific plans encourage TOD and plan for HSR service, project operation would not induce growth beyond planned levels.	Same as Alternative A
Parks, Recreation, and Open Space		
Parks, Recreation, and Open Space Resources		
Impact PK#7: Permanent Changes from Noise and Vibration on Parks, Recreation, and Open-Space Resource Character and Use	Operations would result in moderate operational noise impacts at five resources because of the increase in trains operating in the corridor and the associated increase in the frequency of warning horn sounding that would be more noticeable to park users, but would not prevent use of the resources. No vibration impacts would occur.	Same as Alternative A
Impact PK#8: Physical Alteration of Existing Facilities or a Need to Provide New Parks or Other Recreational Facilities, the Construction of Which Could Cause Significant Environmental Impact	No new parks or other recreational facilities would need to be built to accommodate demand.	Same as Alternative A
School District Play Areas		
Impact PK#14: Permanent Changes from Noise and Vibration on School District Play Area Character and Use	Operations would not result in a noise or vibration impacts at any school district play areas.	Same as Alternative A

Resource Category	Operations Impacts	
	Alternative A	Alternative B
Aesthetics and Visual Quality		
Visual Quality		
Impact AVQ#14: Indirect Impacts on Visual Quality from HSR Stations	Land use development around HSR stations in San Francisco, Millbrae, and San Jose would be expected to maintain the existing visual character of the community, through implementation of sound design principles in the Authority's "zone of responsibility" around each station, resulting in no impact on visual quality.	Same as Alternative A
Light and Glare		
Impact AVQ#17: Permanent Direct Impacts on Nighttime Light Levels at Fixed Locations	Alternative A would introduce new lighting at the Brisbane LMF, which would be visible from the residential areas on San Bruno Mountain. The new light from the Brisbane LMF would be less bright than other existing sources, such as traffic on US 101 or the skyline of southern San Francisco. Lighting from other fixed HSR facilities would be similar to light from existing Caltrain facilities.	Similar to Alternative A, except in the San Mateo–Redwood City Landscape Unit, where expanded, modified, and relocated Caltrain stations would result in station platform lighting at different locations, but similar to existing light levels.
Impact AVQ#18: Permanent Direct Impacts on Nighttime Light Levels from Trains	Light levels from operation of HSR trains would be similar to existing light from Caltrain and freight train operations.	Same as Alternative A
Cultural Resources		
Historic Built Resources		
Impact CUL#6: Intermittent Noise and Vibration Impacts on Built Resources Caused by Operations	0 built resources would be adversely affected	Same as Alternative A

Authority = California High-Speed Rail Authority
BAAQMD = Bay Area Air Quality Management District
Bay Area = San Francisco Bay Area
BMP = best management practice
C.F.R. = Code of Federal Regulations
CAAQS = California ambient air quality standards
CMP = construction management plan
CO = carbon monoxide
CO_2e = carbon dioxide equivalent
dB = decibel
dBA = A-weighted decibel
DPM = diesel particulate matter
EMCPP = Electromagnetic Compatibility Program Plan
EMF = electromagnetic field
EMI = electromagnetic interference
FAA = Federal Aviation Administration
FCC = Federal Communications Commission
FEMA = Federal Emergency Management Agency
FTA = Federal Transit Administration
GHG = greenhouse gas
HSR = high-speed rail
I- = Interstate
IGP = Industrial General Permit
ISEP = Implementation Stage Electromagnetic Compatibility Plan

L_{dn} = day-night sound level
LMF = light maintenance facility
LOS = level of service
mG = milligauss
MMBtu = million British thermal units
MPE = maximum permissible exposure
mph = miles per hour
MSAT = mobile source air toxics
MS4 = municipal separate storm sewer system
MT = metric ton
NAAQS = national ambient air quality standards
NO_X = nitrogen oxides
O&M = operations and maintenance
OCS = overhead contact system
PAH = polycyclic aromatic hydrocarbon
PCEP = Peninsula Corridor Electrification Project
PCJPB = Peninsula Corridor Joint Powers Board
PHA = preliminary hazard analysis
PTC = positive train control
PM_{10} = particulate matter smaller than or equal to 10 microns in diameter
$PM_{2.5}$ = particulate matter smaller than or equal to 2.5 microns in diameter
RSA = resource study area
SEPP = security and emergency preparedness plan
SFBAAB = San Francisco Bay Area Air Basin
SO_2 = sulfur dioxide
SSMP = safety and security management plan
SSP = system safety program
SWPPP = stormwater pollution prevention plan
TOD = transit-oriented development
TPF = traction power facility
US = U.S. Highway
VMT = vehicle miles traveled
VOC = volatile organic compounds
WEAP = worker environmental awareness program

S.8.4 Comparison of HSR Stations

As described in Section S.5.5, Station Area Development, HSR trains would stop at the existing 4th and King Street, Millbrae, and San Jose Diridon Stations under both project alternatives. Section S.8.3 provides a comparison of impacts for the project alternatives. As part of this comparison, Table S-4 and Table S-5 present all impacts from the project alternatives, including any impacts that are associated with construction or operation of the HSR stations.

As described in Section S.5.4.4, Diridon Design Variant, a design variant in the San Jose Diridon Station Approach Subsection is available that would allow for faster speeds in the approaches to and through the San Jose Diridon Station under Alternative A. The incremental differences in environmental impacts for Alternative A with the Diridon Design Variant compared to Alternative A without the Diridon Design Variant are summarized in Section 3.19.

S.8.5 Comparison of Maintenance Facilities

As described in Section S.5.6, Maintenance Facilities, there are two possible locations for the LMF. Section S.8.3 provides a comparison of impacts for the project alternatives. As part of this comparison, Table S-4 and Table S-5 present all impacts from the project alternatives, including any impacts that are associated with construction or operation of the LMF.

S.8.6 CEQA Summary of Impacts and Mitigation

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

- EMF/EMI
- Public utilities and energy
- Geology, soils, seismicity, and paleontological resources
- Socioeconomics and communities

Table S-6 describes significant CEQA impacts for each resource, summarizes the applicable mitigation measures, and indicates the level of significance after mitigation. This information is also provided for resources where cumulative impacts have been identified to which the project alternatives would considerably contribute.

Table S-6 CEQA Summary of Resources with Significant Impacts and Applicable Mitigation Measures

Resource Category	Significant (CEQA) Impacts before Mitigation[1]	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation[2]
Transportation			
Construction	Temporary Impacts on Bus Transit	No mitigation measures are available.	Significant and unavoidable for both alternatives.
	Temporary Impacts on Passenger Rail Operations	TR-MM#3: Implement Railway Disruption Control Plan	Less than significant for both alternatives.
	Temporary Impacts on Freight Rail Operations	TR-MM#3: Implement Railway Disruption Control Plan	Less than significant for both alternatives.
Operations	Continuous Permanent Impacts on Bus Services	TR-MM#2: Install Transit Priority Treatments	Significant and unavoidable for both alternatives for MUNI Route 55 at the 16th Street at-grade crossing, and for MUNI Routes 30 and 45 near the 4th and King Street Station while the interim HSR station is in operation. Less than significant for both alternatives for the SamTrans Route ECR along El Camino Real, SamTrans Route 296 at the Ravenswood Avenue at-grade crossing, and VTA Routes 181, 22, 64, and DASH.
	Continuous Permanent Impacts on Passenger Rail and Bus Access	TR-MM#4: Install San Carlos Station Pedestrian Improvements (Alternative B)	Less than significant for Alternative A. Significant and unavoidable for Alternative B.
	Continuous Permanent Impacts on Pedestrian and Bicycle Access	TR-MM#5: Contribute to 4th and King Street Station Pedestrian Improvements	Less than significant for both alternatives.
Air Quality and Global Climate Change[3]			
Construction	Temporary Direct and Indirect Impacts on Air Quality in the SFBAAB	AQ-MM#1: Offset Project Construction Emissions in the SFBAAB	Less than significant for both alternatives.
	Temporary Direct Impacts on Implementation of an Applicable Air Quality Plan	AQ-MM#1: Offset Project Construction Emissions in the SFBAAB	Less than significant for both alternatives.

Resource Category	Significant (CEQA) Impacts before Mitigation[1]	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation[2]
	Temporary Direct Impacts on Localized Air Quality—Criteria Pollutants	No mitigation measures are available.	Significant and unavoidable for both alternatives.
Noise and Vibration			
Construction	Temporary Exposure of Sensitive Receptors to Construction Noise	NV-MM#1: Construction Noise Mitigation Measures	Significant and unavoidable for both alternatives.
	Temporary Exposure of Sensitive Receptors and Buildings to Construction Vibration	NV-MM#2: Construction Vibration Mitigation Measures	Less than significant for both alternatives.
Operations	Intermittent Permanent Exposure of Sensitive Receptors to Noise from Operations	NV-MM#3: Implement Proposed California High-Speed Rail Project Noise Mitigation Guidelines NV-MM#4: Support Potential Implementation of Quiet Zones by Local Jurisdictions NV-MM#5: Vehicle Noise Specification NV-MM#6: Special Trackwork at Crossovers, Turnouts, and Insulated Joints NV-MM#7: Additional Noise Analysis during Final Design	Significant and unavoidable for both alternatives.
	Permanent Exposure of Sensitive Receptors to Vehicular Traffic Noise Increases	NV-MM#3: Implement Proposed California High-Speed Rail Project Noise Mitigation Guidelines NV-MM#7: Additional Noise Analysis during Final Design	Significant and unavoidable for both alternatives
	Traction Power Facility Noise	NV-MM#3: Implement Proposed California High-Speed Rail Project Noise Mitigation Guidelines NV-MM#7: Additional Noise Analysis during Final Design	Less than significant for both alternatives.
	Intermittent Permanent Exposure of Sensitive Receptors to Vibration from Operations	NV-MM#8: Project Vibration Mitigation Measures	Significant and unavoidable for both alternatives.

Resource Category	Significant (CEQA) Impacts before Mitigation[1]	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation[2]
Biological Resources and Wetlands			
Construction	Permanent Conversion or Degradation of Habitat for Special-Status Plant Species	BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan BIO-MM#2: Prepare and Implement a Weed Control Plan BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Establish and Implement a Compliance Reporting Program BIO-MM#6: Conduct Protocol-Level or Presence/Absence Pre-Construction Surveys for Special-Status Plant Species and Special-Status Plant Communities BIO-MM#7: Prepare and Implement Plan for Salvage, Relocation, or Propagation of Special-Status Plant Species BIO-MM#8: Prepare a Compensatory Mitigation Plan for Species and Species Habitat BIO-MM#9: Implement Measures to Minimize Impacts During Off-Site Habitat Restoration, or Enhancement, or Creation on Mitigation Sites BIO-MM#10: Compensate for Impacts on Listed Plant Species	Less than significant for both alternatives.
	Permanent Conversion of Habitat for and Direct Mortality of Listed Butterfly Species	BIO-MM#5: Establish and Implement a Compliance Reporting Program BIO-MM#8: Prepare a Compensatory Mitigation Plan for Species and Species Habitat BIO-MM#9: Implement Measures to Minimize Impacts During Off-Site Habitat Restoration, or Enhancement, or Creation on Mitigation Sites BIO-MM#11: Compensate for Impacts on Listed Butterfly Habitat (Alternative B)	Less than significant for Alternative B. No impact for Alternative A.

Resource Category	Significant (CEQA) Impacts before Mitigation[1]	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation[2]
	Permanent Conversion or Degradation of Habitat for and Direct Mortality of Central California Coast Steelhead, Pacific Lamprey, and Green Sturgeon, and Permanent Conversion or Degradation of Essential Fish Habitat	BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Establish and Implement a Compliance Reporting Program BIO-MM#8: Prepare a Compensatory Mitigation Plan for Species and Species Habitat BIO-MM#9: Implement Measures to Minimize Impacts During Off-Site Habitat Restoration, or Enhancement, or Creation on Mitigation Sites BIO-MM#12: Work Stoppage BIO-MM#13: Restore Temporary Riparian Habitat Impacts BIO-MM#14: Prepare Plan for Dewatering and Water Diversions BIO-MM#15: Prepare and Implement a Cofferdam Fish Rescue Plan BIO-MM#16: Prepare and Implement an Underwater Sound Control Plan BIO-MM#17: Provide Compensatory Mitigation for Permanent Impacts on Steelhead Habitat, Green Sturgeon Habitat, and Essential Fish Habitat	Less than significant for both alternatives.

Resource Category	Significant (CEQA) Impacts before Mitigation[1]	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation[2]
	Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Red-Legged Frog and Western Pond Turtle	BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Establish and Implement a Compliance Reporting Program BIO-MM#8: Prepare a Compensatory Mitigation Plan for Species and Species Habitat BIO-MM#9: Implement Measures to Minimize Impacts During Off-Site Habitat Restoration, or Enhancement, or Creation on Mitigation Sites BIO-MM#12: Work Stoppage BIO-MM#18: Conduct Pre-Construction Surveys for Special-Status Reptile and Amphibian Species BIO-MM#19: Implement Avoidance and Minimization Measures for Special-Status Reptile and Amphibian Species BIO-MM#20: Install San Francisco Garter Snake and California Red-Legged Frog Exclusion Fencing at SFO West-of-Bayshore Property BIO-MM#21: Compensate for Impacts on San Francisco Garter Snake and California Red-Legged Frog Habitat	Less than significant for both alternatives.

Resource Category	Significant (CEQA) Impacts before Mitigation[1]	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation[2]
	Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Francisco Garter Snake	BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Establish and Implement a Compliance Reporting Program BIO-MM#8: Prepare a Compensatory Mitigation Plan for Species and Species Habitat BIO-MM#9: Implement Measures to Minimize Impacts During Off-Site Habitat Restoration, or Enhancement, or Creation on Mitigation Sites BIO-MM#12: Work Stoppage BIO-MM#18: Conduct Pre-Construction Surveys for Special-Status Reptile and Amphibian Species BIO-MM#19: Implement Avoidance and Minimization Measures for Special-Status Reptile and Amphibian Species BIO-MM#20: Install San Francisco Garter Snake and California Red-Legged Frog Exclusion Fencing at SFO West-of-Bayshore Property BIO-MM#21: Compensate for Impacts on San Francisco Garter Snake and California Red-Legged Frog Habitat	Less than significant for both alternatives.

Resource Category	Significant (CEQA) Impacts before Mitigation[1]	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation[2]
	Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Burrowing Owl	BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan BIO-MM#2: Prepare and Implement a Weed Control Plan BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Establish and Implement a Compliance Reporting Program BIO-MM#8: Prepare a Compensatory Mitigation Plan for Species and Species Habitat BIO-MM#9: Implement Measures to Minimize Impacts During Off-Site Habitat Restoration, or Enhancement, or Creation on Mitigation Sites BIO-MM#12: Work Stoppage BIO-MM#22: Conduct Surveys for Burrowing Owls BIO-MM#23: Implement Avoidance and Minimization Measures for Burrowing Owls BIO-MM#24: Provide Compensatory Mitigation for Loss of Active Burrowing Owl Burrows and Habitat	Less than significant for both alternatives.
	Removal or Disturbance of Active Alameda Song Sparrow and Saltmarsh Common Yellowthroat Nests	BIO-MM#12: Work Stoppage BIO-MM#25: Conduct Pre-Construction Surveys and Delineate Active Nest Buffers Exclusion Areas for Breeding Birds	Less than significant for both alternatives.

Resource Category	Significant (CEQA) Impacts before Mitigation[1]	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation[2]
	Permanent Conversion and Degradation of Habitat for and Direct Mortality or Disturbance of Least Bell's Vireo, Yellow Warbler, and Tricolored Blackbird	BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan BIO-MM#2: Prepare and Implement a Weed Control Plan BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Establish and Implement a Compliance Reporting Program BIO-MM#8: Prepare a Compensatory Mitigation Plan for Species and Species Habitat BIO-MM#9: Implement Measures to Minimize Impacts During Off-Site Habitat Restoration or Enhancement, or Creation on Mitigation Sites BIO-MM#12: Work Stoppage BIO-MM#13: Restore Temporary Riparian Habitat Impacts BIO-MM#25: Conduct Pre-Construction Surveys and Delineate Active Nest Buffers Exclusion Areas for Breeding Birds BIO-MM#26: Conduct Pre-Construction Surveys and Implement Avoidance Measures for Active Tricolored Blackbird Nest Colonies BIO-MM#27: Provide Compensatory Mitigation for Impacts on Tricolored Blackbird Habitat	Less than significant for both alternatives.
	Removal or Disturbance of Active White-Tailed Kite Nests	BIO-MM#12: Work Stoppage BIO-MM#25: Conduct Pre-Construction Surveys and Delineate Active Nest Buffers Exclusion Areas for Breeding Birds	Less than significant for both alternatives.

Resource Category	Significant (CEQA) Impacts before Mitigation[1]	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation[2]
	Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Francisco Dusky-Footed Woodrat and Ringtail	BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan BIO-MM#2: Prepare and Implement a Weed Control Plan BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Establish and Implement a Compliance Reporting Program BIO-MM#12: Work Stoppage BIO-MM#13: Restore Temporary Riparian Habitat Impacts BIO-MM#28: Conduct Pre-Construction Surveys for Ringtail and Ringtail Den Sites and Implement Avoidance Measures BIO-MM#29: Conduct Pre-Construction Surveys for Dusky-Footed Woodrat and Implement Avoidance Measures	Less than significant for both alternatives.
	Removal of Roost Sites for and Direct Mortality or Disturbance of Special-Status Bats	BIO-MM#30: Conduct Pre-Construction Surveys for Special-Status Bat Species BIO-MM#31: Implement Bat Avoidance and Relocation Measures BIO-MM#32: Implement Bat Exclusion and Deterrence Measures	Less than significant for both alternatives.
	Permanent Conversion or Degradation of Special-Status Plant Communities	BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan BIO-MM#2: Prepare and Implement a Weed Control Plan BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Establish and Implement a Compliance Reporting Program BIO-MM#6: Conduct Protocol-Level or Presence/Absence Pre-Construction Surveys for Special-Status Plant Species and Special-Status Plant Communities BIO-MM#13: Restore Temporary Riparian Habitat Impacts BIO-MM#35: Provide Compensatory Mitigation for Permanent Impacts on Riparian Habitat BIO-MM#36: Restore Aquatic Resources Subject to Temporary Impacts BIO-MM#37: Prepare and Implement a Compensatory Mitigation Plan for Impacts on Aquatic Resources	Less than significant for both alternatives.

Resource Category	Significant (CEQA) Impacts before Mitigation[1]	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation[2]
	Permanent Conversion or Degradation of Aquatic Resources Considered Jurisdictional under Section 404 of the Federal Clean Water Act and the State Porter-Cologne Act, or under Section 10 of the Rivers and Harbors Act	BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan BIO-MM#2: Prepare and Implement a Weed Control Plan BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Establish and Implement a Compliance Reporting Program BIO-MM#13: Restore Temporary Riparian Habitat Impacts BIO-MM#35: Provide Compensatory Mitigation for Permanent Impacts on Riparian Habitat BIO-MM36: Restore Aquatic Resources Subject to Temporary Impacts BIO-MM#37: Prepare and Implement a Compensatory Mitigation Plan for Impacts on Aquatic Resources	Less than significant for both alternatives.
	Permanent Conversion or Degradation of Aquatic Resources, including Riparian Communities, Subject to Notification under California Fish and Game Code Section 1600 et seq.	BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan BIO-MM#2: Prepare and Implement a Weed Control Plan BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Establish and Implement a Compliance Reporting Program BIO-MM#13: Restore Temporary Riparian Habitat Impacts BIO-MM#35: Provide Compensatory Mitigation for Permanent Impacts on Riparian Habitat BIO-MM#36: Restore Aquatic Resources Subject to Temporary Impacts BIO-MM#37: Prepare and Implement a Compensatory Mitigation Plan for Impacts on Aquatic Resources	Less than significant for both alternatives.
	Removal of Trees Protected under Municipal Tree Ordinances	BIO-MM#39: Implement Transplantation and Compensatory Mitigation Measures for Protected Trees	Less than significant for both alternatives.

Resource Category	Significant (CEQA) Impacts before Mitigation[1]	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation[2]
Operation	Intermittent Disturbance of Habitat for and Direct Mortality of Special-Status Wildlife during Operations	BIO-MM#33: Install Aprons or Barriers within Security Fencing BIO-MM#34: Minimize Permanent Intermittent Impacts on Aerial Species Movement	Less than significant for both alternatives.
	Intermittent Disturbance or Degradation of Aquatic Resources during Operations	BIO-MM#38: Prepare and Implement an Annual Vegetation Control Plan	Less than significant for both alternatives.
Hydrology and Water Resources			
Construction	Temporary Impacts on Surface Water Quality during Construction	BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#13: Restore Temporary Riparian Habitat Impacts BIO-MM#14: Prepare Plan for Dewatering and Water Diversions BIO-MM#36: Restore Aquatic Resources Subject to Temporary Impacts BIO-MM#37: Prepare and Implement a Compensatory Mitigation Plan for Impacts on Aquatic Resources	Less than significant for both alternatives.
	Permanent Impacts on Surface Water Quality	BIO-MM#35: Provide Compensatory Mitigation for Permanent Impacts on Riparian Habitat BIO-MM#37: Prepare and Implement a Compensatory Mitigation Plan for Impacts on Aquatic Resources	Less than significant for both alternatives.
	Permanent Impacts on Floodplain Hydraulics	HYD-MM#1: Maintain Existing 100-Year Water Surface Elevations of Guadalupe River in San Jose (Alternative A)	Less than significant for both alternatives.
Hazardous Materials and Wastes			
Construction	Intermittent Direct Impacts from Hazardous Material and Waste Activities near Schools during Construction	HMW-MM#1: Limit Use of Extremely Hazardous Materials near Schools during construction	Less than significant for both alternatives.

Resource Category	Significant (CEQA) Impacts before Mitigation[1]	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation[2]
Safety and Security			
Construction	Temporary Impacts on Emergency Access and Response Times from Temporary Road Closures, Relocations, and Modifications	SS-MM#1: Construction Traffic Management for Passing Track Section (Alternative B)	Significant and unavoidable for Alternatives A and B (by jurisdiction): Brisbane: Tunnel Avenue realignment construction (Alternative A) Brisbane: Tunnel Avenue overpass relocation construction (Alternatives A and B) San Mateo, Belmont, San Carlos, and Redwood City: Passing track construction and associated modification of 10 underpasses (Alternative B)
	Permanent Impacts on Emergency Access and Response Times Caused by Construction	SS-MM#2: Modify Driveway Access Control for Relocated Brisbane Fire Station (Alternative B)	Less than significant for both alternatives.

Resource Category	Significant (CEQA) Impacts before Mitigation[1]	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation[2]
Operations	Continuous Permanent Impacts on Emergency Access and Response Times due to Station Traffic and Increased Gate-Down Time	SS-MM#3: Install Emergency Vehicle Priority Treatments near HSR Stations SS-MM#4: Install Emergency Vehicle Priority Treatments Related to Increased Gate-Down Time Impacts	Significant and unavoidable for Alternatives A and B (by jurisdiction): Burlingame (fire station/first responder access impacts): Area east of rail corridor bounded by Oak Grove to Howard Lane crossings if City of Burlingame chooses not to construct and operate emergency vehicle priority treatments. Redwood City (fire station/first responder impact): Area west of rail corridor from Whipple Avenue crossing to Broadway if Redwood City chooses not to construct and operate emergency vehicle priority treatments. Menlo Park (fire station/first responder impact): Area east of Ravenswood Avenue if City of Menlo Park chooses not to construct and operate emergency vehicle priority treatments. Mountain View (fire station/first responder impact): Area west of rail corridor adjacent to Rengstorff Avenue if City of Mountain View chooses not to construct and operate emergency vehicle priority treatments. Less than significant with implementation of mitigation measures at other locations.

Resource Category	Significant (CEQA) Impacts before Mitigation[1]	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation[2]
Station Planning, Land Use, and Development			
Construction	Permanent Alteration of Land Use Patterns from Land Use Conversion and Introduction of Incompatible Uses at Stations	No mitigation measures are available.	Significant and unavoidable for both alternatives.
	Permanent Alteration of Land Use Patterns from Land Use Conversion at the Brisbane Light Maintenance Facility	No mitigation measures are available.	Significant and unavoidable for both alternatives.
	Conflict with BCDC Shoreline Band Policies	LU-MM#2: Relocate Lagoon Road to Avoid Priority Use Areas within BCDC's Jurisdiction LU-MM#3: Shoreline Access Improvements in Brisbane	Less than significant for both alternatives.
Operations	Permanent Alteration of Land Use Patterns from Increased Noise, Light and Glare	LU-MM#1: Implement Noise Mitigation in Conjunction with Land Use Development in Brisbane	Less than significant for both alternatives.
Parks, Recreation, and Open Space			
Construction	Temporary Changes to Access to or Use of Parks	PK-MM#1: Provide Access to Trails and Parks during Construction (Alternative B) PK-MM#3: Implement Project Design Features (Alternative B)	Less than significant for both alternatives.
	Permanent Changes Affecting Access to or Circulation in Parks, Recreational Facilities, and Open-Space Resources	PK-MM#2: Provide Permanent Park Access (Alternative B) PK-MM#3: Implement Project Design Features (Alternative B)	Less than significant for both alternatives.
	Permanent Acquisition of Parks, Recreation, and Open Space Resources	PK-MM#4: Design Refinements to Avoid Aboveground Park Encroachment at Tamien Park (Alternative B)	Less than significant for both alternatives.

Resource Category	Significant (CEQA) Impacts before Mitigation[1]	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation[2]
Aesthetics and Visual Quality			
Construction	Temporary Direct Impacts on Visual Quality and Scenic Vistas	AVQ-MM#1: Minimize Visual Disruption from Construction Activities (Alternative B) AVQ-MM#2: Minimize Light Disturbance during Construction (Alternative B)	Less than significant for both alternatives.
	Permanent Direct Impacts on Visual Quality—San Mateo-Redwood City Landscape Unit	AVQ-MM#3: Incorporate Design Aesthetic Preferences into Final Design and Construction of Non-Station Structures (Alternative B) AVQ-MM#4: Provide Vegetation Screening along At-Grade and Elevated Guideways Adjacent to Residential Areas (Alternative B) AVQ-MM#5: Replant Unused Portions of Lands Acquired for the HSR (Alternative B)	Less than significant for both alternatives.
Cultural Resources			
Construction	Permanent Disturbance of Unknown Archaeological Resources	CUL-MM#1: Mitigate Adverse Effects on Archaeological and Built Resources Identified during Phased Identification and Comply with the Stipulations Regarding the Treatment of Archaeological and Historic Built Resources in the PA and MOA CUL-MM#2: Halt Work in the Event of an Archaeological Discovery, and Comply with the PA, MOA, ATP, and all State and Federal Laws, as Applicable CUL-MM#3: Other Mitigation for Effects on NRHP-Eligible Pre-Contact Archaeological Resources	Less than significant for both alternatives.
	Permanent Disturbance of a Known Archaeological Resource	CUL-MM#1: Mitigate Adverse Effects on Archaeological and Built Resources Identified during Phased Identification and Comply with the Stipulations Regarding the Treatment of Archaeological and Historic Built Resources in the PA and MOA CUL-MM#2: Halt Work in the Event of an Archaeological Discovery, and Comply with the PA, MOA, ATP, and all State and Federal Laws, as Applicable CUL-MM#3: Other Mitigation for Effects on NRHP-Eligible Pre-Contact Archaeological Resources	Less than significant for both alternatives.

Resource Category	Significant (CEQA) Impacts before Mitigation[1]	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation[2]
	Permanent Demolition, Destruction, Relocation, or Alteration of Built Resources or Setting	CUL-MM#6: Prepare and Submit Additional Recordation and Documentation CUL-MM#7: Prepare Interpretive or Educational Materials CUL-MM#10: Station Design Consistent with the Secretary of the Interior's Standards for the Treatment of Historic Properties CUL-MM#11: Relocate Auto Train Control to Avoid Demolition of 415 Illinois Avenue	Significant and unavoidable for both alternatives.

ATP = archaeological treatment plan
CEQA = California Environmental Quality Act
HSR = high-speed rail
LMF = light maintenance facility
MOA = Memorandum of Agreement
MUNI = San Francisco Municipal Railway
NRHP = National Register of Historic Places
PA = Programmatic Agreement
SamTrans = San Mateo County Transit District
SFO = San Francisco International Airport
VTA = Santa Clara Valley Transportation Authority
[1] The determination before mitigation for the consideration of cumulative impacts is cumulatively significant.
[2] The determination after mitigation would be either cumulatively considerable or not cumulatively considerable under CEQA.

Table S-7 Significant and Unavoidable Impacts After Mitigation by Alternative

Project Alternative	Number of Significant and Unavoidable Impacts
Alternative A	12
Alternative B	13

S.8.7 Capital and Operations Costs

Capital costs represent the total cost associated with the design, management, land acquisition, and construction of the HSR system. The alignments would be approximately 49 miles and are estimated to have construction costs from $4,253 million to $6,858 million (2018$). The total estimated capital costs for each alternative are presented in Table S-8. For additional information on costs, see Chapter 6, Project Costs and Operations, in the Draft EIR/EIS.

Table S-8 Capital Cost by Alternative (2018$, in millions)

Alternative	Cost
Alternative A	$4,253
Alternative B[1]	$6,128/$6,858

I- = Interstate
[1] Values are presented for Alternative B (Viaduct to I-880) first, followed by Alternative B (Viaduct to Scott Boulevard).

S.9 Section 4(f) and Section 6(f)

S.9.1 Section 4(f)

Under Section 4(f) of the U.S. Department of Transportation Act (codified at 49 U.S.C. § 303), an operating administration of the U.S. Department of Transportation may not approve a project that uses properties protected under this section of the law unless there are no prudent or feasible alternatives and the project includes all possible planning to minimize harm to such properties. Properties protected under Section 4(f) are publicly owned lands of a park, recreation area, or wildlife and waterfowl refuge, or a historical site (publicly or privately owned), that is listed or determined eligible for listing in the National Register of Historic Places (NRHP).

What are Section 4(f) properties?

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

There are 170 Section 4(f) resources in the RSAs for recreational and cultural resources: 143 parks, recreational facilities, open-space resources, and school district play areas, and 27 historical resources.

Alternative A and Alternative B (Viaduct to I-880) would result in the use of two Section 4(f) resources, while Alternative B (Viaduct to Scott Boulevard) would use three Section 4(f) recreational resources. Of the 27 NRHP-listed or -eligible historic properties in the RSA, Alternative A would use 1 historic property and Alternative B would use 2 historic properties.

The Authority is continuing coordination, as appropriate, with the State Historic Preservation Officer. During final design, additional measures to minimize harm may be agreed on to further reduce potential impacts on Section 4(f) properties. For additional information, see Chapter 4, Section 4(f) and Section 6(f) Evaluations.

S.9.2 Section 6(f)

Section 6(f) properties are recreation resources funded by the Land and Water Conservation Fund Act. Land purchased or improved with these funds cannot be converted to nonrecreation use without coordination with the National Park Service and mitigation that includes replacement of the quality and quantity of land used. Eight Section 6(f)-protected properties were identified within the RSA. The project alternatives would not require permanent or temporary acquisition of land from any of the Section 6(f) properties. In addition, construction activities would not occur within any of the resources. Therefore, no impacts on Section 6(f) resources would occur.

S.10 Environmental Justice

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

- Would be predominantly borne by minority populations or low-income populations, or
- Would be suffered by minority populations and low-income populations and would be appreciably more severe or greater in magnitude than the adverse effect suffered by the non-low-income and non-minority populations in the affected area and the reference community.

Laws and Regulations that Govern Environmental Justice:

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

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

As documented in Chapter 5, Environmental Justice, there are minority populations and low-income populations throughout the environmental justice RSA. Concentrations of minority populations or low-income populations are greater than the reference community in San Francisco, Daly City, South San Francisco, San Bruno, San Mateo, Redwood City, North Fair Oaks, Mountain View, Sunnyvale, Santa Clara, and San Jose. The project alternatives would result in local and regional benefits to the low-income populations and minority populations. These benefits would include improvements in mobility within the region, air quality improvements, safety improvements for vehicles and pedestrians along the Caltrain corridor, and new employment opportunities during construction and operations.

The design of the project alternatives would minimize or avoid impacts related to health risks associated with air quality (operations); EMF and EMI; public utilities and energy; geology, soils, seismicity, and paleontological resources; biological and aquatic resources; water quality; community safety and security; community cohesion; and station planning, land use, and development. These topics do not have the potential to adversely affect low-income and minority populations (see discussion of these resource topics in Chapter 5).

Project effects associated with emergency vehicle access/response times, aesthetics and visual quality, hazardous materials and wastes, parks, recreation, and school district play areas, and disturbance or destruction of cultural resources were determined to have adverse effects on populations, including minority populations and low-income populations, which were addressed through resource-specific mitigation. For these resource topics, the proposed mitigation would be applied equally to minority populations and low-income populations and the general population as a whole, and was responsive to the concerns raised during the environmental justice engagement process.

Overall, the project would result in a limited set of adverse impacts on minority and low-income populations residing or conducting business in the project corridor. These impacts are expected to be similar in kind and magnitude as those that would be experienced by the general population living or working along the corridor, and would be offset by the project benefits. Project benefits including safety improvements along the Caltrain corridor, increased transit connectivity, jobs, and air quality improvements would accrue to minority populations and low-income populations, and the general population within the corridor. As a result, there would be no disproportionate adverse effects on minority populations and low-income populations.

S.11 Areas of Controversy

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

- Alignment and station planning
- Design and public safety
- Construction impacts
- Right-of-way and impacts on property values
- Community quality of life and connectivity
- Location of LMF and potential passing tracks
- Noise and vibration
- Visual impacts

S.12 Environmental Process

The Authority is circulating the Draft EIR/EIS to affected local jurisdictions, state and federal agencies, tribes, community organizations, other interest groups, interested individuals, and the public. The Authority has posted this Draft EIR/EIS on its website (www.hsr.ca.gov). Printed and/or electronic copies of the Draft EIR/EIS and electronic copies of associated technical reports are available at the repository locations listed in Chapter 10, Distribution List, the Authority's Northern California Regional Office at 100 Paseo de San Antonio, Suite 300, San Jose, CA 95113, and the Authority's Headquarters at 770 L Street, Suite 620 MS-1, Sacramento, CA 95814. A copy of the Draft EIR/EIS may also be requested by calling (800) 435-8670. The following discussion outlines the steps in the environmental process, from public and agency comment on the Draft EIR/EIS to construction and operations.

S.12.1 Public and Agency Comment

The Draft EIR/EIS is being circulated for a minimum 45-day review and comment period, which includes open houses and one public hearing. Information about the schedule of public meetings and hearings is available on the Authority's website.

S.12.2 Identification of Preferred Alternative

The Authority identified Alternative A as the Preferred Alternative for the project on the basis of a balanced consideration of the environmental information presented in the Draft EIR/EIS in the context of Purpose and Need; project objectives; CEQA, NEPA, and Section 404(b)(1) requirements; regional and local land use plans; community preferences; and costs.

Preferred Alternative

The alternative identified as preferred by the lead agencies. For the San Francisco to San Jose Project Section, Alternative A is the Preferred Alternative.

The Authority identified the Preferred Alternative that the agencies believe would fulfill their statutory missions and responsibilities by giving consideration to economic, environmental, technical, and other factors. The Authority identified the Preferred Alternative by balancing the adverse and beneficial impacts of the project on the human and natural environment. Taking this holistic approach means that no single issue was decisive in identifying the Preferred Alternative in any given geographic area. The Authority weighed all the issues—including natural resource and community impacts, the input of the communities along the route, the views of federal and state resource agencies, and project costs—to identify what both agencies believe is the best alternative to achieve the project's Purpose and Need.

Table S-9 shows the individual impacts of the alternatives after mitigation based on the environmental analysis in the Draft EIR/EIS. The best-performing alternative is highlighted in **bold** and denoted with an asterisk (*). This table provides information on the environmental topics where the project alternatives differ substantively; it does not focus on resource topics where the potential impacts of the project alternatives are similar.

Table S-9 Community and Environmental Factors by Alternative

Effects	Alternative A	Alternative B[1]
Community Factors		
Displacements		
Residential displacements (# of units)	**14***	42/62
Commercial and industrial displacements (# of units)	**48***	171/202
Community and public facilities displacement (# of units)	**3***	6/7
Aesthetics and Visual Quality		
Visual quality effects	**At-grade alignment** **Existing right-of-way***	▪ 6-mile-long passing track ▪ 4 miles (Viaduct to I-880) or 6 miles (Viaduct to Scott Boulevard) of aerial viaducts and station in downtown San Jose
Land Use and Development		
Permanent Alteration of Land Use Patterns at Brisbane Light Maintenance Facility	**The East Brisbane LMF would not affect Icehouse Hill.** **The East Brisbane LMF would reduce the area of planned development at Brisbane Baylands by:** ▪ **Planned development (residential prohibited): 93 acres** ▪ **Planned development (residential permitted): 2 acres***	The West Brisbane LMF would grade Icehouse Hill, an area designated for preservation by the 2018 Brisbane General Plan Amendment (City of Brisbane 2018). This would be considered a permanent and significant alteration of an existing land use. The West Brisbane LMF would reduce the area of planned land uses at Brisbane Baylands by: ▪ Planned development (residential prohibited): 90 acres ▪ Planned development (residential permitted): 21 acres Implementation of the West Brisbane LMF would have a greater effect on development of planned residential units.

Effects	Alternative A	Alternative B[1]
Transportation		
Pedestrian access from Downtown San Carlos to Caltrain Station	**No change***	Reduced pedestrian access due to the relocation of the station approximately 2,260 feet south of current location.
Emergency Vehicle Access/Response Times		
Temporary impacts in emergency vehicle access/response times due to temporary road closures	**Temporary road closures would result in delays in emergency vehicle access and increases in response times.***	There would be more temporary road closures under Alternative B because of passing track construction. They would create more disruptions to emergency vehicle access thereby generating greater delays and increases in response times than under Alternative A.
Noise		
Severe noise impacts with noise barrier mitigation (# of sensitive receptors)	482	455/**452***
Severe noise impacts with noise barrier mitigation and if local municipalities implement quiet zones[2] (# of sensitive receptors)	254	237/**234***
Environmental Factors		
Aquatic Resources[3]		
Direct impacts on jurisdictional aquatic resources[4] (acres)	**13.2***	18.1
Biological Resources (Special-Status Species Habitat)		
Direct impacts on habitat for special-status plant species (non-overlapping acres)	110.3	**57.9***/58.7
Direct impacts on suitable habitat for three listed butterflies (acres)	**0.0***	8.0
Direct impacts on central California coast steelhead habitat (acres)	3.0	**2.0***
Direct impacts on green sturgeon habitat (acres)	1.9	**1.2***
Direct impacts on Pacific lamprey habitat (acres)	**2.4***	3.0
Direct impacts on essential fish habitat for Chinook Pacific Coast salmon (acres)	5.3	**4.0***
Direct impacts on essential fish habitat for Pacific Coast groundfish (acres)	2.2	**1.4***

Effects	Alternative A	Alternative B[1]
Direct impacts on California red-legged frog habitat (acres)	**13.6***	15.3
Direct impacts on western pond turtle habitat (acres)	**45.6***	73.7/72.9
Direct impacts on burrowing owl habitat (acres)	128.0	**96.0***/96.9
Direct impacts on saltmarsh common yellowthroat habitat (acres)	**4.8***	10.0
Direct impacts on least Bell's vireo habitat (acres)	**2.1***	3.6
Direct impacts on yellow warbler habitat (acres)	**0.8***	2.6
Direct impacts on tricolored blackbird habitat (acres)	11.7	**4.7***/5.6
Direct impacts on white-tailed kite nesting habitat (acres)	23.2	**20.5***/28.2
Direct impacts on San Francisco dusky-footed woodrat and ringtail habitat (acres)	**0.8***	2.7/10.4
Direct impacts on pallid bat and Townsend's big-eared bat roosting habitat (acres)	1.5	**1.3***
Direct impacts on western red bat roosting habitat (acres)	**11.0***	14.0/21.6
Section 4(f)/6(f) Resources		
Permanent use (*de minimis)* of park resources (# of resources)	**2***	**2***/3
Built Environment Historic Resources		
Number of permanent adverse effects on NRHP-listed/eligible resources (# of resources)	**1***	2/3
Number of permanent significant impacts on CEQA-only historic resources (# of resources)	**1***	**1***

CEQA = California Environmental Quality Act
FRA = Federal Railroad Administration
I- = Interstate
LMF = light maintenance facility
NRHP = National Register of Historic Places
Bold values denoted with an asterisk (*) identify the best-performing alternative(s).
[1] Where applicable, values are presented for Alternative B (Viaduct to I-880) first, followed by Alternative B (Viaduct to Scott Boulevard). If only one value is presented, the value would be identical under the Viaduct to I-880 and Viaduct to Scott Boulevard options.
[2] A *quiet zone* is an area in which an FRA exemption has been granted to the rule requiring trains to sound their horns when approaching public highway-rail grade crossings. A quiet zone is a section of rail line at least 0.5 mile in length that contains one or more consecutive public grade crossings or a single public grade crossing at which locomotive horns are not routinely sounded. Only local cities and counties can request establishment of a quiet zone through the FRA.
[3] Acreages represent estimates of direct (temporary and permanent) impacts on a given resource.
[4] Includes aquatic resources considered jurisdictional under Section 404 of the federal Clean Water Act or the Porter-Cologne Act.

The Authority staff identified Alternative A as the Preferred Alternative in June 2019 based on the analysis contained in this Draft EIR/EIS and the input from the public; local, state, and federal agencies; businesses; tribes; and organizations. Subsequent public outreach meetings were held in July and August 2019 to solicit input on the Preferred Alternative. A staff report was presented to the Authority Board of Directors at their September 17, 2019, meeting that summarized information on the project alternatives and public, agency, and other stakeholder input. The Board of Directors considered the staff report and input from public testimony at the September 17, 2019 meeting and concurred with the identification of Alternative A as the Preferred Alternative for the San Francisco to San Jose Project Section. As part of ongoing design optimization, Authority staff have identified a design variant (the Diridon Design Variant) to allow for higher speeds that is applicable to Alternative A. The Authority will consider whether to formally adopt Alternative A (with or without the Diridon Design Variant) or another project alternative as the selected alternative for the project after the release of the Draft EIR/EIS, consideration of comments on the Draft EIR/EIS, and preparation and certification of the Final EIR/EIS.

S.13 Next Steps in the Environmental Process

S.13.1 California High-Speed Rail Authority Decision-Making

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

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

If the Authority proceeds with approval of the project, the Authority would file a Notice of Determination (NOD) that identifies the project and notes whether the project would have a significant impact on the environment. If the Authority approves a project that would result in the occurrence of a significant impact identified in the Final EIR but not avoided or substantially lessened, CEQA requires the preparation of a Statement of Overriding Considerations. This statement provides specific reasons to support the project, including economic, legal, social, technological, or other benefits of the proposed project that outweigh adverse environmental impacts. If such a statement is prepared, the Authority's NOD will reference the statement.

The environmental process under NEPA is completed with publication of a Final EIR/EIS and a Record of Decision (ROD). Pursuant to 23 U.S.C. Section 327 and the Assignment MOU, the Authority is the NEPA lead agency. As such, if the Authority proceeds with approval of the project, it will issue a ROD. The ROD would describe the project and alternatives considered, describe the selected alternative, and identify the environmentally preferable alternative; make environmental findings and determinations with regard to the federal Endangered Species Act, Section 106, Section 4(f), and environmental justice; and identify any required mitigation measures.

S.13.2 Federal Railroad Administration Decision-Making

As established in the Assignment MOU, the FRA will make findings and determinations with regard to air quality conformity under the Clean Air Act.

S.13.3 U.S. Army Corps of Engineers Decision-Making

Construction of the project would require a permit from the USACE under Section 404 of the CWA (33 U.S.C. § 1251 et seq.), Section 10 of the Rivers and Harbors Act (33 U.S.C. § 403), and Section 14 of the Rivers and Harbors Act (33 U.S.C. § 408). The USACE is using the Draft EIR/EIS to integrate procedural and substantive requirements of NEPA and its permitting responsibilities (including the USEPA's Section 404(b)(1) Guidelines) to provide a single document that streamlines and enables informed decision-making, including but not limited to adoption of the EIS, issuance of necessary RODs, Section 404 permit decisions, Section 10 permit decisions, and Section 408 permit decisions (as applicable). This single document can be used for alteration/modification of completed federal flood risk management facilities and any associated O&M, and real estate permissions or instruments (as applicable).

S.13.4 Surface Transportation Board Decision-Making

The Authority will seek STB permission to build the San Francisco to San Jose Project Section. On completion of the environmental process and issuance of a ROD and upon request from the Authority, the STB is anticipated to issue a final decision on whether to approve the project (the final decision also serves as the STB's ROD under NEPA). No project-related construction on the Project Section may begin until the STB's final decision has been issued and has become effective.

S.13.5 Project Implementation

Table S-10 shows the anticipated dates for completion of key milestones as part of the environmental process. After the issuance of the ROD and the NOD, the Authority would complete final design, obtain construction permits, and acquire property before construction.

Table S-10 San Francisco to San Jose Project Section Milestone Schedule

Date	Key Milestones
July 2020	Public release of Draft EIR/EIS
July 2021	Final EIR/EIS published
August 2021	Notice of Determination and Record of Decision

EIR = environmental impact report
EIS = environmental impact statement