

California High-Speed Rail Authority

San Francisco to San Jose Project Section

Final Environmental Impact Report/
Environmental Impact Statement

Summary

June 2022



The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being or have been carried out by the State of California pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated July 23, 2019, and executed by the Federal Railroad Administration and the State of California.

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ACRONYMS AND ABBREVIATIONS

Authority	California High-Speed Rail Authority
BAAQMD	Bay Area Air Quality Management District
Bay Area	San Francisco Bay Area
BCDC	San Francisco Bay Conservation and Development Commission
CDOF	California Department of Finance
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CO ₂ e	carbon dioxide equivalent
CWA	Clean Water Act
DDV	Diridon Design Variant
EIR	environmental impact report
EIS	environmental impact statement
EMF	electromagnetic field
EMI	electromagnetic interference
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulation
FRA	Federal Railroad Administration
GHG	greenhouse gas
HSR	high-speed rail
I-	Interstate
IAMF	impact avoidance and minimization feature
LMF	light maintenance facility
MOU	Memorandum of Understanding
mph	miles per hour
NCCAB	North Central Coast Air Basin
NEPA	National Environmental Policy Act
NOD	Notice of Determination
NOI	Notice of Intent
NOP	Notice of Preparation
NRHP	National Register of Historic Places
O&M	operations and maintenance
PCJPB	Peninsula Corridor Joint Powers Board
Project Section, project	San Francisco to San Jose Project Section
PTC	positive train control
ROD	Record of Decision
RSA	resource study area

SAFE	Safer Affordable Fuel-Efficient
SCVWD	Santa Clara Valley Water District
SFO	San Francisco International Airport
SFTC	Salesforce Transit Center
SJVAB	San Joaquin Valley Air Basin
STB	Surface Transportation Board
U.S.C.	United States Code
US	U.S. Highway
USACE	U.S. Army Corps of Engineers
USDOT	U.S. Department of Transportation
USEPA	U.S. Environmental Protection Agency
VMT	vehicle miles traveled
VTA	Santa Clara Valley Transportation Authority

SUMMARY

Since publication of the San Francisco to San Jose Project Section Draft Environmental Impact Report (EIR)/Environmental Impact Statement (EIS), the following substantive changes have been made to this section.

- Section S.1.1, Modifications since the Draft EIR/EIS, was added to provide a summary of changes made since the publication of the Draft EIR/EIS.
- Section S.1.2, Evaluation of Need for CEQA Recirculation or NEPA Supplementation, was added to explain that additional recirculation of the Draft EIR or an additional supplement to the Draft EIS is not required.
- A footnote was added to Section S.2, Tiered Environmental Review: Final Statewide Program EIR/EIS and San Francisco to San Jose Project Section, to reflect the updated CEQ regulations.
- A paragraph was added to Section S.2, identifying California Environmental Quality Act (CEQA) responsible agencies.
- In Table S-1, Atherton was removed under both alternatives in the row for Modifications to Caltrain Stations to remove hold-out rule. Section S.5.3.1, Track and Station Modifications, was also updated to reflect the exclusion of modifications to Atherton Station under both alternatives.
- A paragraph was added to Section S.5.4, Design Variations, to mention the Millbrae Station Reduced Site Plan (RSP Design Variant) and reference Chapter 2, Alternatives, where this design variant is described in more detail.
- In Section S.5.4.4, Diridon Design Variant, the reference to Section 3.19, Design Variant to Optimize Speed, was removed as this section from the Draft EIR/EIS was removed and the information therein incorporated throughout this Final EIR/EIS.
- In Table S-3, the following Impact Avoidance and Minimization Features (IAMFs) were added: AQ-IAMF#6 and PUE-IAMF#2.
- Section S.8.3.1, Alternative A, was updated to remove the Atherton Station from the count of existing Caltrain Stations, reflect displacements associated with the Diridon Design Variant (DDV), and summarize impacts at Visitacion Creek related to the East Brisbane LMF.
- Section S.8.3.2, Alternative B, was updated to remove the Atherton Station from the count of existing Caltrain Stations and correct the acreages for permanent conversion related to construction of the West Brisbane LMF.
- The following construction impacts summarized in Table S-4 were updated: Impacts TR#6, AQ#1, AQ#2, AQ#3, AQ#4, AQ#6, AQ#7, AQ#16, PUE#1, PUE#2, PUE#4, PUE#7, PUE#12, BIO#1, BIO#2a, BIO#2b, BIO#3, BIO#4, BIO#6, BIO#7, BIO#8, BIO#9, BIO#10, BIO#11, BIO#12, BIO#18, BIO#20, BIO#21, HYD#1, HYD#2, HYD#4, HYD#5, HYD#13, GEO#4, HMW#10, S&S#1, S&S#3, S&S#9, S&S#11, S&S#13, SOCIO#2, SOCIO#5, SOCIO#8, SOCIO#10, SOCIO#13, LU#1, LU#5, LU#7, PK#1, PK#2, PK#3, PK#6, PK#11, AVQ#9, and CUL#2.
- The following operations impacts summarized in Table S-5 were updated: Impacts TR#5, TR#7, AQ#9, AQ#13, NV#2, EMF/EMI#2, EMF/EMI#4, EMF/EMI#9, PUE#13, HYD#6, S&S#5, S&S#15, S&S#16, SOCIO#3, SOCIO#14, and LU#9.
- Section S.8.4, Comparison of HSR Stations, was updated to include the RSP Design Variant. Table S-6 was added to provide a summary comparison of impacts between the Millbrae Station Design and the RSP Design Variant.
- In Table S-7, Mitigation Measure TR-MM#2 was added as mitigation for Impact TR#8. For Impact TR#11, the MUNI route affected by a significant and unavoidable impact at the 16th

Street at-grade crossing was corrected. Mitigation Measure AQ-MM#1 was added as mitigation Impacts AQ#1, AQ#4, and AQ#5. Updates were made to reflect impacts described in the San Francisco to San Jose Project Section Revised Draft EIR/Supplemental Draft EIS (Revised/Supplemental Draft EIR/EIS), namely Impact BIO#2b and the associated mitigation measures were added. The Tunnel Avenue realignment and Tunnel Avenue Overpass relocation in Brisbane were removed from the list of locations with significant and unavoidable impacts under Impact S&S#1. Site-specific traffic mitigation measures were added to reduce impacts relevant to Impact S&S#6. LU-MM#2 was removed as mitigation for Impact LU#7. PK-MM#5 was added as mitigation for Impact PK#6. The titles of TR-MM#4 and BIO-MM#6 were updated. The column for Significant Impacts before Mitigation was updated to identify in parentheses which alternative it was for if the conclusion did not apply to both

- Revisions to Tables S-4, S-5, and S-7 were made to incorporate changes included in the Revised/Supplemental Draft EIR/EIS and in response to public comments on the Revised/Supplemental Draft EIR/EIS.
- Table S-8 was updated to reflect corrections in the number of significant and unavoidable impacts under Alternative A.
- Table S-9 was updated for consistency with Chapter 6 of this Final EIR/EIS to reflect design changes and to reflect escalated costs in 2021 dollars.
- The number of Section 4(f) properties was updated in Section S.9.1, Section 4(f).
- Section S.10, Environmental Justice, was updated to clarify the meaning of environmental justice.
- Section S.11, Areas of Controversy, was updated to include traffic impacts.
- Section S.12, Environmental Process, was revised to reflect releasing the Final EIR/EIS.
- Table S-10 was updated to reflect inclusion of the DDV under Alternative A and update values for impacts related to displacements, land use and development, transportation, noise, aquatic resources, biological resources, and Section 4(f) resources. A footnote was added for the DDV.
- The dates for key project milestones were updated in Table S-11.
- Where appropriate, the verb “would,” when used specifically to describe IAMFs or mitigation measures, as well as their directly related activities, was changed to “will,” indicating their integration into project design.

S.1 Introduction and Background

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

The California 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,

High-Speed Rail System

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

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

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 blended² 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 Rail 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 Rail Extension Project extends the electrified peninsula rail corridor from Mariposa Street (south of the 4th and King Street Station) to the SFTC, HSR trains would use the track built for the Downtown Rail 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 Final EIR/EIS.

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

- The Final EIR/EIS as part of the tiered environmental review
- The issues raised during public outreach on the Final 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 IAMFs 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 Final EIR/EIS is available on the Authority’s website at: www.hsr.ca.gov.

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

³ The Downtown Rail Extension Project and SFTC project were analyzed pursuant to NEPA and CEQA 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 analyzed 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

S.1.1 Modifications since the Draft EIR/EIS

This Final EIR/EIS is a final document that includes the text of the Draft EIR/EIS with text and figure revisions made since publication of the Draft EIR/EIS. A vertical line in the margin indicates a substantive change in the text since publication of the Draft EIR/EIS; minor editorial changes and clarifications are not identified. In addition, substantive changes are summarized at the beginning of each chapter and resource topic section of Chapter 3.

S.1.1.1 Global Changes in the Final EIR/EIS

Revisions to the Draft EIR/EIS were made to reflect the following global issues:

- Minor design refinements for both project alternatives
- Incorporation of content regarding the Diridon Design Variant (DDV) into Chapter 2, each resource section in Chapter 3, Chapter 4, and Chapter 5
- Incorporation of content from the Revised/Supplemental Draft EIR/EIS

Design Refinements

Since publication of the Draft EIR/EIS, the Authority has made several revisions to project features, including:

- **Modifications to the East Brisbane LMF Lead Track**—After publication of the Draft EIR/EIS, the Authority identified the need for a design change to the East Brisbane light maintenance facility (LMF) lead track under Alternative A. The design change would shift the lead track farther west of the location proposed in the Draft EIR/EIS Volume 3, Preliminary Engineering Plans, requiring additional right-of-way acquisition on the west side of the Caltrain corridor in the city and county of San Francisco and the city of Brisbane. Whereas the design of Alternative A in the Draft EIR/EIS relocated the Bayshore Caltrain Station southbound platform and pedestrian overpass farther south and maintained the existing location for the northbound platform, the lead track design change in this Final EIR/EIS would involve extending the southbound platform from its current location southward, retaining the current pedestrian overpass, and retaining the existing northbound platform. The northern portion of the extended southbound platform of the Bayshore Caltrain Station would be used as a walkway to access the “active platform” where train boarding and alighting would occur.
- **Lagoon Road Realignment**—The Authority has incorporated the Draft EIR/EIS mitigation measure LU-MM#2 into the project design under both project alternatives. This design refinement will relocate Lagoon Road farther north from Brisbane Lagoon, aligning it with the U.S. Highway (US) 101 southbound freeway on- and off-ramps.
- **Removal of Old County Road Extension**—Based on feedback provided by the City of Brisbane on the Draft EIR/EIS, the extension of Visitacion Avenue from Old County Road to Valley Drive has been removed from both project alternatives.
- **Removal of Atherton Caltrain Station Platform Modifications**—Because Caltrain closed the Atherton Caltrain Station in 2020 and removed the center platform, the hold-out rule no longer applies at this station. Therefore, the Authority will not need to remove the center platform or construct new outboard platforms as part both project alternatives.
- **Relocation of Brisbane Corporation Yard**—The Final EIR/EIS Volume 3 reflects revisions to Alternative A to depict the proposed relocation of the Brisbane Corporation Yard building to a location approximately 100 feet north of the current location in the same parcel. The relocated Brisbane Corporation Yard building would be accessible from the proposed Kinder Morgan access road in the northeast corner of the parcel.
- **Brisbane Fire Station**—Based on feedback provided by the City of Brisbane and North County Fire Authority staff on the Draft EIR/EIS, as well as subsequent consultation, this Final EIR/EIS reflects revisions to the design for the Relocated Brisbane Fire Station (for Alternative A) and clarifies the access design for Alternative B. Under Alternative A, the

Brisbane Fire Station would be relocated approximately 800 feet to the south of the existing fire station, with two driveways connecting to Bayshore Boulevard, similar to existing access. For Alternative B, the fire station would be relocated approximately 150 feet to the south of the existing fire station, with a driveway connecting to Bayshore Boulevard via the existing station's secondary driveway, a mid-block location that provides right-in, right-out access to northbound Bayshore Boulevard in addition to access to the new Tunnel Avenue/Bayshore Boulevard/Valley Drive intersection.

- **Refinements and Construction Staging Plans for the Tunnel Avenue Overpass**—Since publication of the Draft EIR/EIS, the Authority has identified a feasible approach to phased construction of the realigned Tunnel Avenue overpass required for the Brisbane LMF, such that emergency vehicle access to Tunnel Avenue from Bayshore Boulevard would be retained throughout the construction activities for both project alternatives. Similarly, construction of the realigned Lagoon Road would also be conducted in stages so emergency vehicle access to Lagoon Road would be retained throughout the construction.
- **Guadalupe River Bridge (Alternative A)**—Since publication of the Draft EIR/EIS, the Authority increased the length of the Guadalupe River Bridge to accommodate future flood control channel widening by others and avoid a potential increase in water surface elevation.

Incorporation of Content Regarding the Diridon Design Variant

Section 3.19, Design Variant to Optimize Speed, of the Draft EIR/EIS, has been removed, and its content has been integrated throughout Chapters 2, 3, 4, and 5 of the Final EIR/EIS.

Revised/Supplemental Draft EIR/EIS

The content of the Revised/Supplemental Draft EIR/EIS has been incorporated into the Final EIR/EIS. This includes a new biological resources analysis for monarch butterfly (Section 3.7, Biological and Aquatic Resources, Section 3.18, Cumulative Impacts) and an analysis of a design variant for the Millbrae Station (Section 3.20, Millbrae Station Reduced Site Plan Design Variant).

S.1.1.2 Summary of Substantive Changes Made since the Draft EIR/EIS

This section summarizes some of the key substantive changes within the chapters and sections in Volume 1, Report; Volume 2, Technical Appendices; and Volume 3. Each Chapter 3 resource section in Volume 1 has been modified to reflect the changes in Volume 3, as applicable. In addition, substantive changes are summarized at the beginning of each chapter and resource topic section of Chapter 3. Chapter 13, Glossary of Terms did not have substantive changes since publication of the Draft EIR/EIS.

Volume 1

Chapter 1, Project Purpose, Need and Objectives

- Information was added about the Peninsula Corridor Joint Powers Board (PCJPB) and agreements the Authority has with PCJPB regarding blended service.
- Updates were made to reflect recently available airport enplanement data and to reflect the current status of various projects and plans.

Chapter 2, Alternatives

- Updates were made to add clarifying information regarding lighting associated with HSR system infrastructure, to add information about the operations of the LMF, to reflect design refinements to the project alternatives, and to provide additional information regarding construction activities and assumptions for the Brisbane LMF.
- Additional information regarding an underground alignment through Millbrae and the evaluation of LMF sites was added to the discussion of alternatives considered.
- Updates were made to the No Project Alternative discussion to reflect the current status of various projects and plans.

- Text was clarified regarding the Authority's approach to establishing the amount of station parking facilities.
- Updates were made to clarify the San Francisco Bay Conservation and Development Commission (BCDC) jurisdiction.
- Updates were made to the table of potential permits or approvals required for the project.

Section 3.1, Introduction

- A footnote was added to address the updated Council on Environmental Quality (CEQ) regulations issued after release of the Draft EIR/EIS.
- Text was added to regarding the Authority's 2020 Business Plan.

Section 3.2, Transportation

- Section 3.2.3, Consistency with Plans and Laws, was updated to add three additional policy inconsistencies.
- Updates were made to reflect recent freight operation projections from the *2018 California State Rail Plan* (California Department of Transportation 2018) and to update the status and schedule for planned projects.
- The impact analysis was revised to reflect a phased construction approach to roadway modifications in the vicinity of the Brisbane LMF under Impact TR#2, to provide additional information about construction traffic at the Brisbane LMF under Impact TR#3, to incorporate additional information about the project's consistency with *Plan Bay Area 2040* (Association of Bay Area Governments and Metropolitan Transportation Commission 2017) with respect to the Geneva-Harney Bus Rapid Transit project under Impact TR#11, to provide additional information about the track and platform analysis at the San Jose Diridon Station under Impact TR#14, to address the increased walking or biking distance to the Bayshore Caltrain Station due to the HSR project modifications under Impact TR#16, and to include additional information and analysis about potential effects on freight operations during construction and during project operations under Impacts TR#18 and TR#19.
- Section 3.2.7, Mitigation Measures, was modified to include site-specific traffic mitigation measures for National Environmental Policy Act (NEPA) effects under TR-MM#1: Potential Mitigation Measures Available to Address Traffic Delays (NEPA Effect Only), and an analysis of the potential for secondary effects due to these site-specific mitigation measures and to include additional detail for TR-MM#3 concerning minimizing effects on passenger and freight rail during construction.

Section 3.3, Air Quality and Greenhouse Gases

- Emissions generated by light-duty gasoline-powered vehicles used during construction were remodeled to include the effects of the Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule. The revised emissions results are presented in this Final EIR/EIS.
- Revisions were made to the impact analysis to reflect design modifications since publication of the Draft EIR/EIS; to account for the estimated amount of hazardous materials that must be removed from the LMF site and trucked to a disposal site through the North Central Coast Air Basin (NCCAB) and the San Joaquin Valley Air Basin (SJVAB); and to incorporate additional discussion of Valley fever due to truck hauling within SJVAB.
- One new mitigation measure was added: AQ-MM#1: Construction Emissions Reductions—Requirements for use of Zero Emission and/or Near-Zero Emission Vehicles and Off-Road Equipment.

Section 3.4, Noise and Vibration

- The operational noise impact analysis was revised to reflect updates in the San Jose Diridon Station Approach Subsection and design refinements.

- NV-MM#4: Support Potential Implementation of Quiet Zones by Local Jurisdictions, was modified to clarify that the Authority will assist with the preparation of technical analysis and provide input for quiet zone applications, which the local communities could then use as part of their application to the Federal Railroad Administration (FRA).

Section 3.5, *Electromagnetic Fields and Electromagnetic Interference*

- San Carlos Airport was added as a sensitive receptor and source of electromagnetic fields (EMF), and the impact analysis under Impact EMF/EMI#9 was updated to consider San Carlos Airport.
- Additional text was added to clarify the EMF and electromagnetic interference (EMI) generated by the Brisbane LMF utility substation, and the impact analyses under Impacts EMF/EMI#2, EMF/EMI#3, and EMF/EMI#4 were updated to consider the potential impacts associated with the LMF's power supply and electrical infrastructure.

Section 3.6, *Public Utilities and Energy*

- Revisions were made to the impact analysis to update the number of utility conflicts, to clarify the extent of new utility infrastructure that would be required to support the project, to reflect updated estimates of excavated material requiring disposal as solid waste and hazardous waste associated with each alternative, and to reflect updated calculations of energy consumption associated with project construction.
- Revisions were made to the affected environment and impact analysis to reflect the San Francisco Public Utility Commission's *2020 Urban Water Management Plan* (San Francisco Public Utilities Commission 2021).

Section 3.7, *Biological and Aquatic Resources*

- Revisions were included to update the federal Clean Water Act (CWA) definition of waters of the U.S. (refer to the Clean Water Act Section 404 (Waters of the U.S., including Wetlands) subsection) and to clarify that all aquatic resources in the Project Section are considered to be under federal and state jurisdiction.
- Section 3.7.4, Consultation with Regulatory Agencies for Federal Endangered Species Act Compliance, was revised to reflect current status of consultation.
- The impact analysis was revised to reflect updated aquatic resource land cover data and species habitat models as a result of additional coordination with the U.S. Army Corps of Engineers (USACE) in spring 2021 and comments received from the U.S. Fish and Wildlife Service and National Marine Fisheries Service on the biological assessment.
- The impact analysis was revised to reflect updated project footprints incorporating design modifications since publication of the Draft EIR/EIS, to address impacts on potentially suitable breeding and rearing habitat and nectaring and dispersal habitat for listed butterflies, and to incorporate additional information and assessment regarding operational noise and lighting impacts on wildlife.
- Section 3.7.9, Mitigation Measures, was updated as follows:
 - BIO-MM#11: Compensate for Impacts on Listed Butterfly Habitat, was revised to clarify that the Authority will determine the compensatory mitigation required to offset impacts on habitat in accordance with authorizations issued under the federal Endangered Species Act.
 - BIO-MM#12: Work Stoppage, was revised to clarify that relocation of fully protected species is not allowed and fully protected species must move out of the work area of their own volition.

- BIO-MM#16: Prepare and Implement an Underwater Sound Control Plan, was revised in response to comments from the California Department of Fish and Wildlife on the Draft EIR/EIS.
- BIO-MM#23: Implement Avoidance and Minimization Measures for Burrowing Owls, and BIO-MM#24: Provide Compensatory Mitigation for Loss of Active Burrowing Owl Burrows and Habitat, which address impacts on burrowing owl, were revised in response to comments from the California Department of Fish and Wildlife.
- BIO-MM#25: Conduct Pre-Construction Surveys and Delineate Active Nest Buffers Exclusion Areas for Breeding Birds, was revised to include a 0.5-mile buffer for white-tailed kite, 500-foot buffer for other raptor species, and 250-foot buffer for other birds protected by the Migratory Bird Treaty Act or California Fish and Game Code.
- BIO-MM#40: Avoid Direct Impacts on Monarch Butterfly Host Plants, and BIO-MM#41: Provide Compensatory Mitigation for Impacts on Monarch Butterfly Habitat, were added to avoid impacts on monarch butterfly host plants and provide compensatory mitigation for monarch butterfly habitat.

Section 3.8, Hydrology and Water Resources

- The impact analysis was revised to account for the latest basin boundary modification approved by the California Department of Water Resources; to indicate the updated percentage of impervious areas the project would introduce within each watershed; to further characterize the hazardous materials, buried refuse, and soils in the area of the Brisbane LMF and the effects of construction in these areas on surface water and groundwater quality; and to add information regarding waterproofing of subsurface structures and the effect of subsurface structure on groundwater levels.
- Additional discussion and clarification about the potential effects of sea level rise on the project has been added to Section 3.8.10, Vulnerability and Adaptation to Sea Level Rise.

Section 3.9, Geology, Soils, Seismicity, and Paleontological Resources

- Section 3.9.2.1, Geology, Soils, and Seismicity, was revised to include a discussion of relevant Title 27 regulations.
- Section 3.9.5.1, Physiography and Regional Geologic Setting, and Soils and Section 3.9.5.2, Geologic Hazards, were revised to include discussion of the former Brisbane Landfill and of prior geotechnical investigations on the Brisbane Baylands project site was added to the Landfill Gas and Refuse subsection. Impact GEO#6 in Section 3.9.6.2 was revised to include discussion of slope stability and Title 27 regulations.
- Section 3.9.8, Impact Summary for NEPA Comparison of Alternatives, was updated to clarify that project features under Alternative B will minimize potential construction-related risks associated with subsurface migration of landfill gases.

Section 3.10, Hazardous Materials and Wastes

- Additional information was added regarding potential contamination and draft cleanup plans at the former Southern Pacific Railroad railyard, the former Brisbane Landfill, and several adjacent sites in Brisbane; landfill gas at the former Brisbane Landfill; and regulatory requirements related to construction on former landfills.
- The impact analysis was revised to specify the estimated amount of waste generated during earthwork activities that may be contaminated and require special disposal as hazardous waste under each project alternative, as well as potential disposal locations; to include additional information concerning construction period impacts associated with LMF construction; and to describe how the Authority would work with local and state authorities concerning cleanup and closure activities at the former Brisbane Landfill.

Section 3.11, Safety and Security

- Additional information was added to the affected environment section on current safety features at existing at-grade crossings, to clarify federal requirements governing airport obstructions and state requirements governing airport-compatible land use planning, and to update the number of high-risk utilities in the resource study area (RSA) under both project alternatives.
- The impact analysis was revised to describe and illustrate a phased construction approach to roadway modifications in the vicinity of the Brisbane LMF that would maintain emergency vehicle access to Tunnel Avenue and Lagoon Road from Bayshore Boulevard throughout the construction process. Text was also updated to reflect revisions to the design for the Relocated Brisbane Fire Station (Alternative A) based on feedback from the City of Brisbane and to clarify the access design for the Relocated Brisbane Fire Station (Alternative B).
- Section 3.11.7, Mitigation Measures, was updated as follows:
 - SS-MM#2: Modify Driveway Access Control for Relocated Brisbane Fire Station (Alternative B), was modified to clarify access to the Relocated Brisbane Fire Station under Alternative B.
 - SS-MM#3: Install Emergency Vehicle Priority Treatments near HSR Stations, was updated to acknowledge the City of San Jose’s implementation of emergency vehicle preemption and its applicability to the project.
 - SS-MM#4: Install Emergency Vehicle Priority Treatments Related to Increased Gate-Down Time Impacts, was revised to modify the monitoring requirements, to clarify the provision of additional emergency response equipment for existing fire stations, and to clarify consultation with local cities and fire departments. Additionally, a description was added of certain site-specific traffic mitigation measures that will apply if SS-MM#4 cannot reduce emergency vehicle response time impacts to a less-than-significant level under CEQA.

Section 3.12, Socioeconomics and Communities

- The discussion of temporary road closures and lane closures under Impact SOCIO#1 was revised to reflect a longer construction duration for the installation of four-quadrant gates, to describe a phased construction approach to the realigned Tunnel Avenue overpass that would maintain access to Tunnel Avenue and Lagoon Road from Bayshore Boulevard throughout the construction process, and to correct the construction duration for the Brisbane LMF.
- Impact SOCIO#2 was updated to reflect revisions to the design for the Relocated Brisbane Fire Station (Alternative A) based on feedback from the City of Brisbane and to clarify the access design for the Relocated Brisbane Fire Station (Alternative B).
- Impacts SOCIO#2 and SOCIO#8 were revised to note that the City of Brisbane’s Corporation Yard was considered an industrial displacement under Alternative A and to identify displacements with the DDV.
- Impacts SOCIO#10, SOCIO#13, SOCIO#14 were revised to reflect updated expenditures, sales tax revenue, and employment related to capital costs and O&M costs.

Section 3.13, Station Planning, Land Use, and Development

- Section 3.13.3.3, Plan Bay Area and Local Plans and Laws, was revised to add a discussion of the project’s inconsistency with Policy 4.1 of the *Millbrae Station Area Specific Plan* (City of Millbrae 2016) and Policies 82, BL.1 H, and BL.16 of the Brisbane General Plan.
- The impact analysis was revised to reflect project footprint changes near the Brisbane LMF, including impacts on planned land uses associated with the Schlage Lock project.

- Section 3.13.7, Mitigation Measures, was updated to remove LU-MM#2: Relocate Lagoon Road to Avoid Priority Use Areas within BCDC's Jurisdiction, identified in the Draft EIR/EIS, which was incorporated into the project description and impact analysis for the Final EIR/EIS.

Section 3.14, Parks, Recreation, and Open Space

- Section 3.14.3, Consistency with Plans and Laws, was revised to add discussion of inconsistency with one policy in the City of Brisbane General Plan.
- The impact analysis was revised to reflect project footprint changes near the Brisbane LMF and to clarify the impacts with respect to Tamien Park and Los Gatos Creek Trail.
- New analysis was added to address project impacts on Monterey Park, Reed and Grant Streets Sports Park, Del Monte Park, and Roberto Antonio Balermينو Park.
- New mitigation measure PK-MM#5: Reconfigure Reed and Grant Streets Sports Park, was added to address permanent acquisition impacts on Reed and Grant Streets Sports Park under Alternative B (Viaduct to Scott Boulevard).

Section 3.15, Aesthetics and Visual Quality

- A new policy inconsistency was added to the discussion in Section 3.15.3, Consistency with Plans and Laws.
- Impact AVQ#4 was revised to describe the removal of Icehouse Hill for construction of the West Brisbane LMF under Alternative B, and Impact AVQ#17 was revised to include clarifying information about the lighting design for the Brisbane LMF.

Section 3.16, Cultural Resources

- The City and County of San Francisco was added as a Section 106 consulting party.
- A new policy inconsistency was added to the discussion in Section 3.16.3, Consistency with Plans and Laws.
- The analysis was revised to add an archaeological resource (CA-SRF-191H) and correct the trinomial for another archaeological resources (P-41-000498). Corresponding updates were also made to Impact CUL#2 to reflect these changes.
- 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, was updated to provide additional details regarding temporary work stoppage and to clarify requirements with respect to treatment of remains.

Section 3.17, Regional Growth

- Revisions were made throughout the chapter to reflect updated capital costs for the project alternatives and changes to estimates of project-related employment and induced growth.

Section 3.18, Cumulative Impacts

- Revisions were made throughout the chapter to update the status of cumulative projects and to reflect updates to the impact analysis for various resource topics including transportation; air quality; noise and vibration; public utilities and energy; biological and aquatic resources; safety and security; station planning, land use, and development; and aesthetics and visual quality.

Section 3.19, Design Variant to Optimize Speed

- The content from this section of the Draft EIR/EIS has been incorporated throughout Chapters 2, 3, 4, and 5 of the Final EIR/EIS and this section has been removed from the Final EIR/EIS.

Section 3.20, Millbrae Station Reduced Site Plan Design Variant

- A new section, with content previously circulated for public review as part of the Revised/Supplemental Draft EIR/EIS, was added to the Final EIR/EIS. This section includes an evaluation of the environmental impacts of the RSP Design Variant, which was developed to address stakeholder concerns and, to the extent feasible, reduce the impact on existing and planned development.

Chapter 4, Section 4(f)/6(f) Evaluation

- The impact analysis was revised to reflect project footprint changes near the Brisbane LMF.
- The analysis was revised to include new information about additional existing sections of two trails (i.e., the San Francisco Bay Trail-2 and Three Creeks Trail) and four additional existing parks (i.e., Monterey Park, Reed and Grant Streets Sports Park, Del Monte Park, and Roberto Antonio Balermino Park).
- The Authority's Section 4(f) determinations concerning the use of Section 4(f) protected properties were finalized and updated regarding coordination with and concurrence of officials with jurisdiction over the Section 4(f) resources.
- The alternative with the least overall harm was identified concerning the use of Section 4(f)-protected properties.

Chapter 5, Environmental Justice

- Text was added about BCDC's environmental justice and social equity policies.
- Revisions were made to reflect updates to the impact analysis for various resource topics, including safety and security; station planning, land use, and development; parks and recreation; transportation; socioeconomics; air quality; and noise and vibration.
- Text was added about the Authority's policies to provide targeted job training and hiring opportunities for minority populations and low-income populations.

Chapter 6, Project Costs

- Revisions were made to the capital costs associated with each project alternative.

Chapter 7, Other CEQA/NEPA Considerations

- Revisions were made to reflect updates to the impact analysis for various resource topics.

Chapter 8, Preferred Alternative

- Updates were made to summarize comments received on the Draft EIR/EIS, to reflect revisions to the impact analysis since publication of the Draft EIR/EIS, to reflect updated capital cost estimates, and to add information about the Authority's preferred communication radio tower sites.

Chapter 9, Public and Agency Involvement

- This chapter was updated to describe the circulation of the Draft EIR/EIS and the Revised/Supplemental Draft EIR/EIS and to describe the release of the Final EIR/EIS, including additional public and agency meetings that have occurred.
- Updates were made to add Bay Area Rapid Transit District as a CEQA responsible agency, to add the City and County of San Francisco as a Section 106 consulting party, to update the status of Checkpoint C, and to update the status of the biological assessment and biological opinion.

Chapter 10, Distribution List

- This chapter was updated to reflect notice and distribution of the Final EIR/EIS.

Chapter 11, List of Preparers

- This chapter was updated to reflect revisions to staff roles and responsibilities.

Chapter 12, References

- The reference lists for each chapter and section were updated to reflect references cited in the Final EIR/EIS.

Chapter 15, Acronyms and Abbreviations

- Revisions to acronyms and additional acronyms introduced after printing and publication of the Draft EIR/EIS were added to this chapter.

Volume 2

- **Appendix 2-E, Project Impact Avoidance and Minimization Features**—This appendix was updated to reflect clarifications to the requirements and performance standards for certain IAMFs. In addition, AQ-IAMF#6 was added and additional requirements/features were added to IAMFs.
- **Appendix 2-I, Regional and Local Plans and Policies**—This appendix was updated to add or revise policies relevant to transportation; noise and vibration; EMF/EMI; hydrology and water resources; station planning, land use, and development; parks, recreation, and open space; and aesthetics and visual quality.
- **Appendix 2-J, Policy Consistency Analysis**—This appendix was updated to add or revise policy inconsistencies relevant to transportation; noise and vibration; station planning, land use, and development; parks, recreation, and open space; aesthetics and visual quality; and cultural resources.
- **Appendix 2-K, Light Maintenance Facility Site Selection Evaluation**—This appendix was added to provide additional information about the Authority's LMF site selection evaluation process.
- **Appendix 3.1-A, Parcels within the HSR Footprint**—This appendix was updated to reflect revisions to the project footprints and more recent aerial imagery.
- **Appendix 3.1-B, Analysis of Consistency with McAteer-Petris Act and San Francisco Bay Plan**—This appendix was updated to address comments from the BCDC on the Draft EIR/EIS and to revise references to the land use mitigation measures consistent with revisions made to Section 3.13.
- **Appendix 3.2-A, Transportation Data on Roadways, Freeways, and Intersections**—This appendix was updated to correct the location of the intersection of San Mateo Avenue/Scott Street, and to include a new table (Table 7) that provides information about intersection operations with the application of site-specific traffic mitigation measures. In addition, traffic count sheets for Bayshore Blvd/Industrial Way were added as an attachment to this appendix.
- **Appendix 3.2-C, Traffic Mitigation Measures Screening**—This appendix was added to provide the screening evaluation of potential site-specific traffic mitigation measures considered to address NEPA adverse effects related to traffic against Authority criteria for identifying traffic mitigation measures.
- **Appendix 3.3-A, Air Quality and Global Climate Change Technical Report**—This appendix was revised to update the project description and to reflect emissions associated with the transport of excavated materials from the LMF site to disposal facilities via truck routes in the NCCAB and the SJVAB. Additional information was added about Valley fever and health risks associated with exposure to high concentrations of nitrogen dioxide. Emissions generated by light-duty gasoline-powered vehicles used during construction were remodeled to include the effects of the SAFE Vehicles Rule.

- **Appendix 3.3-B, Draft General Conformity Determination**— Appendix 3.3-B, General Conformity Requirements and Process, was replaced with Appendix 3.3-B, Draft General Conformity Determination, that provides a discussion of the federal General Conformity requirements and demonstrates how the project complies with the General Conformity requirements. In addition, the emissions calculations were updated and the narrative was revised in this appendix based on feedback received from FRA.
- **Appendix 3.4-A, Noise and Vibration Technical Report**—The appendix was revised to update the project description, to reflect relevant noise policies from the Atherton General Plan update, to clarify the location where the Downtown Rail Extension Project would be in a tunnel, and to clarify that the at-grade 4th and King Street Station would not be used for HSR service in 2040. A statement was added to Section 4.1.5.2, Operations Noise, to explain that the analysis included terrain information and the elevation of all receptors relative to the tracks and that train maintenance would take place inside the maintenance building with minimal noise spillover into the surrounding area.
- **Appendix 3.4-C, Noise Impact Locations**—Based on comments received on the Draft EIR/EIS, this new appendix was prepared to provide more detailed figures illustrating potential impact locations and noise barriers.
- **Appendix 3.6-A, Public Utilities and Energy Facilities**—This appendix was updated to reflect several missing major utility lines within the public utilities RSA.
- **Appendix 3.6-B, Existing Plus Project Conditions Energy Analysis**—This appendix was updated to reflect revisions to the energy consumption for on-road vehicle travel.
- **Appendix 3.6-C, Water Use Assessment**—This appendix was updated to clarify the methods used to develop construction water use estimates.
- **Appendix 3.7-A, Special-Status Species Potentially Affected**—This appendix was updated to reflect information from the Revised/Supplemental Draft EIR/EIS regarding monarch butterfly.
- **Appendix 3.7-B, Scientific Nomenclature**—This appendix was updated to reflect information from the Revised/Supplemental Draft EIR/EIS regarding monarch butterfly.
- **Appendix 3.8-B, Summary of Hydraulic Modeling**—This appendix was updated to correct the number of waterbodies in the project footprint, to reflect revisions to the Los Gatos Creek and Guadalupe River and Tributaries hydraulic model results and the corresponding figures, and to remove some content about impacts along the Guadalupe River crossing that would occur outside of the Project Section.
- **Appendix 3.8-C, Basin Plan Water Quality Impact Assessment**—This appendix was updated to reflect revisions to project impacts on aquatic resources within the San Francisco to San Jose Subsection.
- **Appendix 3.11-A, Safety and Security Data**—This appendix was updated to clarify the location of the North Pedestrian Crossing at the Sunnyvale Caltrain Station.
- **Appendix 3.11-B, Airport Obstructions**—This appendix was updated with more recent information about the Norman Y. Mineta San Jose International Airport and to address comments on Federal Aviation Regulation (FAR) 14 Code of Federal Regulations [C.F.R.] Part 77.
- **Appendix 3.13-A, General Plan Land Use Maps**—Figure 1 of this appendix was updated to reflect the land use designations from the Brisbane General Plan.
- **Appendix 3.16-A, Agency and Interested Party Outreach**—This appendix was updated to reflect outreach since publication of the Draft EIR/EIS.
- **Appendix 3.16-B, Tribal Outreach Consultation**—This appendix was updated to reflect corrections and to provide updated information since publication of the Draft EIR/EIS.

- **Appendix 3.16-C, Archaeological and Built Resources**—This appendix was updated with revisions to the mapping of archaeological resources.
- **Appendix 3.16-D, Programmatic Agreement**—This appendix was updated to reflect the 2021 amendment to the Section 106 Programmatic Agreement.
- **Appendix 3.16-E, SHPO Correspondence**—This new appendix was added to document the Authority’s correspondence with the State Historic Preservation Office on this Project Section.
- **Appendix 3.17-A, Regional Input-Output Modeling System II Modeling Details**—This appendix was updated to reflect revised capital cost estimates, including updating the use of 2018\$ to 2021\$.
- **Appendix 3.18-A, Cumulative Nontransportation Plans and Projects List**—Tables were revised to reflect status updates for plans and projects.
- **Appendix 3.18-B, Cumulative Transportation Plans and Projects List**—Tables were revised to reflect status updates for plans and projects.
- **Appendix 4-A, Concurrence Letter**—This new appendix was added to include the concurrence letter received from the City of San Jose Department of Parks, Recreation & Neighborhood Services.
- **Appendix 6-A, San Francisco to San Jose Project Section: PEPD Record Set Capital Cost Estimate Report**—This appendix was replaced with an updated report reflecting revised capital cost estimates, including updates to the use of 2021\$ instead of 2018\$.
- **Appendix 9-A, Public and Agency Meeting List**—This appendix was updated to reflect additional public and agency meetings that have occurred since publication of the Draft EIR/EIS.

Volume 3

Key changes in Volume 3 include:

- Sheets were updated depicting design refinements described in Section S.1.1.1, Global Changes in the Final EIR/EIS.
- A new book was added focused on the Millbrae Station Reduced Site Plan Design Variant.

S.1.2 Evaluation of Need for CEQA Recirculation or NEPA Supplementation

Neither CEQA nor NEPA is intended to freeze the status of a project as of the time of circulation of a Draft EIR/EIS. Both environmental statutes accommodate the fact that projects may evolve and be refined in response to public input. Under CEQA, recirculation of the Draft EIR is required only when significant new information is added to an EIR after public review but before certification (CEQA Guidelines, §15088.5). New information added to an EIR is not “significant” unless “the EIR is changed in a way that deprives the public of a meaningful opportunity to comment upon a substantial adverse environmental effect of the project or a feasible way to mitigate or avoid such an effect (including a feasible project alternative) that the project’s proponents have declined to implement” (CEQA Guidelines, § 15088.5(a)). Under NEPA, a supplemental draft EIS is required only if the agency makes substantial changes in the proposed action that are relevant to environmental concerns, or there are significant new circumstances or new information relevant to environmental concerns and bearing on the proposed action and its impacts (40 C.F.R. § 1502.9(c)).

Following the Authority’s publication of the Draft EIR/EIS in July 2020, monarch butterfly (*Danaus plexippus*) became a candidate for listing under the federal Endangered Species Act (FESA) on December 15, 2020 (85 Federal Register 81813, December 17, 2020). This action by the U.S. Fish and Wildlife Service made monarch butterfly subject to the definition of special-status species used by the Authority for analysis: “Plants or wildlife listed or proposed for listing as threatened or endangered under FESA (16 U.S.C. § 1531 et seq.)” Monarch butterfly is assumed to be present in the resource study area for the project alternatives based on historical records

and existence of suitable habitat for the species. Because this was a new potential impact not included in the Draft EIR/EIS, the Authority determined that the analysis of this impact should be included in a recirculated document. Accordingly, the Authority released the Revised/Supplemental Draft EIR/EIS on July 23, 2021, that contained a new biological resources analysis for monarch butterfly (Section 3.7, Biological and Aquatic Resources, Section 3.18, Cumulative Impacts). In addition, after publication of the Draft EIR/EIS, the Authority developed the Millbrae Station Reduced Site Plan Design Variant (RSP Design Variant) to address stakeholder concerns by analyzing a smaller, potentially feasible footprint for the station design at this location. Because the RSP Design Variant is a potentially feasible alternative different from the Millbrae Station Design that would lessen some significant environmental impacts of the project, the Authority also determined that the analysis of the RSP Design Variant should be included in a recirculated document as Section 3.20, Millbrae Station Reduced Site Plan Design Variant. As described in Section S.1.1.1, the content of the Revised/Supplemental Draft EIR/EIS has been incorporated into the Final EIR/EIS. The Authority carefully considered whether any other changes would necessitate either a recirculated Draft EIR or a supplement to the Draft EIS. The Authority reviewed other sections of the Draft EIR/EIS and found, based on research and a review of the evidence, that no other substantive changes were required to be included in the Revised/Supplemental Draft EIR/EIS and all other appendices to Section 3.7, as well as all technical reports supporting Section 3.7 of the Draft EIR/EIS, remain unchanged.

Additionally, since the circulation of the Draft EIR/EIS, there have been various design refinements and the Final EIR/EIS was revised to address those refinements, but these changes do not change the fundamental project description of the construction, operation, and maintenance of an electrified high-speed train between San Francisco and San Jose as presented in Chapter 2.

Although some updates to impact data and calculations were made in this Final EIR/EIS, the overall analysis, conclusions, and CEQA significance determinations did not change from those presented in the Draft EIR/EIS or Revised/Supplemental Draft EIR/EIS. No new significant environmental impacts were identified and no substantial increase in the severity of an environmental impact already identified has resulted from the development of new information or of the incorporation of the refinements into the project design. Therefore, the Authority has determined that additional recirculation of the Draft EIR or an additional supplement to the Draft EIS is not required.

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

The CEQ regulations establish procedures for compliance with NEPA (42 United States Code [U.S.C.] § 4321 et seq.).⁴ 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. CEQA (California Public Resources Code § 21000 et seq.) also encourages tiering and provides for first-tier and second-tier EIRs.

⁴ The CEQ issued new regulations, effective September 14, 2020, updating the NEPA implementing procedures at 40 C.F.R. Parts 1500–1508. However, because this project initiated the NEPA process before September 14, 2020, it is not subject to the new regulations. The Authority is relying on the regulations as they existed prior to September 14, 2020. Therefore, all citations to CEQ regulations in this environmental document refer to the 1978 regulations, pursuant to 40 C.F.R. Section 1506.13 and the preamble at 85 *Federal Register* 43340.

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 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 USEPA and the 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 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 Final 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 Final 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 was 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.

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

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 Final EIR/EIS (2022)
- San Francisco to San Jose Project Section Final EIR/EIS (this document)

(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.

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.

Several state and regional California agencies serve as CEQA responsible agencies for the San Francisco to San Jose Project Section. These include the California Department of Fish and Wildlife, California Department of Transportation, California Public Utilities Commission, BCDC, Bay Area Rapid Transit District, PCJPB, and State Lands Commission.

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 and Final 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”⁵ boarding platforms at stations shared with Caltrain,⁶ 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 2018 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.

⁵ “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.

⁶ Where the Final 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.

- 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 Peninsula⁷ 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 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,⁸ 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 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

⁷ For the purpose of this Draft EIR/EIS, the *Peninsula* is San Mateo and northern Santa Clara Counties.

⁸ *South Bay* refers to Santa Clara County.

Chapter 1, Project Purpose, Need, and Objectives, in the Final 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 Final EIR/EIS. Chapter 2, Alternatives, provides details on the identification of the project alternatives in the Final 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 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 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 Rail Extension Project would extend existing Caltrain commuter service to the SFTC.

S.5.2 San Francisco to San Jose Project Section Alternatives

The Final 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

Design Features	Project Alternative	
	Alternative A	Alternative B ¹
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) ²	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	Bayshore
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, College Park	Broadway
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 8 (Alternative A) and 11 (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,⁹ and build project features such as the Brisbane LMF under both alternatives and passing track under Alternative B.

The blended system would require curve straightening, track center modifications, and superelevation¹⁰ 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.

Two existing Caltrain stations—Broadway Station (both alternatives) and the College Park Station (Alternative A only)—would be modified as part of the blended system 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 at the Bayshore Station. 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.

⁹ 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.

¹⁰ *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.

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 Millbrae Station Reduced Site Plan Design Variant

As described in Section 2.6.2.4, Alternative A, the Authority developed a design variant—the RSP Design Variant—that would address stakeholder concerns and minimize impacts, to the degree feasible, on existing and planned development in Millbrae. The RSP Design Variant could apply to both project alternatives and would involve building new HSR station facilities on the west side of the existing Millbrae BART/Caltrain Intermodal Station.

S.5.4.2 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 Final 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.5.4.3 Passing Track Options

Since the framework for blended system operations was established in 2012, the Authority and the PCJPB¹¹ 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 and Final 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 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.5.4.4 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

¹¹ PCJPB is the owner and managing authority for the Peninsula Corridor.

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.5.4.5 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.

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
AQ-IAMF#6	Reduce the Potential Impact of Concrete Batch Plants
Aesthetics and Visual Quality	
AVQ-IAMF#1	Aesthetic Options
AVQ-IAMF#2	Aesthetic Review Process

Impact Avoidance and Minimization Features	
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 and BMP Training
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
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

Impact Avoidance and Minimization Features	
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 I and Phase II 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
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

Impact Avoidance and Minimization Features	
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 Implementation 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 of the Final EIR/EIS. Chapter 3 of the Final 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” trips¹² 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 Final 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 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.
- **EMF and 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.

¹² 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.

- **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-7 shows a summary of resources subject to significant impacts under CEQA and applicable mitigation measures. Table S-8 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 2016 Business Plan (Authority 2016). 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 (CO₂e) 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 CO₂e (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 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 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 in Santa Clara and 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 construction 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.

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 uses of Section 4(f) properties as a result of the project alternatives. Section S.10, Environmental Justice, describes adverse and beneficial effects on minority populations and low-income 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 eight existing Caltrain 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 (one additional commercial business displacement would occur with the DDV). 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-

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.

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 258.3 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. However, Alternative A would require culverting a portion of Visitacion Creek to construct the East Brisbane LMF, resulting in greater impacts on aquatic resources within BCDC jurisdiction (including the placement of fill) than would occur under Alternative B. 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.

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 11 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 284.0 acres (Viaduct to I-880) or 279.1 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 Santa Clara and 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 ²
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 will 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 will 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 ²
Parking		
Impact TR#6: Temporary Construction-Related Effects on Parking	<p>Some parking space displacement would occur along the Caltrain corridor and at Caltrain stations during construction.</p> <p>An estimated 397 parking spaces without the DDV and 432 parking spaces with the DDV at the San Jose Diridon Station and SAP Center would be temporarily displaced during construction.</p> <p>Project features will 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.</p>	<p>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.</p> <p>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.</p>
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.	Similar to 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.	Similar to 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 ²
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. Emissions of all pollutants would be less than the respective General Conformity <i>de minimis</i> thresholds. ¹³	Emissions would be greater than Alternative A primarily because of construction of the passing tracks and the larger number of truck trips required for construction of the LMF under Alternative B. Construction-related VOC and NO _x emissions would exceed BAAQMD significance thresholds and NO _x emissions would exceed the General Conformity <i>de minimis</i> threshold. Alternative B (Viaduct to Scott Boulevard) would have slightly greater emissions (except for NO _x and fugitive PM) than Alternative B (Viaduct to I-880) because of additional construction activity required for the longer viaduct.
Impact AQ#2: Temporary Direct and Indirect Impacts on Air Quality within the NCCAB	Temporary construction activity (truck travel on SR 152) would generate criteria pollutants, but those emissions would not degrade air quality resources in the NCCAB because the RSA is considered in attainment for all criteria pollutants and there are no General Conformity <i>de minimis</i> thresholds.	Similar to Alternative A. Emissions would be greater than under Alternative A because more truck trips would be required for construction of the LMF under Alternative B.

¹³ Although Table 3.3-12 shows that Alternative A in 2025 would have NO_x emissions of 104 tons, which is greater than the General Conformity threshold of 100 tons, Table 3.3-12 includes emissions associated with construction of the San Jose Diridon Station Approach Subsection. The General Conformity Determination presented in Appendix 3.3-B does not include the San Jose Diridon Station Approach Subsection, which is analyzed as part of the general conformity determination for the San Jose to Merced Project Section. When the emissions in the San Jose Diridon Station Approach Subsection are excluded for purposes of conformity evaluation (see Table 6 of Appendix 3.3-B), all emissions under Alternative A are less than the applicable General Conformity thresholds. Under Alternative B, NO_x emissions exceed the General Conformity threshold both with and without the San Jose Diridon Station Approach Subsection.

Resource Category	Construction Impacts	
	Alternative A	Alternative B ²
Impact AQ#3: Temporary Direct and Indirect Impacts on Air Quality within the SJVAB	Temporary construction activity (truck travel on SR 152 and I-5) would generate criteria pollutants, but those emissions would not degrade air quality resources in the SJVAB because emissions of all criteria pollutants would be less than the respective General Conformity <i>de minimis</i> thresholds.	Similar to Alternative A. Emissions would be greater than under Alternative A because more truck trips would be required for construction of the LMF under Alternative B.
Impact AQ#4: Temporary Direct Impacts on Implementation of an Applicable Air Quality Plan	<p>Emissions of criteria pollutants from temporary construction activity in the SFBAAB would not exceed the General Conformity <i>de minimis</i> thresholds.¹⁴</p> <p>Emissions of criteria pollutants from temporary construction activity in the NCCAB would not be subject to the General Conformity <i>de minimis</i> thresholds.</p> <p>Emissions of criteria pollutants from temporary construction activity in the SJVAB would not exceed the General Conformity <i>de minimis</i> thresholds.</p> <p>Therefore, construction emissions would not impede implementation of air quality plans in the SFBAAB (once mitigation offsets are applied), NCCAB, and SJVAB.</p>	<p>Emissions of NO_x from temporary construction activity in the SFBAAB would exceed the General Conformity <i>de minimis</i> thresholds and so could impede implementation of air quality plans in the SFBAAB. Emissions of criteria pollutants other than NO_x from temporary construction activity in the SFBAAB would not exceed the <i>de minimis</i> thresholds.</p> <p>Emissions of criteria pollutants from temporary construction activity in the NCCAB would be greater than under Alternative A but would not be subject to the General Conformity <i>de minimis</i> thresholds.</p> <p>Emissions of criteria pollutants from temporary construction activity in the SJVAB would be greater than under Alternative A but would not exceed the General Conformity <i>de minimis</i> thresholds.</p> <p>Therefore, construction emissions would not impede implementation of air quality plans in the NCCAB and SJVAB.</p>
Impact AQ#5: Temporary Direct Impacts on Localized Air Quality in the SFBAAB—Criteria Pollutants	<p>Construction-related PM₁₀ concentrations would contribute to existing exceedances of the PM₁₀ CAAQS.</p> <p>Construction-related criteria pollutant concentrations would lead to new exceedances of the PM_{2.5} CAAQS and NAAQS.</p>	Similar to Alternative A. Emissions would be greater than Alternative A primarily because of construction of the passing tracks and the viaduct. 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.

¹⁴ Although Table 3.3-12 shows that Alternative A in 2025 would have NO_x emissions of 104 tons, which is greater than the General Conformity threshold of 100 tons, Table 3.3-12 includes emissions associated with construction of the San Jose Diridon Station Approach Subsection. The General Conformity Determination presented in Appendix 3.3-B does not include the San Jose Diridon Station Approach Subsection, which is analyzed as part of the general conformity determination for the San Jose to Merced Project Section. When the San Jose Diridon Station Approach Subsection is excluded from Table 3.3-12 for purposes of conformity evaluation (see Table 6 of Appendix 3.3-B), all emissions under Alternative A are less than the applicable General Conformity thresholds. Under Alternative B, NO_x emissions exceed the General Conformity threshold both with and without the San Jose Diridon Station Approach Subsection.

Resource Category	Construction Impacts	
	Alternative A	Alternative B ²
Impact AQ#6: Temporary Direct Impacts on Localized Air Quality in the SFBAAB—Exposure to Diesel Particulate Matter and PM _{2.5} (Health Risk)	Temporary construction activity would not generate DPM or PM _{2.5} concentrations greater than applicable health risk thresholds, with or without the DDV. The maximum increase in potential cancer risk (5.5 per million without the DDV) and an acute Hazard Index of 0.1 would occur in the San Jose Diridon Station Approach Subsection. For Alternative A with the DDV, the incremental cancer risk would be 8.4 per million.	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 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 (with either viaduct option) would be slightly greater than Alternative A.
Impact AQ#7: Temporary Direct Impacts on Localized Air Quality—Exposure to Asbestos, Lead-Based Paint, and Fungal Spores That Cause Valley Fever	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. Because Valley fever is rare within the SFBAAB, there would be limited potential for exposure of sensitive receptors to <i>C. immitis</i> . There would be no potential for exposure of sensitive receptors to <i>C. immitis</i> associated with truck travel in the NCCAB or SJVAB because there would be no earth disturbance in the NCCAB or SJVAB.	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). Because Valley fever is rare within the SFBAAB, there would be limited potential for exposure of sensitive receptors to <i>C. immitis</i> . There would be no potential for exposure of sensitive receptors to <i>C. immitis</i> associated with truck travel in the NCCAB or SJVAB because there would be no earth disturbance in the NCCAB or SJVAB.
Impact AQ#8: Temporary Direct Impacts on Localized Air Quality in the SFBAAB—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#16: Temporary Direct and Indirect Impacts on Global Climate Change—Greenhouse Gas Emissions	GHG emissions generated during temporary construction of 8,727 MT CO ₂ e per amortized year would be offset by reductions achieved through project operations within 2 to 6 months (relative to No Project conditions).	GHG emissions generated during temporary construction of 10,590 MT CO ₂ e per amortized year for Alternative B (Viaduct to I-880) and 10,534 MT CO ₂ e 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).

Resource Category	Construction Impacts	
	Alternative A	Alternative B ²
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 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.
Vibration		
Impact NV#8: Temporary Exposure of Sensitive Receptors and Buildings to Construction Vibration	During nighttime work, potential human annoyance due to construction vibration within 140 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

Resource Category	Construction Impacts	
	Alternative A	Alternative B ²
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 260 major utility lines in the RSA for Alternative A.	Similar to Alternative A, except there are 256 major utility lines in the RSA for Alternative B (Viaduct to I-880) and 249 major utility lines in the RSA for Alternative B (Viaduct to Scott Boulevard).
Impact PUE#2: Existing Major Utilities Requiring Relocation or Removal	<p>Permanent conflicts between major utilities would be minimized because existing major utilities would be permanently relocated or protected in place through agreements between the Authority and utility service providers. Alternative A would require the following:</p> <ul style="list-style-type: none"> ▪ Relocation of 53 major utilities ▪ Protection in place of 200 major utilities ▪ Extension of 6 major utilities ▪ Unknown action (relocation, protection in place, or extension) to be taken on 1 major utility 	<p>Similar to Alternative A, except Alternative B (Viaduct to I-880) would result in the following:</p> <ul style="list-style-type: none"> ▪ Relocation of 78 major utilities ▪ Protection in place of 166 major utilities ▪ Extension of 11 major utilities ▪ Unknown action (relocation, protection in place, or extension) to be taken on 1 major utility <p>Alternative B (Viaduct to Scott Boulevard) would result in the following:</p> <ul style="list-style-type: none"> ▪ Relocation of 81 major utilities ▪ Protection in place of 157 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 new utility infrastructure, including electrical infrastructure to power the HSR system (including an electrical substation at the Brisbane LMF), potable water and wastewater utility connections to serve the stations and maintenance facilities, and new stormwater management structures and drainage infrastructure.	Similar to Alternative A, except Alternative B (both viaduct options) also includes the construction of a TPSS and OCS 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.	<p>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.</p> <p>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.</p>

Resource Category	Construction Impacts	
	Alternative A	Alternative B ²
Impact PUE#6: Temporary Impacts from Wastewater and Stormwater Generation	<p>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.</p> <p>Additionally, project features minimize generation of stormwater from project construction, such that the capacity of existing stormwater management systems would not be exceeded.</p>	<p>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.</p> <p>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.</p> <p>Additionally, project features minimize generation of stormwater from project construction, such that the capacity of existing stormwater management systems would not be exceeded.</p>
Impact PUE#7: Temporary Generation of Solid Waste and Hazardous Wastes	<p>Construction would result in 2,262,700 cubic yards of surplus excavation material. Of this material, approximately 208,300 cubic yards would be hazardous solid waste and 2,054,400 would be nonhazardous solid waste.</p> <p>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.</p> <p>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.</p>	<p>Construction would result in 800,000 cubic yards of surplus excavation material. Of this material, approximately 432,000 cubic yards would be hazardous solid waste and 368,000 would be nonhazardous solid waste.</p> <p>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.</p> <p>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).</p>
Energy		
Impact PUE#12: Temporary Consumption of Energy during Construction	Construction would require 10,819 billion Btu.	Construction would require 11,125 billion Btu for Alternative B (Viaduct to I-880) and 10,992 billion Btu for Alternative B (Viaduct to Scott Boulevard).

Resource Category	Construction Impacts	
	Alternative A	Alternative B ²
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.	
<i>Habitat for bent-flowered fiddleneck</i>	98.5	51.9
<i>Habitat for bristly sedge</i>	1.8	9.3
<i>Habitat for California seablite</i>	1.3	0.7
<i>Habitat for coastal marsh milkvetch</i>	1.3	0.7
<i>Habitat for Congdon's tarplant</i>	95.5	48.1/48.8
<i>Habitat for pappose tarplant</i>	1.3	0.7
<i>Habitat for saline clover</i>	1.3	0.7
<i>Habitat for Point Reyes salty bird's-beak</i>	1.3	0.7
Impact BIO#2a: 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; however, construction activities would remove habitat for listed butterfly species at the East Brisbane LMF	Construction activities would remove habitat for listed butterfly species at Icehouse Hill and the West Brisbane LMF in Brisbane, and could result in direct mortality of individuals, if present in affected habitat.
<i>Habitat for Bay checkerspot butterfly, callippe silverspot butterfly, and Mission blue butterfly</i>	96.3	108.1
Impact BIO#2b: Permanent Conversion or Degradation of Habitat for and Mortality of Monarch Butterfly	The project would disturb or convert habitat for monarch butterfly and could degrade suitable habitat outside of but adjacent to the project footprint. Activities could also result in mortality of individuals if present in affected habitat.	

Resource Category	Construction Impacts	
	Alternative A	Alternative B ²
<i>Habitat for monarch butterfly</i>	139.7	163.4
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.
<i>Habitat for central California coast steelhead</i>	3.7	2.9
<i>Habitat for green sturgeon</i>	7.0	5.8
<i>Habitat for Pacific lamprey</i>	3.0	2.3
<i>Essential Fish Habitat for Pacific Coast salmon</i>	2.8	2.1
<i>Essential Fish Habitat for Pacific Coast Groundfish</i>	2.4	3.0
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.	
<i>Habitat for California red-legged frog</i>	17.7	23.5
<i>Habitat for western pond turtle</i>	43.9	73.7/72.9

Resource Category	Construction Impacts	
	Alternative A	Alternative B ²
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.	
<i>Habitat for San Francisco garter snake</i>	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.	
<i>Habitat for burrowing owl</i>	134.5	108/109
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.	
<i>Habitat for Alameda song sparrow</i>	1.3	0.7
<i>Habitat for saltmarsh common yellowthroat</i>	1.7	8.6
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.	
<i>Habitat for least Bell's vireo</i>	2.1	3.6
<i>Habitat for yellow warbler</i>	0.7	1.9
<i>Habitat for tricolored blackbird</i>	8.8	4.6/5.5
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.	

Resource Category	Construction Impacts	
	Alternative A	Alternative B ²
<i>Nesting habitat for white-tailed kite</i>	22.8	19.9/27.5
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.	
<i>Habitat for San Francisco dusky-footed woodrat and ringtail</i>	0.7	2.0/9.7
Impact BIO#11: Loss of Breeding, Foraging, and Dispersal Habitat for and Direct Mortality or Disturbance of Mountain Lion	Construction activities would not remove or disturb any habitat for mountain lion. Activities are not expected to result in injury or mortality of individual mountain lions due to their extremely low potential to occur in the project corridor.	
Impact BIO#12: 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.	
<i>Roosting habitat for pallid bat</i>	1.5	1.3
<i>Roosting habitat for Townsend's big-eared bat</i>	1.5	1.3
<i>Roosting habitat for western red bat</i>	11.8	13.8/21.4
Impact BIO#15: 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 will 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.
Impact BIO#16: 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.

Resource Category	Construction Impacts	
	Alternative A	Alternative B ²
Impact BIO#18: 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.	
<i>Riparian and scrub/shrub wetland potentially supporting arroyo willow thickets</i>	2.3	1.9
<i>Saline emergent wetland potentially supporting pickleweed mats</i>	1.3	0.7
Impact BIO#20: 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.	
<i>Wetlands</i>	3.1	10.0
<i>Nonwetlands</i>	8.6	8.1
<i>Total aquatic resources</i>	11.7	18.1
Impact BIO#21: 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.	
<i>Riparian habitat</i>	2.8	3.7
<i>Rivers, lakes, and streams</i>	7.1	6.6
<i>Total aquatic resources</i>	9.9	10.3

Resource Category	Construction Impacts	
	Alternative A	Alternative B ²
Impact BIO#23: Removal of Trees Protected under Municipal Tree Ordinances	Construction activities may remove or disturb trees protected under municipal ordinances.	
Impact BIO#25: 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#27: 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.	
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 9 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.

Resource Category	Construction Impacts	
	Alternative A	Alternative B ²
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 159.2 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 3,014,700 more cubic yards of cut and fill and more new or replaced impervious surface (78.8 more acres for Viaduct to I-880 or 99.4 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 989 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 (119 more acres for Viaduct to I-880 and 148 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.
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. A stormwater management and treatment plan will manage the quality and quantity of runoff generated by impervious surfaces. However, 10 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 two fewer aquatic resources.

Resource Category	Construction Impacts	
	Alternative A	Alternative B ²
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 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.
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. A flood protection plan that includes hydraulic analysis of all permanent improvements in regulated 100-year floodplains will minimize permanent impacts on floodplains.	Same as Alternative A

Resource Category	Construction Impacts	
	Alternative A	Alternative B ²
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
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 989 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 will minimize soil erosion and the loss of topsoil.	Construction of Alternative B (Viaduct to I-880) would require soil disturbance of 1,108 acres, and construction of Alternative B (Viaduct to Scott Boulevard) would require soil disturbance of 1,137 acres. The project would include 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.

Resource Category	Construction Impacts	
	Alternative A	Alternative B ²
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, 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 project features minimize the potential for loss of life and structural damage from exposure to surface fault rupture during construction.	Same as Alternative A
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 also includes a CMP that will 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 greater 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 require compliance with regulations that control the transport, use, and storage of hazardous materials; proper permitting; and written hazard communication and spill prevention plans to avoid worker and public exposure to hazardous materials.	Same as Alternative A

Resource Category	Construction Impacts	
	Alternative A	Alternative B ²
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 require characterizing contamination before it is disturbed, managing required disturbances, stopping work if undocumented contamination is discovered, and 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 will be the same as Alternative A.
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 to and underlying 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 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 will 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 will minimize exposure of the public and construction workers to asbestos during construction.

Resource Category	Construction Impacts	
	Alternative A	Alternative B ²
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 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 will address undocumented contaminants encountered during earth-disturbing activities.

Resource Category	Construction Impacts	
	Alternative A	Alternative B ²
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 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 will 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. A landfill cap design report will be prepared and would include final cover requirements consistent with Title 27. These project features 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 will 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 call for a stop to work upon discovery of undocumented contamination and a CMP, as well as barriers and hazard controls, which will 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 ²
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 detours with the potential to delay emergency vehicle access and increase response times.	Construction activity under Alternative B would result in more temporary road closures than Alternative A because construction of the passing track and viaduct options would require construction affecting more roadways. Alternative B (Viaduct to I-880) would have less construction-period disruption than Alternative B (Viaduct to Scott Boulevard) due to less roadway work. Delays in emergency vehicle access and increases in response times under Alternative B would occur as a result of detours 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 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 and Relocated Brisbane Fire Station (Alternative A) would provide equivalent emergency vehicle access to existing conditions and would not add delay to response times or other performance objectives. Other road closures associated with construction would not affect emergency response times.	The permanent relocation and realignment of the Tunnel Avenue overpass would remove exclusive access for the Relocated Brisbane Fire Station (Alternative B) to the signalized Bayshore Boulevard/Valley Drive intersection and replace it with a driveway that would have unsignalized right-in, right-out access to Bayshore Boulevard and a driveway with non-exclusive access to the new Tunnel Avenue/Bayshore Boulevard intersection, such that additional delay for exiting fire trucks and delays in response times for fire trucks exiting the Relocated Brisbane Fire Station (Alternative B) would occur. However, SS-MM#2 will provide a new exclusive mid-block intersection for the Relocated Brisbane Fire Station (Alternative B), which will address this delay.

Resource Category	Construction Impacts	
	Alternative A	Alternative B ²
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 will 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 will comply with all legal requirements and include an SSMP to reduce the potential of construction site hazards and accidents.	Same as Alternative A
Impact S&S#9: Temporary Exposure to Construction-Related 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 will 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 and viaducts. 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. Alternative B (Viaduct to I-880) would have less construction-period disruption than Alternative B (Viaduct to Scott Boulevard) due to less roadway work. 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 include roadway modifications that will 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.

Resource Category	Construction Impacts	
	Alternative A	Alternative B ²
Impact S&S#11: Permanent Interference with Airport Safety	Project structures, including 11 proposed radio towers, would exceed FAR Part 77 imaginary surfaces 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 will work with the FAA to implement FAA-proposed mitigation measures (if any) for FAR Part 77 notification structures.	Same as Alternative A
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 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	<p>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 260 high-risk utilities, 200 would be protected in place, 53 would be relocated, and 6 would be extended. The disposition of one other high-risk utility for Alternative A would be determined prior to construction.</p> <p>The SSMP will identify high-risk facilities that could be affected by construction and would include procedures to remove, relocate, or protect in place pipelines, electrical systems, and other buried and overhead high-risk facilities within the project footprint.</p>	<p>There are 168 high-risk facilities within 2 miles of the project footprint under Alternative B (both viaduct options). There would be 256 high-risk utilities within the RSA for Alternative B (Viaduct to I-880), of which 166 would be protected in place, 78 would be relocated, 11 would be extended, and the disposition of 1 utility would be determined prior to construction. There would be 249 high-risk utilities within the RSA for Alternative B (Viaduct to Scott Boulevard), of which 157 would be protected in place, 81 would be relocated, and 11 would be extended. Project features will minimize potential impacts of high-risk facilities and utilities in the same manner as Alternative A.</p>

Resource Category	Construction Impacts	
	Alternative A	Alternative B ²
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
Socioeconomics and Communities		
Communities and Neighborhoods		
Impact SOCIO#1: Temporary Disruption or Division of Established Communities from Project Construction	The construction transportation plan will 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: <ul style="list-style-type: none"> ▪ 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

Resource Category	Construction Impacts	
	Alternative A	Alternative B ²
	<p>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.</p>	<p>Similar to Alternative A, except in the:</p> <ul style="list-style-type: none"> 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 <p>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.</p>
Impact SOCIO#2: Permanent Disruption or Division of Established Communities from Project Construction	<p>Permanent changes to circulation and access include:</p> <ul style="list-style-type: none"> Permanent closure of Serra Avenue Realignment of Tunnel Avenue for the East Brisbane LMF Reconfiguration of the Tunnel Avenue overpass and Lagoon Road Modifications to Bayshore Station Safety improvements at 41 at-grade crossings <p>The permanent transportation features associated with Alternative A would not physically divide an established community.</p>	<p>Permanent changes to circulation and access would be the same as Alternative A except:</p> <ul style="list-style-type: none"> No realignment of Tunnel Avenue Relocation of San Carlos Station Permanent closures of 4 roads Safety improvements at 39 at-grade crossings <p>The permanent transportation features associated with Alternative B would not physically divide an established community.</p>
	<p>Alternative A without the DDV would displace 14 residential units, 48 businesses (49 with the DDV), 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.</p>	<p>Alternative B (Viaduct to I-880) would displace 42 residential units, 171 businesses, and 6 community and public facilities. 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.</p>

Resource Category	Construction Impacts	
	Alternative A	Alternative B ²
	<p>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.</p>	<p>Similar to Alternative A, except in the:</p> <ul style="list-style-type: none"> 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 <p>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.</p>
Children's Health and Safety		
Impact SOCIO#4: Temporary Impacts on Children's Health and Safety from Project Construction	<p>Construction of the project would:</p> <ul style="list-style-type: none"> 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 fields 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 <p>No disproportionate impacts on children's health and safety would occur.</p>	<p>Similar to Alternative A, except:</p> <ul style="list-style-type: none"> 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 <p>No disproportionate impacts on children's health and safety would occur.</p>

Resource Category	Construction Impacts	
	Alternative A	Alternative B ²
Impact SOCIO#5: Permanent Impacts on Children’s Health and Safety from Project Construction	<p>Project construction would:</p> <ul style="list-style-type: none"> Not require the acquisition of any community facilities where children congregate Modify 40 at-grade crossings for safety <p>No disproportionate impacts on children’s health and safety would occur.</p>	<p>Similar to Alternative A, except:</p> <ul style="list-style-type: none"> Would require the acquisition of the Universe of Colors Preschool in San Mateo and Alternative B (Viaduct to Scott Boulevard) would require the acquisition of a storage building at Bellarmine College Preparatory in San Jose Modify 38 at-grade crossings for safety improvements <p>No disproportionate impacts on children’s health and safety would occur.</p>
Property Displacements and Relocations		
Impact SOCIO#7: Displacements and Relocations of Residences from Project Construction	<ul style="list-style-type: none"> 14 residential units displaced Sufficient available relocation properties exist, so residents could relocate within same communities 	<p>Similar to Alternative A, except:</p> <ul style="list-style-type: none"> 42 residential units displaced under Alternative B (Viaduct to I-880) 62 residential units displaced under Alternative B (Viaduct to Scott Boulevard) <p>Sufficient available relocation properties exist, so residents could relocate within same communities.</p>
Impact SOCIO#8: Displacements and Relocations of Commercial and Industrial Businesses from Project Construction	<ul style="list-style-type: none"> 48 commercial and industrial businesses displaced, including Brisbane Corporation Yard <p>Sufficient available relocation properties exist in the region, but some businesses in Millbrae and Belmont may be unable to relocate within same community.</p> <p>Under Alternative A with the DDV, there would be one additional commercial business displacement.</p>	<p>Similar to Alternative A except:</p> <ul style="list-style-type: none"> 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) <p>Sufficient available relocation properties exist in the region, but some businesses in Millbrae and Belmont may be unable to relocate within same community.</p>
Impact SOCIO#9: Displacements and Relocation of Community and Public Facilities from Project Construction	<p>Community/public facilities displaced, including:</p> <ul style="list-style-type: none"> Brisbane Fire Station Millbrae Station Historic Depot Templo La Hermosa 	<p>Similar to Alternative A, except also:</p> <ul style="list-style-type: none"> Preschool in San Mateo Animal shelter in Belmont San Jose Taiko Conservatory Storage building at Bellarmine College Preparatory (Viaduct to Scott Boulevard only)

Resource Category	Construction Impacts	
	Alternative A	Alternative B ²
Economic Impacts		
Impact SOCIO#10: Temporary Impacts on Employment from Project Construction	4,900 direct, indirect, and induced job-years, representing a small increase in employment demand for the region	9,540 (Viaduct to I-880) or 11,130 (Viaduct to Scott Boulevard) direct, indirect, and induced job-years, representing a small increase in employment demand for the region
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	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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	\$9.4 million increase in sales tax revenues to the RSA	\$18.3 million (Viaduct to I-880) or \$21.4 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 103.4 acres. Lands would be restored to their pre-construction condition, and land use patterns would not be substantially altered.	Similar to Alternative A, but construction of the project would temporarily convert 105.6 acres under Alternative B (Viaduct to I-880) and 123.6 acres under Alternative B (Viaduct to Scott Boulevard).

Resource Category	Construction Impacts	
	Alternative A	Alternative B ²
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, and temporary visual changes that would affect adjacent land uses. Project features 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 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	<p>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.</p> <p>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 the Millbrae Station. Construction of the Millbrae Station modifications 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.</p> <p>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.</p>	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 ²
Impact LU#5: Permanent Alteration of Land Use Patterns from Land Use Conversion at the Brisbane Light Maintenance Facility	<p>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, public facilities, parks/open space, and transportation land uses.</p> <p>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 108.6 acres of land planned for planned development (residential prohibited).</p> <p>Construction of the East Brisbane LMF would affect 0.5 acre of the planned development associated with Schlage Lock project; however, it is expected that development would still occur in the areas not affected by the East Brisbane LMF.</p>	<p>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.</p> <p>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 93.6 acres of land planned for planned development (residential prohibited) and 22.1 acres of land planned for planned development (residential permitted).</p> <p>Construction of the West Brisbane LMF would affect 0.03 acre of the planned development associated with Schlage Lock project; however, it is expected that development would still occur in the areas not affected by the West Brisbane LMF.</p>
Conflict with BCDC Bay Plan Shoreline Band Policies		
Impact LU#7: Conflict with BCDC Shoreline Band Policies	<p>Alternative A would not result in a substantial change in land uses designated in the BCDC Bay Plan for priority use areas within a shoreline band.</p> <p>Development within the 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.</p>	<p>Similar to Alternative A, except Alternative B would not affect the shoreline band of Visitacion Creek.</p>
Inducement of Population Growth beyond Planned Levels		
Impact LU#8: Temporary Induced Population Growth	<p>Population growth that might be induced by increased employment opportunities for construction would not exceed planned levels.</p>	<p>Population growth that might be induced by increased employment opportunities for construction would not exceed planned levels.</p>

Resource Category	Construction Impacts	
	Alternative A	Alternative B ²
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 97 resources could be affected by noise, vibration, and air emissions.	The use and user experience at 100 resources could be affected by noise, vibration, and air emissions. Noise, vibration, and air emissions could be greater under Alternative B because of more intense construction associated with passing tracks and viaducts.
Impact PK#2: Temporary Changes to Access or Use of Parks	Access and use of 18 resources would be limited during construction because of TCEs and placement of equipment.	Viaduct to I-880: Access and use of up to 25 resources would be limited during construction because of TCEs and placement of equipment. Viaduct to Scott Boulevard: Access and use of up to 28 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 37 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 37 resources.	Depending on construction activity and duration as well as location, viewers at 40 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 40 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 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

Resource Category	Construction Impacts	
	Alternative A	Alternative B ²
Impact PK#6: Permanent Acquisition of Parks, Recreation, and Open-Space Resources	Construction would result in permanent acquisition of portions of two resources. All parks and trails would remain useable with project features.	Construction would result in permanent acquisition of portions of five resources (Viaduct to I-880) or six resources (Viaduct to Scott Boulevard). All parks and trails would remain useable with incorporation of project features and mitigation measures, with the exception of Reed and Grant Streets Sports Park (Viaduct to Scott Boulevard), where permanent acquisition would result in diminished capacity to use the resource.
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 could be affected by noise, vibration, and air emissions.	Same as Alternative A
Impact PK#10: Temporary Changes to Access to 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). 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

Resource Category	Construction Impacts	
	Alternative A	Alternative B ²
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 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
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

Resource Category	Construction Impacts	
	Alternative A	Alternative B ²
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 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#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).

Resource Category	Construction Impacts	
	Alternative A	Alternative B ²
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.
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	23 archaeological resources would be adversely affected. Of these, 9 completely or mostly encompassed; 14 narrow rights-of-way acquisitions.	23 archaeological resources would be adversely affected. Of these, 7 completely or mostly encompassed; 16 narrow rights-of-way acquisitions.
Impact CUL#3: Temporary Public Access and Disturbance of Archaeological resources	None anticipated	Same as Alternative A

Resource Category	Construction Impacts	
	Alternative A	Alternative B ²
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 effects

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

DDV = Diridon Design Variant

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

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.

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

NCCAB = North Central Coast Air Basin

NOA = naturally occurring asbestos

NO_x = nitrogen oxides

O₃ = ozone

PCB = polychlorinated biphenyls

PEC = potential environmental concern

PM₁₀ = 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

SJVAB = San Joaquin Valley Air Basin

SFBAAB = San Francisco Bay Area Air Basin

SR = State Route

SSMP = safety and security management plan

SWPPP = stormwater pollution prevention plan

TCE = temporary construction easement

VOC = volatile organic compound

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. 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 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. With identified mitigation, adverse effects would be avoided at 15 intersections.	Similar to Alternative A, except that this alternative would affect an additional five intersections (total of 91 affected intersections) in 2040 in the five subsections. With identified mitigation, adverse effects would be avoided at 17 intersections.
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, the majority 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 213 parking spaces without the DDV and 277 parking spaces with the DDV 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 will 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 percent statewide and 35 percent 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#9: 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, 294 to 561 tons of CO, 213 to 452 tons of NO _x , 23 to 49 tons of SO ₂ , 3 to 33 tons of PM ₁₀ , and 6 to 19 tons of PM _{2.5} , depending on the year and ridership scenario.	Same as Alternative A
Impact AQ#10: 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#11: 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#12: 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#13: Continuous Permanent Direct Impacts on Localized Air Quality—Particulate Matter Hot Spots (NAAQS Compliance)	The project does not meet the criteria for 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#14: 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#15: 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#17: 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	<p>Permanent noise impacts from 2029 Plus Project condition at 4th and King Street Station and approach:</p> <ul style="list-style-type: none"> ▪ none <p>Permanent noise impacts from 2040 Plus Project condition:</p> <ul style="list-style-type: none"> ▪ 4,295 moderate noise impacts ▪ 1,770 severe noise impacts 	<p>Permanent noise impacts from 2029 Plus Project condition at 4th and King Street Station and approach:</p> <ul style="list-style-type: none"> ▪ none <p>Permanent noise impacts from 2040 Plus Project condition:</p> <p>Viaduct to I-880:</p> <ul style="list-style-type: none"> ▪ 4,186 moderate noise impacts ▪ 1,648 severe noise impacts <p>Viaduct to Scott Boulevard:</p> <ul style="list-style-type: none"> ▪ 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	<p>Noise contribution from parking facilities:</p> <ul style="list-style-type: none"> ▪ 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 <p>This additional noise would be substantially lower than noise from HSR trains. No additional impact is projected.</p>	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	<p>Noise contribution from LMF:</p> <ul style="list-style-type: none"> 36 dBA L_{dn} contribution from train movements at the East Brisbane LMF <p>This additional noise would be substantially lower than noise from HSR trains. No additional impact is projected.</p>	<p>Noise contribution from LMF:</p> <ul style="list-style-type: none"> 40 dBA L_{dn} contribution from train movements at the West Brisbane LMF <p>This additional noise would be substantially lower than noise from HSR trains. No additional impact is projected.</p>
Impact NV#5: Intermittent Permanent Human Annoyance from Onset of Passing HSR Trains	<p>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.</p>	<p>Same as Alternative A</p>
Impact NV#6: Permanent Exposure of Sensitive Receptors to Vehicular Traffic Noise Increases	<p>Roadway segments with an anticipated increase in traffic noise of ≥ 3 dB compared to existing conditions include:</p> <p>2029 Plus Project conditions at 4th and King Street Station and approach:</p> <ul style="list-style-type: none"> 2 segments near 4th and King Street Station <p>2040 Plus Project conditions:</p> <ul style="list-style-type: none"> 4 segments near Diridon Station 	<p>Similar to Alternative A</p> <p>2029 Plus Project conditions at 4th and King Street Station and approach:</p> <ul style="list-style-type: none"> 2 segments near 4th and King Street Station <p>2040 Plus Project conditions:</p> <ul style="list-style-type: none"> 5 segments near Diridon Station
Impact NV#7: Traction Power Facility Noise	<p>The installation of additional equipment at PCEP TPFs would generate noise, but would not cause additional noise impacts beyond those from trains and horns.</p>	<p>Same as Alternative A in regard to the addition of equipment at PCEP TPFs. Regarding the new TPSS, for Alternative B, no noise-sensitive receptors lie within the screening distance and no noise impacts were determined.</p>
Vibration		
Impact NV#9: Intermittent Permanent Exposure of Sensitive Receptors to Vibration from Operations	<p>Permanent vibration impacts from 2029 Plus Project conditions at 4th and King Street Station and approach:</p> <ul style="list-style-type: none"> none <p>Permanent vibration impacts from 2040 Plus Project:</p> <ul style="list-style-type: none"> 2,493 ground-borne vibration impacts <p>Permanent ground-borne noise impacts from 2029 Plus Project conditions at 4th and King Street Station and approach:</p> <ul style="list-style-type: none"> none <p>Permanent ground-borne noise impacts from 2040 Plus Project:</p> <ul style="list-style-type: none"> 18 ground-borne noise impacts 	<p>Permanent vibration impacts from 2029 Plus Project conditions at 4th and King Street Station and approach:</p> <ul style="list-style-type: none"> none <p>Permanent vibration impacts from 2040 Plus Project:</p> <p>Viaduct to I-880:</p> <ul style="list-style-type: none"> 2,307 ground-borne vibration impacts <p>Viaduct to Scott Boulevard:</p> <ul style="list-style-type: none"> 2,366 ground-borne vibration impacts <p>Same as Alternative A with respect to ground-borne noise impacts.</p>

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 and passengers 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.	Similar to 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. The ISEP avoids impacts by restricting the public and workers with implanted medical devices from accessing these facilities (EMF/EMI-IAMF#2).	Same as Alternative A
Impact EMF/EMI#4: Interference with Sensitive Equipment	The RSA includes eight medical or industrial/research facilities with sensitive equipment, five of which would be exposed to a magnetic shift of greater than 2 mG. The Authority will coordinate with third parties to identify sensitive equipment at the known receptors with sensitive equipment (EMF/EMI-IAMF#2). 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, will avoid impacts.	The RSA includes nine 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.	Same as Alternative A
Impact EMF/EMI#6: Potential for Corrosion of Underground Pipelines, Cables, and Adjoining Rail	The project will 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 will 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. Project features include working with the engineering departments of adjacent parallel railroads to prevent interference from HSR-generated EMI (EMF/EMI-IAMF#1).	Same as Alternative A
Impact EMF/EMI#9: Electromagnetic Interference with Airports	The project alternatives would pass within 1,000 feet of SFO, 1,600 feet of the SJC, and 2,400 feet of SQL. HSR communications equipment will use dedicated frequency allocations and relevant FAA engineering offices will 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 require recycling and reusing 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 will 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 will 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	<p>Operations would result in a net decrease in regional energy consumption of 5,943,280 MMBtu per year for the medium ridership scenario and a net decrease of 5,817,300 MMBtu per year for the high ridership scenario in 2040. It would take approximately 3.9 and 3.4 years of regional energy reductions to recoup the energy consumed during construction under the medium and high ridership scenarios, respectively.</p> <p>Operations would result in a net decrease in statewide energy consumption of 15,427,700 MMBtu per year for the medium ridership scenario and a net decrease of 23,641,110 MMBtu per year for the high ridership scenario in 2040.</p> <p>It would take approximately 1.3 and 1.8 years of statewide energy reductions to recoup the energy consumed during construction under the medium and high ridership scenarios, respectively.</p>	<p>Similar to Alternative A for Alternative B (both viaduct options), with the exception of the payback period for construction energy. It would take approximately 4.0 and 3.9 years of regional energy reductions to recoup the energy consumed during construction under the medium ridership scenario, respectively for Alternative B (Viaduct to I-880) and Alternative B (Viaduct to Scott Boulevard). It would take approximately 3.5 and 3.4 years of regional energy consumption to recoup the energy consumed during construction under the high ridership scenario, respectively for Alternative B (Viaduct to I-880) and Alternative B (Viaduct to Scott Boulevard).</p> <p>The payback period for statewide energy reductions would be 1.3 years for the medium ridership scenario and 1.9 years for the high ridership scenario for Alternative B (Viaduct to I-880) and would be 1.3 years for the medium ridership scenario and 1.8 years for the high ridership scenario for Alternative B (Viaduct to Scott Boulevard).</p>

Resource Category	Operations Impacts	
	Alternative A	Alternative B
Biological and Aquatic Resources		
Impact BIO#13: 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#14: 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.	
Impact BIO#17: 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#19: 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#22: 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#24: 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#26: 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.	

Resource Category	Operations Impacts	
	Alternative A	Alternative B
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. BMPs, a SWPPP under the IGP, and an O&M plan under the Phase II MS4 permit will 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.
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 traction power facilities would also be protected from flooding. 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 avoid substantial impacts 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 as 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 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.

Resource Category	Operations Impacts	
	Alternative A	Alternative B
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 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.
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 will 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 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 will assess geotechnical conditions and employ ground improvement methods and slope reinforcement, which will minimize the potential for loss of life and structural damage from exposure to secondary seismic hazards. The project will 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 will 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 will 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 the Brisbane LMF in the event of an incident. Project design features include emergency operating procedures, SSP, SEPP, a fire and life safety program, and coordination with local emergency response providers, which 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.	While Alternative B would introduce new elevated viaducts, these would not limit access of emergency service provided to the right-of-way, stations, or the Brisbane LMF in the event of an incident. Otherwise, same as Alternative A.
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

Resource Category	Operations Impacts	
	Alternative A	Alternative B
Community Safety and Security		
Impact S&S#14: Permanent Exposure to Rail-Related Hazards	<p>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).</p> <p>However, project features include safety elements, including an intrusion detection system for dedicated HSR facilities, to maximize operational safety and minimize the potential for train-to-train collisions or derailments, collisions between trains and objects, and at-grade crossing incidents involving vehicles, pedestrians, or bicyclists.</p>	<p>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.</p> <p>Project features will include the same safety elements as Alternative A, and will also include an intrusion detection system for the dedicated HSR track in the San Jose Diridon Station Approach Subsection.</p>
Impact S&S#15: Continuous Permanent Exposure to High-Risk Facilities and Fall Hazards	<p>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.</p> <p>The Authority will conduct a PHA and develop the SSMP to minimize the potential for exposure to high-risk facilities and tall structures including bridges.</p>	<p>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 project alternatives, while the exposure to tall structures would be less for Alternative B (both viaduct options) than Alternative A.</p> <p>As with Alternative A, the Authority will conduct a PHA and develop the SSMP to minimize the potential for exposure to high-risk facilities and tall structures including bridges.</p>
Impact S&S#16: Continuous Permanent Exposure to Criminal and Terrorist Activity	<p>The location of the 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 developed prior to commencing operations will 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.</p>	<p>Similar to Alternative A. Differences between the project alternatives would not lead to heightened exposure to criminal or terrorist activity.</p>

Resource Category	Operations Impacts	
	Alternative A	Alternative B
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 will 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
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: <ul style="list-style-type: none"> 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 	Similar to Alternative A
	Operation of the project in existing transportation corridors would result in: <ul style="list-style-type: none"> 1,770 severe and 4,295 moderate noise 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: <ul style="list-style-type: none"> 1,648 severe and 4,186 moderate noise impacts in 2040 under Alternative B (Viaduct to I-880) 1,628 severe and 4,141 moderate noise impacts in 2040 under Alternative B (Viaduct to Scott Boulevard)

Resource Category	Operations Impacts	
	Alternative A	Alternative B
	Operations would not degrade the visual environment because the project alternatives would operate in an existing rail corridor.	Similar to Alternative A, except: <ul style="list-style-type: none"> ▪ Different site of the LMF ▪ Additional passing track ▪ Operations on 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: <ul style="list-style-type: none"> ▪ 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 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
Economic Impacts		
Impact SOCIO#14: Permanent Impacts on Regional Employment	<ul style="list-style-type: none"> ▪ 920 direct, indirect, and induced jobs annually would be provided ▪ 2,530 accessibility-based jobs would be in the RSA ▪ 3,450 total jobs during operations 	Same as Alternative A
Impact SOCIO#15: Permanent Impacts on Property Tax and Sales Tax Revenues	<ul style="list-style-type: none"> ▪ 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

Resource Category	Operations Impacts	
	Alternative A	Alternative B
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	<p>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.</p> <p>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.</p> <p>Operation of the Brisbane LMF would not substantially change planned land use patterns because project light and glare from the LMF will be minimized by lighting design features.</p>	Same as Alternative A
Inducement of Population Growth beyond Planned Levels		
Impact LU#9: Permanent Induced Population Growth	<p>Taking into consideration population growth associated with both increased accessibility and operation and maintenance employment, project operations are anticipated to generate induced growth of approximately 6,580 people within the three-county region by 2040. This would add about 0.16% to the region's population.</p> <p>Because the adopted station area and specific plans encourage TOD and plan for HSR service, project operation would not induce growth beyond planned levels.</p>	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	<p>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.</p>	Same as Alternative A

Resource Category	Operations Impacts	
	Alternative A	Alternative B
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 noise or vibration impacts at any school district play areas.	Same as Alternative A
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 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

Resource Category	Operations Impacts	
	Alternative A	Alternative B
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
 DDV = Diridon Design Variant
 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
 PM₁₀ = 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
 SFO = San Francisco International Airport
 SJC = Norman Y. Mineta San Jose International Airport
 SO₂ = sulfur dioxide
 SQL = San Carlos Airport
 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.

Under both project alternatives, a design variant for the Millbrae Station that minimizes impacts, to the degree feasible, on existing and planned development in Millbrae was analyzed. The analysis of the RSP Design Variant is included in Section 3.20 of this Final EIR/EIS. Refer to Table S-6 for a summary of the differences in impacts between the Millbrae Station Design and the RSP Design Variant by environmental topic area.

As described in Section S.5.4.4, Diridon Design Variant, a design variant in the San Jose Diridon Station Approach Subsection that would allow for faster speeds in the approaches to and through the San Jose Diridon Station under Alternative A was analyzed.

Table S-6 Summary Comparison of Impacts between Millbrae Station Design and RSP Design Variant

Resource Topic	Millbrae Station Design	RSP Design Variant
Transportation		
Construction Traffic Congestion/Intersection Delays	Traffic generated during construction would interfere with local vehicle circulation. Vehicle delays are not considered a significant impact under CEQA.	The RSP Design Variant would have a smaller construction footprint than the Millbrae Station Design and would require fewer temporary road and lane closures, and thus would result in lesser effects on traffic congestion due to construction-related traffic.
Construction Impacts on Bus Transit	Project-related construction and modifications to El Camino Real would interfere with bus transit along roadways including at the Millbrae Station. SamTrans bus stops would be temporarily relocated during construction of improvements. Notwithstanding the construction management plan, material decreases in performance of certain bus routes in the Millbrae Station area are expected to occur.	The RSP Design Variant would require less construction disruption on El Camino Real and would not require temporary relocation of SamTrans bus stops. Accordingly, material decreases in performance of bus routes in the Millbrae Station area is not anticipated to occur.
Construction Pedestrian and Bicycle Access	Construction of the Millbrae Station Design would not decrease the performance of pedestrian and bicycle facilities, because safe and adequate access would be maintained.	The RSP Design Variant would similarly maintain safe and adequate pedestrian and bicycle access to the Millbrae Station during construction.
Operational Traffic Congestion/Intersection Delays	Traffic generated by the Millbrae Station Design would interfere with local vehicle circulation. Vehicle delays are not considered a significant impact under CEQA.	The RSP Design Variant would result in substantially similar traffic volumes in the station area for the 2040 horizon year as the Millbrae Station Design and therefore result in similar intersection delays around the Millbrae Station.
Operational Pedestrian and Bicycle Access	HSR operations would not decrease the performance of pedestrian and bicycle facilities, because the Millbrae Station Design would provide safe and adequate bicycle and pedestrian facilities.	The RSP Design Variant would provide safe and adequate bicycle and pedestrian facilities at the Millbrae Station.

Resource Topic	Millbrae Station Design	RSP Design Variant
Air Quality		
Construction-Period Air Quality	Air pollutant concentrations during construction of the Millbrae Station Design would be less than the CAAQS and NAAQS, except that PM ₁₀ concentrations would exceed the CAAQS because background PM ₁₀ levels already exceed the CAAQS. BAAQMD guidance provides that if background levels already exceed a standard then the incremental impact of the project should be compared to the USEPA SIL. The impact of the Millbrae Station Design on PM ₁₀ concentrations would be less than the SIL, and accordingly the PM ₁₀ impact would be less than significant under CEQA. There would be no new exceedances of the CAAQS or NAAQS.	Air pollutant concentrations during construction of the RSP Design Variant would be slightly higher for some pollutants during construction and slightly lower for others, compared to the Millbrae Station Design. PM ₁₀ concentrations would exceed the CAAQS because background PM ₁₀ levels already exceed the CAAQS. BAAQMD guidance provides that if background levels already exceed a standard then the incremental impact of the project should be compared to the USEPA SIL. The impact of the RSP Design Variant on PM ₁₀ concentrations would be less than the SIL, and accordingly the PM ₁₀ impact would be less than significant under CEQA. There would be no new exceedances of the CAAQS or NAAQS.
Construction-Period Health Risks	Health risks during construction of the Millbrae Station Design would be less than BAAQMD health risk thresholds.	Health risks during construction of the RSP Design Variant would be slightly greater than for the Millbrae Station Design but would still be less than the BAAQMD health risk thresholds.
Operations-Period Air Quality	Air pollutant concentrations during operation of the Millbrae Station Design would be less than the CAAQS and NAAQS, except that PM ₁₀ concentrations would exceed the CAAQS because background PM ₁₀ levels already exceed the CAAQS. BAAQMD guidance provides that if background levels already exceed a standard then the incremental impact of the project should be compared to the USEPA SIL. The impact of the Millbrae Station Design on PM ₁₀ concentrations would be less than the SIL, and accordingly the PM ₁₀ impact would be less than significant under CEQA. There would be no new exceedances of the CAAQS or NAAQS.	Air pollutant concentrations during operation of the RSP Design Variant would be similar to those for the Millbrae Station Design and would be less than the CAAQS and NAAQS, except that PM ₁₀ concentrations would exceed the CAAQS because background PM ₁₀ levels already exceed the CAAQS. BAAQMD guidance provides that if background levels already exceed a standard then the incremental impact of the project should be compared to the USEPA SIL. The impact of the RSP Design Variant on PM ₁₀ concentrations would be less than the SIL, and accordingly the PM ₁₀ impact would be less than significant under CEQA. There would be no new exceedances of the CAAQS or NAAQS.
Operations-Period Health Risks	Health risks during operation of the Millbrae Station Design would be less than the BAAQMD health risk thresholds.	Health risks during operation of the RSP Design Variant would be similar to those for the Millbrae Station Design and would also be less than the BAAQMD health risk thresholds.

Resource Topic	Millbrae Station Design	RSP Design Variant
Noise and Vibration		
Construction Noise	Construction activity noise would exceed FRA standards at sensitive receptors.	The RSP Design Variant would require similar types of construction activities and locations as those required for construction of the Millbrae Station Design. However, there would be three new buildings exposed to noise levels exceeding FRA standards. There are also 8 commercial businesses and 1 residence in this area that would be displacements with the Millbrae Station Design but would not be displaced with the RSP Design Variant and would be exposed to construction noise.
Operational Noise	Project operations would exceed FRA standards at sensitive receptors.	The RSP Design Variant would not change the operations noise; however, there would be two additional noise-sensitive receptor buildings that would be noise impacts. There would be a severe noise impact at the Revised Serra Station residential building R-2 and a moderate noise impact at the Revised Serra Station residential building R-1.
Construction Vibration	Construction of the project could expose persons or buildings to excessive ground-borne vibration.	The RSP Design Variant would require similar types of construction activities and locations as those required for construction of the Millbrae Station Design. However, there would be three new buildings exposed to construction vibration. There are also 8 commercial businesses and 1 residence in this area that would be displacements with the Millbrae Station Design but would not be with the RSP Design Variant and would be exposed to construction vibration.
Operational Vibration	Project operations would generate ground-borne vibration impacts on nearby vibration sensitive receptors.	The RSP Design Variant would not change the operational vibration levels relative to the Millbrae Station Design, however there would be one additional vibration-sensitive receptor building that would be a vibration impact at the Revised Serra Station residential building R-2.

Resource Topic	Millbrae Station Design	RSP Design Variant
Electromagnetic Fields and Electromagnetic Interference		
Construction-Period EMF/EMI	EMF generated during construction would be below levels known to result in a documented health risk.	Although the Revised Serra Station is assumed to be occupied during construction with the RSP Design Variant, there would be no change in EMF generated during construction relative to the Millbrae Station Design, which would remain below levels known to result in a documented health risk and similar construction easements would be maintained.
Operations-Period EMF/EMI	Anticipated magnetic and electric fields would be below the maximum permissible exposure limit for exposure of the general public to magnetic fields of 9,040 milligauss and to electric fields of 5,000 V/m and there would be no significant risk of exposure or interference.	The RSP Design Variant would not substantially change any EMF/EMI exposure level or potential for interference relative to the Millbrae Station Design.
Public Utilities and Energy		
Construction-Period Public Utilities and Energy	Construction of the Millbrae Station Design would require use of water and electricity and would generate wastewater, stormwater, and solid waste associated with demolition of existing buildings.	Construction of the RSP Design Variant is expected to generate a similar demand on water and electricity and is expected to generate a similar amount of wastewater and stormwater to the Millbrae Station Design. Construction of the RSP Design Variant is anticipated to generate less solid waste than the Millbrae Station Design because it would require less building demolition.
Operations-Period Public Utilities and Energy	HSR operations would require use of water and electricity and would generate wastewater, stormwater, and solid waste.	HSR train operations would be the same with the RSP Design Variant as with the Millbrae Station Design. The RSP Design Variant is expected to generate the same demand on electrical, water, wastewater, stormwater, and solid waste utilities/facilities as the Millbrae Station Design.
Biological and Aquatic Resources		
Construction Impacts	The footprint for the Millbrae Station Design would overlap with habitat areas associated with two constructed watercourses—Highline Creek and Drainage Ditch 8.	The RSP Design Variant would similarly overlap with the same habitat areas associated with the same two constructed watercourses.
Operational Impacts	Operations at all HSR stations, including Millbrae, would involve periodic inspection and maintenance activities, which could result in impacts to nearby habitat areas/aquatic resources.	The RSP Design Variant would have the same nature and frequency of periodic inspection and maintenance activities at the Millbrae HSR Station.

Resource Topic	Millbrae Station Design	RSP Design Variant
Hydrology and Water Resources		
Construction Impacts	Construction of the Millbrae Station Design would result in temporary and permanent impacts on waterbodies and groundwater.	The footprint of the RSP Design Variant would be reduced but would include the same constructed watercourses as in the footprint of the Millbrae Station Design.
Operational Impacts	The Millbrae Station Design would incorporate features that will avoid substantial discharges of sediment, pesticides, and other pollutants into receiving waters, as well as stormwater BMPs to avoid substantial surface-water quality impacts.	The RSP Design Variant would incorporate the same features concerning sediment, pesticides, and pollutants as well as the same stormwater BMPs.
Geology, Soils, Seismicity, and Paleontological Resources		
Construction Impacts	Construction of the Millbrae Station Design would have limited potential to expose people or structures to geologic, soil, and seismic hazards, result in substantial erosion, or destroy paleontological resources because project features will avoid or lessen such potential.	Construction of the RSP Design Variant would have similarly limited potential to expose people or structures to geologic, soil, and seismic hazards or result in substantial erosion. Because of the smaller footprint, the RSP Design Variant would have less potential to destroy paleontological resources.
Operational Impacts	The Millbrae Station Design would operate in a geologic and soils setting that would have potential to be affected by primary and secondary seismic hazards. Project features will reduce this potential.	Like the Millbrae Station Design, the RSP Design Variant would operate in a geologic and soils setting that would have potential to be affected by primary and secondary seismic hazards. Project features will also reduce this potential.
Hazardous Materials and Wastes		
Construction-Period Impacts	The Millbrae Station Design would require excavation in an area with potential to encounter soil and/or groundwater contamination, use and transport of hazardous materials, and demolition of existing buildings.	The RSP Design Variant would occur in the same location as the Millbrae Station Design and would thus have similar potential to encounter contaminated soil and/or groundwater. However, owing to the smaller footprint, the RSP Design Variant would have incrementally less potential to encounter contaminated soil/groundwater, would require less use/transport of hazardous materials, and would require less building demolition relative to the Millbrae Station Design.
Operations-Period Impacts	Operations at all HSR Stations, including Millbrae, would involve periodic inspection and maintenance activities, which would use/generate hazardous materials/waste.	The RSP Design Variant would have the same nature and frequency of periodic inspection and maintenance activities at the Millbrae HSR station.

Resource Topic	Millbrae Station Design	RSP Design Variant
Safety and Security		
Construction-Period Impacts	Construction of the Millbrae Station Design would potentially pose an impediment to emergency access and expose people nearby to risks associated with proximity to active construction areas.	Construction of the RSP Design Variant would pose similar impediments to emergency access and would incorporate the same mitigation that will similarly reduce risks associated with proximity to active construction areas.
Operations-Period Impacts	HSR operations would induce peak hour automobile traffic in the Millbrae Station area, thus potentially impeding the movement of emergency vehicles.	The RSP Design Variant would result in substantially similar traffic volumes in the station area for the 2040 horizon year as the Millbrae Station Design and thus would have similar potential as the Millbrae Station Design to impede the movement of emergency vehicles.
Socioeconomics and Communities		
Division or Disruption of Existing Communities due to Construction	Construction of the Millbrae Station Design would result in changes in access, noise and vibration impacts, visual changes, and the displacement of residences and businesses. These changes would temporarily inconvenience communities and would have a minor effect on community cohesion but would not result in the physical division of a community or permanent disruption to community cohesion.	Construction of the RSP Design Variant would result in fewer changes in access and fewer displacements of residences and businesses compared to the Millbrae Station Design. Construction-related noise and visual impacts of the RSP Design Variant would be similar to those of the Millbrae Station Design but would affect additional residential receptors at the Revised Serra Station. Construction of the RSP Design Variant would temporarily inconvenience the community and would have a minor effect on community cohesion but would not result in the physical division of a community or permanent disruption to community cohesion.
Division or Disruption of Existing Communities due to Operations	HSR operations would not physically divide the communities along the project corridor, although a small weakening of community cohesion would result.	Similar to the Millbrae Station Design, HSR project operations with the RSP Design Variant would not physically divide the communities along the project corridor, although a small weakening of community cohesion would result.
Children’s Health and Safety Impacts	No disproportionate impacts on children’s health and safety would occur from air quality, noise and vibration, EMF/EMI, hazardous materials and wastes, or safety and security because of project construction or project operations.	Similar to the Millbrae Station Design, there would be no disproportionate impacts on children’s health and safety from air quality, noise and vibration, EMF/EMI, hazardous materials and wastes, or safety and security because of project construction or project operations with the RSP Design Variant.

Resource Topic	Millbrae Station Design	RSP Design Variant
Property Displacements and Relocation Impacts	Construction of the Millbrae Station Design would displace 1 residence. Sufficient available relocation properties exist so the displaced residents could relocate within the same community.	Construction of the RSP Design Variant would displace 0 residences.
	Construction of the Millbrae Station Design would displace 14 commercial businesses. Insufficient available relocation properties exist, so some displaced commercial businesses may need to relocate to a neighboring community, where more commercial facilities are available for sale or lease.	Construction of the RSP Design Variant would displace 2 businesses. Sufficient available relocation properties exist so the displaced commercial businesses could relocate within the same community.
	Construction of the Millbrae Station Design would displace 1 community facility.	Construction of the RSP Design Variant would displace 1 community facility.
Economic Impacts	<p>Construction of the Millbrae Station Design would:</p> <ul style="list-style-type: none"> ▪ Generate direct and indirect jobs from project construction ▪ Result in 1 residential displacement, which would not materially affect school district funding ▪ Reduce school district funding in Millbrae Elementary School District and San Mateo Union High School District due to reductions in property taxes from displacements and student relocations ▪ Reduce property tax revenues collected by San Mateo County ▪ Conflict with the Millbrae Serra Station Development, which was estimated by others to result in net positive revenues to the City of Millbrae of \$199,000 to \$441,400 annually. 	<p>Compared to the Millbrae Station Design, the RSP Design Variant would:</p> <ul style="list-style-type: none"> ▪ Generate slightly fewer direct and indirect jobs from project construction ▪ Result in no residential displacements, which would not affect school district funding ▪ Result in fewer reductions to school district funding in Millbrae Elementary School District and San Mateo Union High School District due to fewer displacements ▪ Result in fewer reductions to property tax revenues collected by San Mateo County due to fewer displacements ▪ Reduce the development potential for a Revised Serra Station by 39 percent; assuming the net revenue would be proportional to the footprint reduction, the City of Millbrae's net revenue would be \$121,390 to \$269,010 annually.
Station Planning, Land Use, and Development		
Temporary Alteration of Land Use Patterns due to Construction	Construction of the Millbrae Station Design would temporarily convert 8.0 acres. Lands would be restored to their pre-construction condition, and land use patterns would not be substantially altered.	Similar to the Millbrae Station Design, but construction of the RSP Design Variant would temporarily convert 7.5 acres.

Resource Topic	Millbrae Station Design	RSP Design Variant
Permanent Alteration of Land Use Patterns due to Construction	Construction of the Millbrae Station Design would: <ul style="list-style-type: none"> ▪ Permanently convert 7.8 acres for the HSR modifications ▪ Displace 1 residence and 14 businesses, resulting in a substantial change in existing land uses due to the conversion of commercial buildings to transportation uses. ▪ Conflict with the approved Millbrae Serra Station Development, resulting in a substantial change in planned land use patterns. 	Construction of the RSP Design Variant would: <ul style="list-style-type: none"> ▪ Permanently convert 3.7 acres directly, and indirectly convert 1 additional acre due to the realignment of the California Drive extension. ▪ Displace 2 commercial businesses, which would not result in a substantial change in existing land uses. ▪ Reduce the amount of land available for a Revised Serra Station from 3.53 acres to 2.15 acres (a reduction of 39 percent), resulting in a substantial change in planned land use patterns.
Parks, Recreation, and Open Space		
Construction and Operational Impacts	No parks, recreation, or open space areas are present in the Millbrae Station area.	The RSP Design Variant would be located in the same area as the Millbrae Station Design, which lacks parks, recreation, and open space areas.
Aesthetics and Visual Quality		
Temporary Direct Impacts on Visual Quality and Scenic Vistas	Construction of the Millbrae Station Design, track shifts and other modifications within and adjacent to existing railway facilities would not substantially degrade the existing visual quality.	Similar to the Millbrae Station Design, but construction of the RSP Design Variant would entail construction activity in a smaller area in the vicinity of the Millbrae Station. This reduces the area subject to changes in visual quality due to construction activity. Sensitive viewers increase in the area, due to the Revised Serra Station, but those with a view of construction activities are limited to residents with a view to the Millbrae Station.

Resource Topic	Millbrae Station Design	RSP Design Variant
Permanent Direct Impacts on Visual Quality—San Bruno–Millbrae Landscape Unit	Construction of the Millbrae Station Design would expand the tracks and station facilities at the Millbrae Station and would decrease the visual quality by one level (from moderate to moderately low) for travelers along El Camino Real and would decrease the visual quality by one level (from moderately low to low) for residential viewers along California Drive. It would not substantially degrade the existing visual character or quality in the San Bruno–Millbrae Landscape Unit for most viewers.	Similar to the Millbrae Station Design, but the RSP Design Variant would not be visible from El Camino Real, so there would be no reduction in visual quality. Sensitive viewers with direct views to the Millbrae Station would increase in the area due to the Revised Serra Station, but the HSR station features of the RSP Design Variant would be similar to those of the Millbrae Station Design, with no change in visual quality. The reconstruction of California Drive south of Millbrae Avenue, including narrowing of the roadway and new landscaping, would increase visual quality by one level (from moderately low to moderate).
Indirect Impacts on Visual Quality from HSR Stations	The project features provide high design standards for development around the HSR stations. Construction of the Millbrae Station Design would conform to applicable zoning and other regulations governing scenic quality, maintaining the existing or planned visual character of the local communities.	The RSP Design Variant would follow the same standards.
Temporary and Permanent Direct Impacts on Nighttime Light Levels from Fixed Sources and Trains	Construction lighting practices and project features of the Millbrae Station Design will minimize impacts through visually sensitive lighting design. Because existing light levels are moderate in the area, train operations would not increase light levels.	The RSP Design Variant would follow the same standards. Station lighting would thus be similar to but less extensive than the Millbrae Station Design; rail operations would also be the same and would thus produce the same level of light as in a moderately lit area.
Cultural Resources		
Construction-Related Impacts—Archaeology	The Millbrae Station Design would occur in an area without any known archaeological resources but the potential for unknown resources.	The RSP Design Variant would occur in same area as the Millbrae Station Design but would have a smaller footprint and thus incrementally reduced potential to encounter unknown archaeological resources.
Construction-Related Impacts—Historic Built Resources	The Millbrae Station Design would require relocation of the SPRR Depot/Millbrae Station but would have no adverse effect on this resource under Section 106. Construction would result in some construction-related vibration, but would not be at a substantial level.	The RSP Design Variant would also require relocation of the SPRR Depot/Millbrae Station to a location approximately 30 feet west and 40 feet south of the location associated with the Millbrae Station Design. As with the Millbrae Station Design, there would be no adverse effect on this resource. Construction of the RSP Design Variant would also entail vibration, but not appreciably different from that associated with the Millbrae Station Design.

Resource Topic	Millbrae Station Design	RSP Design Variant
Operations-Related Impacts	The SPRR Depot/Millbrae Station would be subject to noise and vibration associated with HSR operations, but not at substantial levels.	With the RSP Design Variant, the SPRR Depot/Millbrae Station would remain subject to noise and vibration associated with HSR operations, but not at substantial levels. The RSP Design Variant would have less on-site parking and thus generate incrementally less noise than the Millbrae Station Design.
Regional Growth		
Construction- and Operations-Period Impacts	Neither construction nor operation of the project with the Millbrae Station Design would induce employment or population growth substantially beyond what is projected, and no adverse growth-related impacts are anticipated.	Because project construction and operations would be largely similar to those of the Millbrae Station Design, construction and operation of the project with the RSP Design Variant would not be expected to induce employment or population growth substantially beyond what is projected, and no adverse growth-related impacts are anticipated.
Cumulative Impacts¹		
Construction-Related Health Risks (Air Quality)	Overall project construction (with the Millbrae Station Design) would combine with the construction of other cumulative projects leading to local cancer risks and PM _{2.5} concentrations exceeding BAAQMD thresholds. The project's contribution to this cumulative impact would be considerable.	The RSP Design Variant would have slightly greater contribution to this significant cumulative impact relative to the Millbrae Station Design, but the overall contribution would still be considered small relative to health risks originating from other existing sources.
Construction-Related Noise and Vibration	Overall project construction (with the Millbrae Station Design) would not combine with the construction of other cumulative projects to create cumulatively significant noise/vibration impacts because such construction activities are not expected to occur simultaneously and would be geographically separated.	Although construction of the project with the RSP Design Variant would result in greater construction-period noise and vibration impacts than the Millbrae Station Design due to the assumed occupied status of the Revised Serra Station, construction of the project with the RSP Design Variant would still be expected to be separated in space and time from the construction of other cumulative projects.
Operations-Period Noise and Vibration	Project operations (with the Millbrae Station Design) would combine with the operations of other cumulative projects leading to noise and vibration levels exceeding relevant FRA criteria. These exceedances would remain even after feasible mitigation. The project's contribution to this cumulative impact would be considerable.	The RSP Design Variant would result in additional noise and vibration sensitive receptors relative to the Millbrae Station Design. Although the RSP Design Variant would be subject to the same mitigation measures as the Millbrae Station Design, impacts would remain significant and unavoidable at the project level and would therefore increase the contribution to this significant cumulative impact relative to the Millbrae Station Design.

Resource Topic	Millbrae Station Design	RSP Design Variant
Construction-Related Visual Effects	Overall project construction (with the Millbrae Station Design) would not combine with the construction of other cumulative projects to create cumulatively significant visual impacts because such construction activities would be both temporary and geographically separated.	Although project construction with the RSP Design Variant would have more viewers in the immediate Millbrae Station area than the Millbrae Station Design due to the assumed occupied status of the Revised Serra Station, HSR project construction would be temporary in nature and geographically separated from other cumulative construction projects such that no significant cumulative impact would result.
Section 4(f)/6(f) Resources		
Construction and Operations	The only Section 4(f)-eligible property associated with the Millbrae Station Design is the SPRR Depot/Millbrae Station, which would be relocated. This relocation would not adversely affect the activities, features, and attributes that qualify the resource for protection under Section 4(f). Noise, vibration, and visual impacts would not substantially impair the protected attributes that qualify the SPRR Depot/Millbrae Station for protection under Section 4(f), and no constructive use would result.	The only Section 4(f)-eligible property associated with the RSP Design Variant is the SPRR Depot/Millbrae Station. The relocation would be slightly different than that associated with the Millbrae Station Design, but it would not adversely affect the activities, features, and attributes that qualify the resource for protection under Section 4(f). The RSP Design Variant would result in similar noise, vibration, and visual effects concerning the SPRR Depot/Millbrae Station, and thus the RSP Design Variant would not result in any constructive use of this resource.
Environmental Justice		
Construction and Operations	There are no environmental justice communities in the Millbrae Station area, so the Millbrae Station Design would not result in any disproportionately high or adverse effects on such communities.	Because the RSP Design Variant would be in the same location as the Millbrae Station Design (which lacks environmental justice communities), the RSP Design Variant would not result in any disproportionately high or adverse effects on such communities.

BAAQMD = Bay Area Air Quality Management District
 BART = Bay Area Rapid Transit
 BMP = best management practice
 CAAQS = California ambient air quality standards
 CEQA = California Environmental Quality Act
 EIR = environmental impact report
 EIS = environmental impact statement
 EMF = electromagnetic field
 EMI = electromagnetic interference
 FRA = Federal Railroad Administration

HSR = high-speed rail
 NAAQS = national ambient air quality standards
 PM_{2.5} = particulate matter 2.5 microns or less in diameter
 PM₁₀ = particulate matter 10 microns or less in diameter
 Revised Serra Station = a potential revised TOD that would fit within the remaining developable footprint to be consistent with the Millbrae Station Area Specific Plan and the RSP Design Variant
 RSP = Millbrae Station Reduced Site Plan
 SIL = significant impact level
 SPRR = Southern Pacific Railroad
 USEPA = U.S. Environmental Protection Agency

¹ For cumulative impacts, table summarizes only resource topics for which the RSP Design Variant would result in an increased degree of project level impact. Because the RSP Design Variant would result in similar or lesser impacts for all other resources topics, the RSP Design Variant would result in similar or slightly reduced degrees of cumulative effects.

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 will 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 will reduce the impacts to a less-than-significant level. The following resources do not result in significant impacts under CEQA for either of the project alternatives and do not require mitigation:

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

Table S-7 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-7 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	Impact TR#8: Temporary Impacts on Bus Transit	TR-MM#2: Install Transit Priority Treatments	Significant and unavoidable for both alternatives
	Impact TR#10: Temporary Impacts on Passenger Rail Operations	TR-MM#3: Implement Railway Disruption Control Plan	Less than significant for both alternatives.
	Impact TR#18: Temporary Impacts on Freight Rail Operations	TR-MM#3: Implement Railway Disruption Control Plan	Less than significant for both alternatives.
Operations	Impact TR#11: Continuous Permanent Impacts on Bus Services	TR-MM#2: Install Transit Priority Treatments	Significant and unavoidable for both alternatives for MUNI Route 22 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.
	Impact TR#12: Continuous Permanent Impacts on Passenger Rail and Bus Access	TR-MM#4: Install San Carlos Caltrain Station Pedestrian Improvements (Alternative B)	Less than significant (Alternative A) Significant and unavoidable (Alternative B)
	Impact TR#17: 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.

Resource Category	Significant (CEQA) Impacts before Mitigation ¹	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation ²
Air Quality and Global Climate Change³			
Construction	Impact AQ#1: Temporary Direct and Indirect Impacts on Air Quality in the SFBAAB	AQ-MM#1: Construction Emissions Reductions—Requirements for use of Zero Emission and/or Near-Zero Emission Vehicles and Off-Road Equipment AQ-MM#2: Offset Project Construction Emissions in the SFBAAB	Less than significant for both alternatives.
	Impact AQ#4: Temporary Direct Impacts on Implementation of an Applicable Air Quality Plan	AQ-MM#1: Construction Emissions Reductions—Requirements for use of Zero Emission and/or Near Zero Emission Vehicles and Off-Road Equipment AQ-MM#2: Offset Project Construction Emissions in the SFBAAB	Less than significant for both alternatives.
	Impact AQ#5: Temporary Direct Impacts on Localized Air Quality in the SFBAAB—Criteria Pollutants	AQ-MM#1: Construction Emissions Reductions—Requirements for use of Zero Emission and/or Near Zero Emission Vehicles and Off-Road Equipment	Significant and unavoidable for both alternatives.
Noise and Vibration			
Construction	Impact NV#1: Temporary Exposure of Sensitive Receptors to Construction Noise	NV-MM#1: Construction Noise Mitigation Measures	Significant and unavoidable for both alternatives.
	Impact NV#8: Temporary Exposure of Sensitive Receptors and Buildings to Construction Vibration	NV-MM#2: Construction Vibration Mitigation Measures	Less than significant for both alternatives.
Operations	Impact NV#2: 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.

Resource Category	Significant (CEQA) Impacts before Mitigation ¹	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation ²
	Impact NV#6: 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
	Impact NV#7: 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.
	Impact NV#9: Intermittent Permanent Exposure of Sensitive Receptors to Vibration from Operations	NV-MM#8: Project Vibration Mitigation Measures	Significant and unavoidable for both alternatives.
Biological Resources and Wetlands			
Construction	Impact BIO#1: 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 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.

Resource Category	Significant (CEQA) Impacts before Mitigation ¹	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation ²
	Impact BIO#2a: Permanent Conversion of Habitat for and Direct Mortality of Listed Butterfly Species (Alternative B)	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.
	Impact BIO#2b: Permanent Conversion or Degradation of Habitat for and Mortality of Monarch Butterfly	BIO-MM#1: Prepare and Implement a Restoration and Revegetation Plan 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#40: Avoid Direct Impacts on Listed Butterfly Host Plants BIO-MM#41: Provide Compensatory Mitigation for Impacts on Monarch Butterfly 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
	<p>Impact BIO#3: 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</p>	<p>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</p>	<p>Less than significant for both alternatives.</p>

Resource Category	Significant (CEQA) Impacts before Mitigation ¹	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation ²
	Impact BIO#4: 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
	Impact BIO#5: 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
	Impact BIO#6: 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.
	Impact BIO#7: 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
	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	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.
	Impact BIO#9: 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
	Impact BIO#10: 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.
	Impact BIO#12: 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.
	Impact BIO#18: 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 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
	Impact BIO#20: 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-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.
	Impact BIO#21: 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.
	Impact BIO#23: 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	Impact BIO#14: 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.
	Impact BIO#22: 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	Impact HYD#4: 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.
	Impact HYD#5: 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.
Hazardous Materials and Wastes			
Construction	Impact HMW#13: 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	Impact S&S#1: Temporary Impacts on Emergency Access and Response Times from Temporary Road Closures, Relocations, and Modifications (Alternative B)	SS-MM#1: Construction Traffic Management for Passing Track Section (Alternative B)	Significant and unavoidable for Alternative B (by jurisdiction): San Mateo, Belmont, San Carlos, and Redwood City: Passing track construction and associated modification of 9 underpasses (Alternative B)
	Impact S&S#3: Permanent Impacts on Emergency Access and Response Times Caused by Construction (Alternative B)	SS-MM#2: Modify Driveway Access Control for Relocated Brisbane Fire Station (Alternative B)	Less than significant for both alternatives.
Operations	Impact S&S#6: 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 In addition, if cities choose not to implement fire station improvements included in SS-MM#4 the following traffic delay mitigation measures will be required: TR MM#1a.2, TR MM#1a.3, TR MM#1a.5, TR MM#1h, and TR-MM#1i	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

Resource Category	Significant (CEQA) Impacts before Mitigation ¹	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation ²
			chooses not to construct and operate emergency vehicle priority treatments. Less than significant with mitigation measures at other locations.
Station Planning, Land Use, and Development			
Construction	Impact LU#4: 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.
	Impact LU#5: 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.
	Impact LU#7: Conflict with BCDC Shoreline Band Policies	LU-MM#2: Shoreline Access Improvements in Brisbane	Less than significant for both alternatives.
Operations	Impact LU#6: 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	Impact PK#2: Temporary Changes to Access to or Use of Parks (Alternative B)	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.
	Impact PK#4: Permanent Changes Affecting Access to or Circulation in Parks, Recreational Facilities, and Open-Space Resources (Alternative B)	PK-MM#2: Provide Permanent Park Access (Alternative B) PK-MM#3: Implement Project Design Features (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
	Impact PK#6: Permanent Acquisition of Parks, Recreation, and Open Space Resources (Alternative B)	PK-MM#4: Design Refinements to Avoid Aboveground Park Encroachment at Tamien Park (Alternative B) PK-MM#5: Reconfigure Reed and Grant Streets Sports Park	Less than significant for both alternatives.
Aesthetics and Visual Quality			
Construction	Impact AVQ#1: Temporary Direct Impacts on Visual Quality and Scenic Vistas (Alternative B)	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.
	Impact AVQ#8: Permanent Direct Impacts on Visual Quality—San Mateo-Redwood City Landscape Unit (Alternative B)	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	Impact CUL#1: 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.

Resource Category	Significant (CEQA) Impacts before Mitigation ¹	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation ²
	Impact CUL#2: 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.
	Impact CUL#4: 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-8 Significant and Unavoidable Impacts After Mitigation by Alternative

Project Alternative	Number of Significant and Unavoidable Impacts
Alternative A	11
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-9. For additional information on costs, see Chapter 6 in the Final EIR/EIS.

Table S-9 Capital Cost by Alternative (2021\$, in millions)

Alternative	Cost
Alternative A ¹	\$5,317
Alternative B ²	\$8,835 / \$9,899

I- = Interstate

¹ The capital costs for Alternative A include the costs associated with the Diridon Design Variant.

² 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, or the use of the property would result in a *de minimis* impact on the property. Properties protected under Section 4(f) are publicly owned lands of a park, recreation area, or wildlife or waterfowl refuge, or historic sites (publicly or privately owned) that are listed or determined eligible for listing in the National Register of Historic Places (NRHP).

There are 174 Section 4(f) resources in the RSAs for recreational and cultural resources: 147 parks and recreational facilities and 27 historic resources.

Alternative A and Alternative B (Viaduct to I-880) would result in the use of two Section 4(f) park 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. For additional information, see Chapter 4, Section 4(f) and Section 6(f) Evaluations.

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, or the use of the property would result in a *de minimis* impact on the property.

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, ethnicity, income, national origin, or educational level, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies, from the early stages of transportation planning and investment decision making through construction, operations, and maintenance. The environmental justice analysis must address, to the extent practicable and permitted by law, the potential disproportionately high and adverse human health and environmental impacts of transportation 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 and/or low-income populations, or
- Would be suffered by minority populations and/or 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.

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

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 5610.2C*
- *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 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.

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 will 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 populations 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 disproportionately high and adverse effects on minority populations or 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
- Traffic impacts
- Noise and vibration
- Visual impacts

S.12 Environmental Process

The Authority is releasing the Final 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 Final EIR/EIS on its website (www.hsr.ca.gov). Printed and/or electronic copies of the Final EIR/EIS 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 Final EIR/EIS may also be requested by calling (800) 435-8670. The following discussion outlines the steps in the environmental process.

S.12.1 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 Final 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 agency. For the San Francisco to San Jose Project Section, Alternative A is the Preferred Alternative.

The Authority identified the Preferred Alternative that would fulfill its 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 alternatives 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 the Authority believes is the best alternative to achieve the project's Purpose and Need.

Table S-10 shows the individual impacts of the alternatives after mitigation based on the environmental analysis in the Final 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-10 Community and Environmental Factors by Alternative

Effects	Alternative A ¹	Alternative B ²
Community Factors		
Displacements		
Residential displacements (# of units)	14*	42/62
Commercial and industrial displacements (# of units)	48/49*	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*	<ul style="list-style-type: none"> ▪ 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	<p>The East Brisbane LMF would not affect Icehouse Hill.*</p> <p>The East Brisbane LMF would reduce the area of planned development at Brisbane Baylands by:</p> <ul style="list-style-type: none"> ▪ Planned development (residential prohibited): 108.6 acres ▪ Planned development (residential permitted): 3.7 acres* 	<p>The West Brisbane LMF would grade Icehouse Hill, an area designated for preservation in the 2018 Brisbane General Plan Amendment (City of Brisbane 2018). This would be considered a permanent and significant alteration of an existing land use.</p> <p>The West Brisbane LMF would reduce the area of planned land uses at Brisbane Baylands by:</p> <ul style="list-style-type: none"> ▪ Planned development (residential prohibited): 93.6 acres ▪ Planned development (residential permitted): 22 acres <p>The West Brisbane LMF would have a greater effect on development of planned residential units.</p>

Effects	Alternative A ¹	Alternative B ²
Transportation		
Intersections with adverse NEPA effects after mitigation	80*	83
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)	495	455/452*
Severe noise impacts with noise barrier mitigation and if local municipalities implement quiet zones ³ (number of sensitive receptors)	264	237/234*
Environmental Factors		
Aquatic Resources⁴		
Direct impacts on jurisdictional aquatic resources ⁵ (acres)	11.7*	18.1
Biological Resources (Special-Status Species Habitat)⁴		
Direct impacts on habitat for special-status plant species (non-overlapping acres)	109.7	64.6*/65.4
Direct impacts on habitat for three listed butterflies (acres)	96.3*	108.1
Direct impacts on suitable habitat for monarch butterfly (acres)	139.7*	163.4
Direct impacts on central California coast steelhead habitat (acres)	3.7	2.9*
Direct impacts on green sturgeon habitat (acres)	7.0	5.8*
Direct impacts on Pacific lamprey habitat (acres)	3.0	2.3*

Effects	Alternative A ¹	Alternative B ²
Direct impacts on essential fish habitat for Chinook Pacific Coast salmon (acres)	2.8	2.1*
Direct impacts on essential fish habitat for Pacific Coast groundfish (acres)	2.4*	3.0
Direct impacts on California red-legged frog habitat (acres)	17.7*	23.5
Direct impacts on western pond turtle habitat (acres)	43.9*	73.7/72.9
Direct impacts on burrowing owl habitat (acres)	134.5	108.0*/109.0
Direct impacts on Alameda song sparrow habitat (acres)	1.3	0.7*
Direct impacts on saltmarsh common yellowthroat habitat (acres)	1.7*	8.6
Direct impacts on least Bell's vireo habitat (acres)	2.1*	3.6
Direct impacts on yellow warbler habitat (acres)	0.7*	1.9
Direct impacts on tricolored blackbird habitat (acres)	8.8	4.6*/5.5
Direct impacts on white-tailed kite nesting habitat (acres)	22.8	19.9*/27.5
Direct impacts on San Francisco dusky-footed woodrat and ringtail habitat (acres)	0.7*	2.0/9.7
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)	11.8*	13.8/21.4
Section 4(f)/6(f) Resources		
Permanent use (<i>de minimis</i>) of park resources (# of resources)	1*	2*/4

Effects	Alternative A ¹	Alternative B ²
Built 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 historical 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 differences occur, values are presented for Alternative A without the DDV, followed by Alternative A with the DDV.

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 value would be identical under the Viaduct to I-880 and Viaduct to Scott Boulevard options.

³ 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 roadway-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.

⁴ Acreages represent estimates of direct (temporary and permanent) impacts on a given resource.

⁵ 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 later presented in the 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 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 project 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 NEPA 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 Final 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. After completion of the environmental process and issuance of the Authority's ROD and upon request from the Authority, the STB is anticipated to issue its ROD on whether to approve the project. 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-11 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-11 San Francisco to San Jose Project Section Milestone Schedule

Date	Key Milestones
July 2020	Public release of Draft EIR/EIS
July 2021	Public release of Revised/Supplemental Draft EIR/EIS
June 2022	Final EIR/EIS published
August 2022	Authority's Notice of Determination and Record of Decision

EIR = environmental impact report
 EIS = environmental impact statement