

California High-Speed Rail Authority

San Jose to Merced Project Section

Final Environmental Impact Report/
Environmental Impact Statement

Executive Summary

February 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

2005 Statewide Program EIR/EIS	<i>2005 Final Program EIR/EIS for the Proposed California High-Speed Train System</i>
Authority	California High-Speed Rail Authority
Bay Area	San Francisco Bay Area
Bay Area to Central Valley EIR/EIS	<i>Bay Area to Central Valley High-Speed Train Final Program EIR/EIS</i>
Caltrans	California Department of Transportation
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
C.F.R.	Code of Federal Regulations
CWA	Clean Water Act
DDV	Diridon design variant
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EMF	electromagnetic field
EMI	electromagnetic interference
FRA	Federal Railroad Administration
GHG	greenhouse gas
Google Project	Downtown West Mixed-Use Plan
HSR	high-speed rail
I-	Interstate
IAMF	impact avoidance and minimization feature
LWCF	Land and Water Conservation Fund Act
MOU	memorandum of understanding
MOWF	maintenance of way facility
MOWS	maintenance of way siding
mph	miles per hour
MT	Mainline Track
NEPA	National Environmental Policy Act
NOD	Notice of Determination
NOI	Notice of Intent
NOP	Notice of Preparation
Partially Revised Final Program EIR	<i>Bay Area to Central Valley High-Speed Train Partially Revised Final Program EIR</i>
PCJPB	Peninsula Corridor Joint Powers Board
PM _{2.5}	particulate matter smaller than or equal to 2.5 microns in diameter

PM ₁₀	particulate matter smaller than or equal to 10 microns in diameter
project, or project extent	San Jose to Central Valley Wye Project Extent
Project Section	San Jose to Merced Project Section
Revised/Supplemental Draft EIR/EIS	<i>San Jose to Merced Project Section Revised Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement, Biological Resources Analysis</i>
ROD	Record of Decision
RSA	resource study area
SAFE	Safer Affordable Fuel-Efficient
SHPO	State Historic Preservation Officer
SO ₂	sulfur dioxide
SR	State Route
SSMP	Safety and Security Management Plan
STB	Surface Transportation Board
TDV	tunnel design variant
TOD	transit-oriented development
UPRR	Union Pacific Railroad
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
USEPA	U.S. Environmental Protection Agency
Valley-to-Valley	Central Valley to Silicon Valley
VMT	vehicle miles traveled

SUMMARY

Since publication of the 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.3, Issues Raised during the Scoping Process, was revised to show the correct dates for the Notice of Preparation (NOP) and Notice of Intent (NOI).
- A footnote was added in Section S.5.1, No Project Alternative, regarding the updated Council on Environmental Quality (CEQ) regulations issued after release of the Draft EIR/EIS.
- Section S.5.2.1, Common Design Features, was revised to remove a bullet describing eliminating leg of intersections from a list of state highway and local roadway modifications.
- Section S.7, No Project Alternative Impacts, was updated to include descriptions of transportation and noise and vibration impacts under the No Project Alternative.
- The following impacts summarized in Table S-3 were updated: Impacts TR#3, TR#4, TR#5, TR#8, AQ#1, AQ#6, AQ#9, AQ#16, PUE#1, PUE#4, PUE#12, BIO#38, BIO#42, BIO#43, BIO#51, BIO#53, HYD#8, HYD#9, HYD#10, HYD#15, S&S#7, and AG#8. In addition, the following impact summaries related to socioeconomics and communities were updated: Permanent Displacement and Relocation of Residential Properties, Permanent Displacement and Relocation of Commercial and Industrial Facilities, Permanent Displacement and Relocation of Agricultural Properties, Construction Impacts on Employment, and Temporary Impact on Private Recreational Waterfowl Hunting. Impacts BIO#2b and BIO#26a were added.
- The following impacts summarized in Table S-4 were updated: Impacts TR#7, NV#2, NV#7, NV#10, EMF/EMI#2, PUE#13, BIO#44, BIO#45, BIO#46, BIO#47, S&S#9, LU#7, and PK#7. In addition, the following impact summaries related to socioeconomics and communities were updated: Disruption or Division of Established Communities from Changes to Noise and Vibration from HSR Operations, Operations Impacts on Employment, and Permanent Impact on Private Recreational Waterfowl Hunting. A table note was added to the Noise section to describe how impacts associated with the design variants are identified in the table.
- In Table S-5, Mitigation Measure TR-MM#2 was added as mitigation for Temporary Impacts on Bus Transit, and the California Environmental Quality Act (CEQA) level of significance after mitigation for each alternative was added. Mitigation Measure AQ-MM#1 and AQ-MM#2 were added as mitigation for all air quality and greenhouse gas (GHG) impacts that are significant before mitigation. Mitigation Measure AQ-MM#2: Offset Project Construction Emissions in the NCCAB was removed as mitigation for Temporary Direct Impacts on Implementation of an Applicable Air Quality Plan. Mitigation Measure BIO-MM#80 was added as mitigation for the impacts Intermittent Permanent Exposure of Sensitive Receptors to Noise from Train Operations and Permanent Changes from Noise and Vibration on Parks, Recreation, and Open Space Resource Character and Use. Additional detail on the CEQA level of significance after mitigation was added for the impact Intermittent Permanent Exposure of Sensitive Receptors to Vibration from Operations. The titles of BIO-MM#10, BIO-MM#14, BIO-MM#28, BIO-MM#84b, and BIO-MM#85 were updated. BIO-MM#77b was added as mitigation for impacts Permanent Impacts on Wildlife Movement and Conflict with Coyote Valley Linkage. BIO-MM#84a was added as mitigation for impacts Permanent Conversion or Degradation of Conservation Areas and Conflict with Santa Clara Valley Habitat Plan. The row for impact Alternatives 1 and 2: Permanent Impacts on Groundwater Quality and Volume during Construction was deleted. For the impact Continuous Permanent Impacts on Emergency Access and Response Times, Mitigation Measure SS-MM#3 was added for Alternatives 1, 2, and 3; SS-MM#4 was noted as for Alternatives 1, 2, and 3 in part and Alternative 4 in full; and TR-MM#1e, TR-MM#1t, TR-MM#1u, TR-MM#1w, TR-MM#1x.6,

TR-MM#1x.8, TR-MM#1x.9, and TR-MM#1x.10 were added for Alternative 4. For impact Alternative 3: Permanent Alteration of Land Use Patterns from Land Use Conversion and Introduction of Incompatible Uses, LU-MM#1 was removed and replaced with a statement that no mitigation measures are required for Alternatives 1, 2, and 4, and no mitigation measures have been identified for Alternative 3. Impact Alternatives 2 and 4: Temporary Changes from Noise, Vibration, and Construction Emissions on Use and User Experience of Parks, Recreational Facilities, and Open Space Resources was clarified to apply to Alternatives 2 and 4. For impact Temporary Changes to Access or Use of Parks, PR-MM#7 was clarified as applying to Alternatives 1, 2, and 3, and PR-MM#8 was added for Alternatives 2 and 3. PR-MM#8 was also added for impact Permanent Acquisition of Parks, Recreation, and Open Space Resources. Table note 4 was revised.

- In Table S-5, the CEQA Level of Significance after Mitigation was corrected for Impacts TR#10 and S&S#4.
- Revisions to Tables S-3, S-4, and S-5 were made to incorporate changes included in the *San Jose to Merced Project Section Revised Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement, Biological Resources Analysis* (Revised/Supplemental Draft EIR/EIS) and in response to public comments on the Revised/Supplemental Draft EIR/EIS.
- Table S-5 was modified to include the corresponding numbering for each impact title.
- Table S-6 was updated to reflect corrections in the number of significant and unavoidable impacts under each alternative.
- Table S-7 was updated for consistency with Chapter 6 of this Final EIR/EIS to reflect design changes and to reflect escalated costs in 2021 dollars.
- Table S-8 was updated to show community and environmental factors, including commercial displacements and severe noise impacts, impacted by the Diridon design variant (DDV) and tunnel design variant (TDV) in parentheses. Rows for vibration impacts and impacts related to intersections with adverse National Environmental Policy Act (NEPA) effects after mitigation were added to this table. The number of permanent adverse impacts on National Register of Historic Places-listed/eligible resources was updated for Alternatives 1 and 2. Environmental justice effects were updated to reflect the final determinations, taking into account direct mitigation, project benefits, and offsetting mitigation measures.
- Section S.8.3.5, Diridon and Tunnel Design Variants, was revised with clarifying detail, and subheadings were added to separate the description of the DDV and the TDV.
- The number of Section 4(f) properties was updated in Section S.9.1, Section 4(f).
- Draft EIR/EIS Section S.12.1, Public and Agency Comment, which addressed comments on the Draft EIR/EIS, was deleted.
- The dates for key project milestones were updated in Table S-9.
- Section S.10, Environmental Justice, was updated to reflect the final determinations, taking into account direct mitigation, project benefits, and offsetting mitigation measures.
- Where appropriate, the verb “would,” when used specifically to describe impact avoidance and minimization features (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 formed in 1996, has the responsibility of planning, designing, constructing, and operating the California High-Speed Rail (HSR) System. Its mandate is to develop an HSR system that coordinates with the state’s existing transportation network, which includes intercity rail and bus lines, regional commuter rail lines, urban rail and bus transit lines, highways, and airports.

High-Speed Rail System

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

The California HSR System will 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 shows this system. California HSR System will use state-of-the-art, electrically powered, high-speed, steel-wheel-on-steel-rail technology, including contemporary safety, signaling, and automated train-control systems, with trains capable of operating up to 220 miles per hour (mph) over a dedicated track alignment.

The Authority plans to implement the California HSR System in two phases. Phase 1 will connect San Francisco to Los Angeles and Anaheim via the Pacheco Pass and the Central Valley with an express travel time of approximately 2 hours and 40 minutes. Phase 2 will connect the Central Valley to the state’s capital, Sacramento, and will extend the system from Los Angeles to San Diego.

The San Jose to Merced Project Section (Project Section) would provide HSR service from Scott Boulevard, just north of the San Jose Diridon Station, to a station in downtown Merced. The Project Section consists of three separate portions: San Jose to Central Valley Wye, Central Valley Wye, and Ranch Road to Merced. The portion of the Project Section analyzed in this Final EIR/EIS is from Scott Boulevard, just north of San Jose Diridon Station, to Carlucci Road. This is referred to as the San Jose to Central Valley Wye Project Extent (project or project extent). It would extend approximately 90 miles, passing through Santa Clara, San Benito, and Merced Counties and the cities of Santa Clara, San Jose, Morgan Hill, Gilroy, and Los Banos. This Final EIR/EIS evaluates four alternatives shown in Figure S-2.

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

- 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

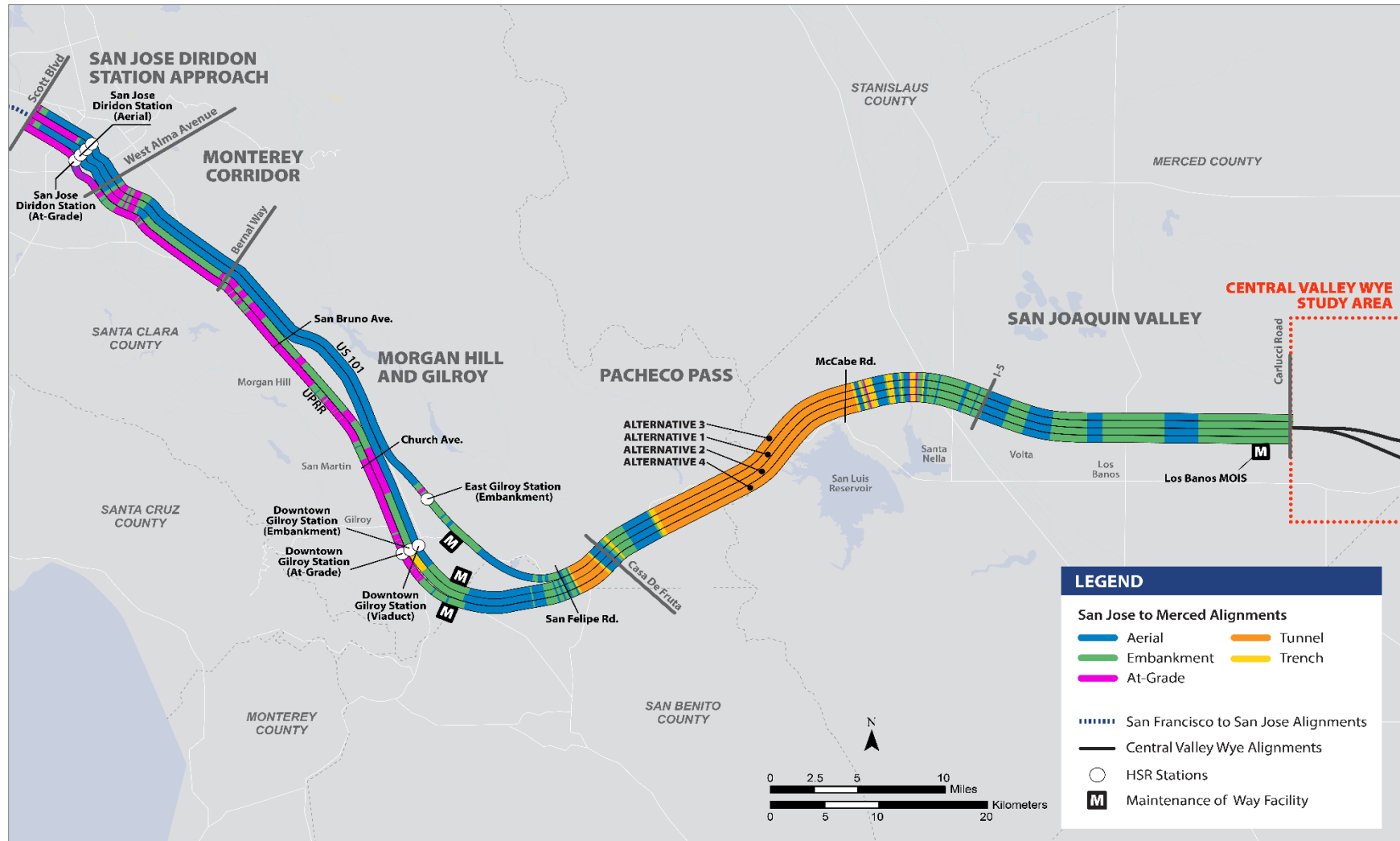
¹ The Inland Empire is a metropolitan region in Southern California encompassing most of San Bernardino and Riverside Counties. Included are the major cities of Riverside, Ontario, San Bernardino, Fontana, and Rancho Cucamonga in the eastern valleys and the high desert cities of Victorville and Hesperia in the north. The Coachella Valley, Palm Desert, and Palm Springs are to the east, and Temecula and Murrieta are to the south.



Note: HSR system described in Program EIR/EIS

MAY 2019

Figure S-1 California High-Speed Rail Statewide System



Note: San Jose to Merced Project Alignments are described in Chapter 2, Alternatives.
 Source: Authority 2019

JANUARY 2019

Figure S-2 San Jose to Merced Project Section

- 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: http://hsr.ca.gov/Programs/Environmental_Planning/index.html.

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. Key substantive changes are summarized in Section S.1.1.1, Volume 1 Summary of Key Changes, Section S.1.1.2, Volume 2 Summary of Key Changes, and Section S.1.1.3, Volume 3 Summary of Key Changes. In addition, substantive changes are summarized at the beginning of each chapter and resource topic section of Chapter 3, Affected Environment, Environmental Consequences, and Mitigation Measures.

Section 3.20, Design Variants to Optimize Speed, of the Draft EIR/EIS, has been removed from the Final EIR/EIS, and the content has been incorporated into each resource topic. The following resource topics are areas with no impact differences as a result of the inclusion of the design variants: Section 3.5, Electromagnetic Fields and Electromagnetic Interference; Section 3.6, Public Utilities and Energy; Section 3.8, Hydrology and Water Resources; Section 3.9, Geology, Soils, Seismicity, and Paleontological Resources; Section 3.10, Hazardous Materials and Waste; Section 3.11, Safety and Security; Section 3.13, Station Planning, Land Use, and Development; Section 3.14, Agricultural Farmland; Section 3.15, Parks, Recreation, and Open Space; Section 3.16, Aesthetics and Visual Quality; Section 3.17, Cultural Resources; and Chapter 4, Section 4(f)/6(f) Evaluation.

Since the close of the public comment period on the Draft EIR/EIS on June 8, 2020, and the close of the public comment period on the Revised/Supplemental Draft EIR/EIS on June 9, 2021, the Authority has reviewed the public comments and made changes between the Draft EIR/EIS and this Final EIR/EIS based on comments received. The Authority has continued to consult with local jurisdictions and property owners along the alignment and has continued to work closely with regulatory agencies with jurisdiction over some components of the project. This consultation has resulted in project refinements, updates to the impacts analysis, and additional or revised mitigation measures. 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, Preliminary Engineering for Project Design Record. Each 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.

The following resource topics did not have major substantive changes since publication of the Draft EIR/EIS: Section 3.9; Section 3.10; Section 3.18, Regional Growth; Chapter 6, Project Costs and Operations; Chapter 11, List of Preparers; Chapter 13, Glossary of Terms; and Chapter 14, Index. Throughout the Final EIR/EIS, the IAMF and mitigation measure language has been modified to use the term "will" instead of the term "would."

S.1.1.1 Volume 1 Summary of Key Changes

Key changes by chapter and section are summarized below. This is not a comprehensive list of changes. A more detailed list of changes is provided at the front of each chapter or section.

Chapter 1, Project Purpose, Need, and Objectives

- Section 1.1.3.2, Business Plans for the Statewide High-Speed Rail System, was updated to reference ridership forecasts for 2040 in the 2020 Business Plan (Authority 2021).
- Additional information was added about the Peninsula Corridor Joint Powers Board (PCJPB) and agreements the Authority has with PCJPB regarding blended service.

Chapter 2, Alternatives

- Updates were made to add clarifying information regarding lighting and glare associated with HSR system infrastructure.
- Revisions were made to update information regarding stations, parking, and planned land use associated with the Google Downtown West Mixed-Use Plan proposed development (Google Project) and to update the status of other projects.
- Additional information was added about the PCJPB and agreements the Authority has with PCJPB regarding blended service.
- Text was added regarding the Authority's approach to station parking facilities and clarifications of the locations of relocated parking.
- 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 CEQ regulations issued after release of the Draft EIR/EIS.
- Text was updated to reference the 2020 Business Plan (Authority 2021).

Section 3.2, Transportation

- Text was added regarding the Authority's approach to station parking facilities.
- Revisions were made to update information regarding stations and parking, including reference to the updated cumulative analysis of parking relative to the Google Project.
- Revisions were made to clarify trip generation methodology.
- Updates were made to reflect recent freight operation projections from the 2018 California State Rail Plan and to update the status and schedule for planned projects. The analysis of construction and operational effects on freight services and facilities was expanded, clarified, and updated.
- Section 3.2.7, Mitigation Measures, was modified to include site-specific traffic mitigation measures for consideration under TR-MM#1 and an analysis of the potential for secondary effects due to these site-specific mitigation measures, to include provisions under TR-MM#2 that apply during construction, 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

- Clarifications regarding methodology and assumptions for the air quality analysis were provided.
- 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.

- The analysis now uses a lower *de minimis* threshold (i.e., 70 tons per year rather than 100 tons per year) for particulate matter smaller than or equal to 2.5 microns in diameter (PM_{2.5}) and sulfur dioxide (SO₂) in the San Joaquin Valley Air Basin.
- Refinements were made to the particulate matter mass emissions inventory to more comprehensively capture emissions reductions that would be achieved through implementation of AQ-IAMF#1: Fugitive Dust Emissions.
- Draft EIR/EIS Mitigation Measure AQ-MM#2 was deleted due to the impact of the refinements to the particulate matter emissions inventory. With these refinements, none of the project alternatives would exceed Monterey Bay Air Resources District's coarse particulate matter (PM₁₀) threshold.
- Two new air quality mitigation measures were added: AQ-MM#1: Implement Additional On-Site Emissions Controls to Reduce Fugitive Dust and AQ-MM#2: Construction Emissions Reductions – Requirements for use of Zero Emission (ZE) and/or Near Zero Emission (NZE) Vehicles and off-road equipment.

Section 3.4, Noise and Vibration

- Revisions to the operational noise impact analysis were made to reflect responses to comments received on the Draft EIR/EIS and to incorporate the updated design for the DDV and TDV.
- NV-MM#3 was modified to acknowledge that transparent materials will not be used in noise barriers in certain areas.
- NV-MM#4 was modified to include language 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).
- The impact analysis was revised to include mitigation proposed in BIO-MM#80, which reduces the impacts at several locations in Pacheco Pass and San Joaquin Valley Subsections.
- Further analysis of the effectiveness of operational noise and vibration mitigation was added.

Section 3.5, Electromagnetic Fields and Electromagnetic Interference

- Text was added to describe magnetic field strengths in the resource study area (RSA) and to clarify that higher speeds associated with the design variants would lead to slightly higher electromagnetic field (EMF) strength but no change in impacts.

Section 3.6, Public Utilities and Energy

- Revisions were made to the impact analysis to update the existing major utilities and the number of utility conflicts, to clarify the extent of new utility infrastructure that would be required to support the project, and to reflect updated calculations of energy consumption associated with project construction.

Section 3.7, Biological and Aquatic Resources

- Revisions were made 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 and that the Authority would be required to obtain a Section 401 permit (refer to the Porter-Cologne Water Quality Control Act (Waters of the State) subsection).
- Updates to Section 3.7.4, Consultation with Regulatory Agencies for Federal Endangered Species Act Compliance, were made to reflect current status of consultation.

- Revisions to the impact analysis were made 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.
- Revisions were made to the impact analysis to reflect incorporation of the Revised/Supplemental 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.
- Updates were made to add clarifying information regarding lighting and glare associated with HSR system infrastructure.
- Clarifications and additions regarding design, monitoring, and adaptive management of wildlife crossings were added. The CEQA Conclusion subsection was updated to provide further explanation of the significance conclusion.
- The following measures in Section 3.7.9, Mitigation Measures, were modified: BIO-MM#1, BIO-MM#3, BIO-MM#7, BIO-MM#8, BIO-MM#9, BIO-MM#10, BIO-MM#14, BIO-MM#23, BIO-MM#26, BIO-MM#27c, BIO-MM#28, BIO-MM#34, BIO-MM#40, BIO-MM#43, BIO-MM#51, BIO-MM#52, BIO-MM#55, BIO-MM#58, BIO-MM#60, BIO-MM#62, BIO-MM#63, BIO-MM#66, BIO-MM#68, BIO-MM#69, BIO-MM#70, BIO-MM#72, BIO-MM#75, BIO-MM#76a, BIO-MM#77a, BIO-MM#78, BIO-MM#79a, BIO-MM#80, BIO-MM#81, BIO-MM#84b, and BIO-MM#85.
- The following measures in Section 3.7.9 were added to the Final EIR/EIS: BIO-MM#P1, BIO-MM#27a, BIO-MM#27b, BIO-MM#76b, BIO-MM#77b, BIO-MM#79b, BIO-MM#84a, BIO-MM#86, BIO-MM#87, BIO-MM#88, and BIO-MM#89.
- Revisions 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.
- Revised/Supplemental Draft EIR/EIS Appendix 3.7-D, Supplemental Species Habitat Model Descriptions; Appendix 3.7-E, Supplemental Noise Analysis on Terrestrial Wildlife Species; and Appendix 3.7-F, Supplemental Artificial Light Analysis on Terrestrial Wildlife Species (located in Volume 2), were added to the Final EIR/EIS.

Section 3.8, Hydrology and Water Resources

- Various updates and clarifications were made to the regulatory setting and the affected environment sections.
- Revisions were made to the impact analysis to account for the latest basin boundary modification approved by the California Department of Water Resources, to indicate the percentage of impervious areas the project would introduce within each watershed, and to add information regarding waterproofing of subsurface structures and the effect of subsurface structure on groundwater levels.
- The Authority performed additional hydraulic analysis for downstream areas that are outside of the RSA as part of responding to public comments, and this analysis indicated there would be negligible impacts on downstream floodplains and floodways as a result of the minimal increase in peak flow rates under Alternative 4. The impact analysis was revised to include this information. Table 3.8-31 was added to quantify existing and proposed peak 100-year flows of the Soap Lake floodplain.
- HYD-MM#3 was removed from the section because the proposed mitigation to avoid an increase in surface elevation has been incorporated into the project design.

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 RSA.
- Text was updated throughout the section to address comments on Federal Aviation Regulation 14 C.F.R. Part 77.
- The impact analysis was modified to add additional description and analysis concerning at-grade crossing safety and to identify the pedestrian-only at-grade crossing at the College Park Caltrain Station.
- Section 3.11.7, Mitigation Measures, was updated as follows:
 - Mitigation Measure SS-MM#1 was modified to include local relocation of the fire department, if necessary, to reduce project effects on response times to less than the significance threshold.
 - Mitigation Measure SS-MM#3 was updated to acknowledge the City of San Jose's implementation of Emergency Vehicle Pre-Emption and its applicability to the project.
 - Mitigation Measure SS-MM#4 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. This measure was also modified to allow for the provision of funding for initial operating costs of a new fire station in South San Jose, one in south Morgan Hill/San Martin, and one in Gilroy, if needed. This measure now also includes partnership with local emergency providers between south San Jose and Gilroy to provide real-time data on train movement and at-grade crossing gate status to help with emergency response planning.
 - Description of certain site-specific traffic mitigation measures that would apply to Alternative 4 if Mitigation Measure SS-MM#4 cannot reduce emergency vehicle response time impacts to a less-than-significant level was added.

Section 3.12, Socioeconomics and Communities

- The impact analysis was modified to provide additional information about private hunting areas, impacts in the Grasslands Ecological Area, noise and vibration impacts, displacements of commercial and industrial facilities, employment numbers, and remnant parcels.
- Section 3.12.7, Mitigation Measures, was updated to include SO-MM#1, which would be implemented to reduce impacts associated with residential displacement in certain areas.

Section 3.13, Station Planning, Land Use, and Development

- Additional information and clarifications were added to the regulatory setting and affected environment sections.
- Revisions were made to update information regarding planned land use associated with the Google Project.
- Reference to Mitigation Measure LU-MM#1 was removed, as this mitigation measure was already included as an IAMF.
- The impact analysis was modified to address intermittent noise.

Section 3.14, Agricultural Farmland

- Changes were made throughout the section to include Important Farmland under conservation easements.

- The description of how the project alternatives would be inconsistent with plans and laws were updated to reflect inconsistencies with the Santa Clara Valley Agricultural Plan, Santa Clara Valley GreenPrint, and Pajaro River Watershed Integrated Regional Water Management Plan.
- New text describing the agricultural conservation easements that intersect the RSA was added.
- Clarifications were provided regarding certain agricultural farmland impacts.
- Discussions of secondary impacts as a result of implementing each mitigation measure were added to the discussion of each mitigation measure.

Section 3.15, Parks, Recreation, and Open Space

- This section was modified to include six additional resources—Reed and Grant Streets Sports Park, Del Monte Park, Roberto Antonio Balermينو Park, Elaine Richardson Park, Juan Bautista de Anza National Historic Trail, and Railroad Park.
- The impact analysis was updated to reflect the current status of planned parks, correct or update the impacts of the alternatives on certain parks, and update tables and figures throughout this section to include the appropriate resources.
- PR-MM#8 was added to the Final EIR/EIS.

Section 3.16, Aesthetics and Visual Quality

- Mitigation measure AVQ-MM#7 was updated to clarify that transparent materials will not be used in noise barriers located in Audubon Important Bird Areas or where noise barriers are being used to attenuate bird startle effects.

Section 3.17, Cultural Resources

- Additional detail was included for the description of known archaeological resources.
- Text was updated to reflect State Historic Preservation Officer (SHPO) concurrence dates for Section 106 technical reports.
- Text was modified to reflect that the Tamien Nation has elected to be a consulting party for the project.
- The impact analysis was revised to further describe the vibration impact thresholds used.
- Text was added to more clearly describe the implementation of CUL-MM#1 and CUL-MM#2.

Section 3.19, Cumulative Impacts

- Revisions were made throughout the section to update the status of cumulative projects and to reflect updates to the impact analysis for various resource topics, including transportation, air quality and greenhouse gas emissions, noise and vibration, public utilities and energy, conservation areas, hydrology and water resources, biological and aquatic resources, socioeconomics and communities, and aesthetics and visual quality.

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

- The Authority's Section 4(f) determinations concerning the use of Section 4(f) protected properties were finalized and updated regarding coordination and concurrence with officials with jurisdiction over the Section 4(f) resources.
- This chapter was updated to reflect the current status of and correct name of parks, correct or update the impacts of the alternatives on certain resources, and update tables and figures throughout this section to include the appropriate resources.
- The analysis was revised to include six additional parks.

- The use determinations were updated to reflect changes in the analysis.
- The alternative with the least overall harm was identified concerning the use of Section 4(f)-protected properties.

Chapter 5, Environmental Justice

- Revisions were made to reflect updates to the impact analysis for various resource topics, including safety and security; residential and commercial displacements; station planning, land use, and development; parks and recreation; transportation; socioeconomics; air quality; noise and vibration, and cumulative effects.
- Text was added about the Authority's policies providing targeted job training and hiring opportunities for minority populations and low-income populations.
- The analysis was updated with a more detailed consideration of the offsetting value of project benefits.
- Further geographic-specific identification of effects was provided.
- Outreach efforts since the Draft EIR/EIS were added.
- Proposed offsetting mitigation measures were identified based on feedback gathered from outreach efforts and Authority policy.
- Final determinations were made concerning environmental justice effects for each of the project alternatives.

Chapter 6, Project Costs and Operations

- Revisions were made to update the capital costs to reflect design changes and escalated costs to 2021 dollars.

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 and Revised/Supplemental Draft EIR/EIS, to reflect revisions to the impact analysis since publication of the Draft EIR/EIS, and to clarify information about the Authority's Preferred Alternative.

Chapter 9, Public and Agency Involvement

- This chapter was updated to include the circulation of the Draft EIR/EIS and the Revised/Supplemental Draft EIR/EIS and describe the release of the Final EIR/EIS, including any additional public and agency meetings that have occurred.

Chapter 10, Distribution List

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

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 since publication of the Draft EIR/EIS were added to this section.

S.1.1.2 Volume 2 Summary of Key Changes

Key changes to appendices are summarized below. This is not a comprehensive list of changes. A more detailed list of changes is provided at the front of each appendix.

Appendix 2-E, Project Impact Avoidance and Minimization Features—This appendix was updated to reflect revisions to AQ-IAMF#4, AQ-IAMF#5, and BIO-IAMF#12.

Appendix 2-J, Regional and Local Plans and Policies—Updated to include *Envision: San José 2040 General Plan* (City of San Jose 2011), the *Santa Clara Valley Agricultural Plan* (County of Santa Clara and Santa Clara Valley Open Space Authority 2018), *Santa Clara Valley GreenPrint* (Santa Clara Valley Open Space Authority 2014), and *Pajaro River Watershed Integrated Regional Water Management Plan* (Pajaro River Watershed Regional Water Management Group 2014).

Appendix 2-K, Policy Consistency Analysis—Updated to include *Communications Hill Specific Plan Area Development Policy* (City of San Jose 2014), *Santa Clara Valley Agricultural Plan* (County of Santa Clara and Santa Clara Valley Open Space Authority 2018), and *Envision: San José 2040 General Plan* (City of San Jose 2011), and other changes.

Appendix 2-M, Gilroy LMF Option Consideration and Elimination— A new appendix was added to provide a history of planning for the Light Maintenance Facility and the reasons for eliminating a Gilroy Light Maintenance Facility from consideration.

Appendix 3.2-A, Transportation Data on Roadways, Freeways, and Intersections—This appendix was updated to reflect the results of additional analysis, including the effect of potential site-specific traffic mitigation measures under consideration.

Appendix 3.2-C, Traffic Mitigation Measures Screening— A new 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 Greenhouse Gases Technical Report—Emissions generated by light-duty gasoline-powered vehicles used during construction were remodeled to include the effects of the SAFE Vehicles Rule. The analysis now uses a lower *de minimis* threshold. Refinements were made to the particulate matter mass emissions inventory. One mitigation measure was removed, and two new mitigation measures were added.

Appendix 3.3-B, Draft Federal General Conformity Determination—This appendix was updated to reflect the published Draft Federal General Conformity Determination.

Appendix 3.4-A, Noise and Vibration Technical Report—This appendix was updated to include analysis about the DDV and TDV.

Appendix 3.4-C, Noise Impact Locations—A new appendix was added to provide more detailed figures showing potential impact locations and noise barriers.

Appendix 3.6-A, Public Utilities and Energy Facilities—This appendix was updated to reflect missing major utility lines within the public utilities RSA.

Appendix 3.7-A, Special-Status Species Subject to Project Impacts—This appendix was updated to reflect information from the Revised/Supplemental Draft EIR/EIS regarding the California Fish and Game Commission’s designation of the southern California/Central Coast population of mountain lion under the California Endangered Species Act and the monarch butterfly’s status as a candidate for listing under the federal Endangered Species Act.

Appendix 3.11-B, Airport Obstructions—Text was updated throughout this appendix to address comments on Federal Aviation Regulation 14 C.F.R. Part 77.

Appendix 3.17-B, Cultural Resources - San Jose to Merced Project Section Tribal Outreach and Consultation Efforts 2009–2021—Text was added to reflect the addition of the Tamien Nation as a Section 106 consulting party.

Appendix 3.19-A, Cumulative Nontransportation Plans and Projects List—The status of cumulative nontransportation plans and projects was updated.

Appendix 3.19-B, Cumulative Transportation Plans and Projects List—The status of cumulative transportation plans and projects was updated.

Appendix 4-A, Concurrence Letter—This appendix was renamed and updated to include the concurrence letter from the City of San Jose Department of Parks, Recreation & Neighborhood Services.

Appendix 5-B, Environmental Justice Engagement Summary Report—This appendix was updated to reflect the continued outreach efforts after the release of the Draft EIR/EIS as well as ongoing environmental justice engagement activities.

Appendix 5-B, Environmental Justice Engagement Summary Report: Attachment B, List of Outreach Meetings Held for the Project—This attachment was updated to include information on engagement concerning community improvements and other engagement following the public circulation of the Draft EIR/EIS.

Appendix 5-B, Environmental Justice Engagement Summary Report: Attachment C, Biannual Environmental Justice Outreach Reports—Biannual environmental justice outreach reports were added for November 1, 2019, through April 20, 2021.

Appendix 5-B, Environmental Justice Engagement Summary Report: Attachment D, Summary of Environmental Justice Outreach in September 2021—Summary of environmental justice outreach concerning updated environmental justice analysis and community improvements in September 2021 was added.

Appendix 5-C, Environmental Justice Development of Community Improvements as Offsetting Mitigation—Description of the community improvements planning and evaluation process was added.

Appendix 5-D, Preferred Alternative, Maps of Disproportionately High and Adverse Effects Before Consideration of Offsetting Mitigation—Figures showing the location of disproportionately high and adverse effects after application of direct mitigation and consideration of the offsetting value of project benefits, but before consideration of offsetting mitigation measures, were added.

Appendix 6-A, PEPD Record Set Capital Cost Estimate Report—Capital costs were updated in this new report to reflect design changes and escalated costs to 2021 dollars.

Appendix 9-A, Public and Agency Meeting List—The list of meetings was updated to include additional public and agency meetings that have occurred.

S.1.1.3 Volume 3 Summary of Key Changes

Key changes in Volume 3 are summarized below. This is not a comprehensive list of changes. Please refer to Volume 3 for all changes.

- Drawings for the DDV to increase speeds through the San Jose Diridon Station from 15 mph to 40 mph under Alternative 4 were incorporated.
- The TDV was added to increase speeds from 200 mph to 220 mph from the maintenance of way facility (MOWF) through the Pacheco tunnels for all alternatives.
- The length of the Guadalupe River Bridge under Alternative 4 was increased to accommodate future flood control channel widening by others and avoid a potential increase in water surface elevation.
- Minor changes were incorporated to reduce conflicts in response to comments on the Draft EIR/EIS.

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

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

The San Jose to Merced Project Section EIR/EIS is a second-tier EIR/EIS that tiers off of 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 EIR/EIS for the Proposed California High-Speed Train System* (Authority and FRA 2005), which provided a first-tier analysis of the general effects of implementing the HSR system across two-thirds of the state. The 2008 *Bay Area to Central Valley High-Speed Train Final Program EIR/EIS* (Authority and FRA 2008) and the Authority's 2012 *Bay Area to Central Valley High-Speed Train Partially Revised Final Program EIR* (Authority 2012) were also first-tier programmatic documents, but they focused on the Bay Area to Central Valley region. The first-tier EIR/EIS documents provided the Authority and FRA with the environmental analyses 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. Between San Jose and Merced, the corridor advanced for Tier 2 study was the Pacheco Pass via Henry Miller Road (Union Pacific Railroad [UPRR] Connection) from San Jose to the Central Valley. The station locations advanced for Tier 2 study were a downtown San Jose/Diridon Station and a downtown Gilroy/Caltrain station, with no station between Gilroy and Merced.

Electronic copies of the Tier 1 documents are available on request by calling the Authority office at 800-455-8166. The Tier 1 documents may also be reviewed at the Authority's offices during business hours at: 770 L Street, Suite 620, Sacramento, CA 95814 and 100 Paseo de San Antonio, Suite 300, San Jose, CA 95113.

The San Jose to Merced Project Section EIR/EIS analyzes the environmental impacts and benefits of implementing the HSR in the more geographically limited area between San Jose Diridon Station and Carlucci Road and is based upon more detailed project planning and engineering. The analysis therefore builds on the earlier decisions and program EIR/EISs and provides more site-specific and detailed analysis.

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. In 2008, the Authority and FRA selected a Pacheco Pass connection, with corridors and station locations for further examination in Tier 2 environmental reviews. As a result of litigation, the Authority prepared additional programmatic environmental review for the Bay Area and the Central Valley Project Sections and again selected the Pacheco Pass connection (Authority 2012).

Sequence of California HSR

Tiered Environmental Documents

Tier 1/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 2/Project Documents

- Merced to Fresno Section Final EIR/EIS (2012)
 - Merced to Fresno Section: Central Valley Wye Final Supplemental EIR/EIS (2020)
 - San Francisco to San Jose Section Draft EIR/EIS (2019)
 - San Jose to Merced Section Final EIR/EIS (this document)
-

The Authority and FRA prepared the Tier 1 documents in coordination with the U.S. Environmental Protection Agency (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.

Consistent with Tier 1 decisions, the Project Section would provide HSR service from the San Jose Diridon Station to a station in downtown Merced. 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; considers public and agency participation in the screening process; and is developed in consultation with resource and regulatory agencies, including 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 (MOU) between the FRA and the State of California, effective July 23, 2019, the Authority is the federal lead agency for environmental reviews and approvals for all Authority Phase 1 and Phase 2 California HSR System projects (FRA and State of California 2019). In this role, the Authority is the project sponsor and the lead federal agency for compliance with NEPA and other federal laws, as well as the state lead agency under CEQA.

Cooperating Agency

Any federal agency, other than a lead agency, that has jurisdiction by law or special expertise with respect to any environmental impact involved in a proposed project or project alternative.

The FRA has primary responsibility for developing and enforcing rail line safety regulations in accordance with 49 U.S.C. Subtitle V, Part A (49 U.S.C. § 20101 et seq.) and for performing Clean Air Act conformity determinations and other federal approvals retained by the FRA. Three cooperating agencies are included in the NEPA review process: the USACE agreed by letter, dated December April 13, 2010, to be a cooperating agency under NEPA; the U.S. Department of the Interior, Bureau of Reclamation acknowledged cooperating agency status in a memorandum of agreement with the Authority on April 30, 2013; and the Surface Transportation Board (STB), per their letter dated May 2, 2013, is also a cooperating agency under NEPA.

S.3 Issues Raised during the Scoping Process

Public scoping is an important element in the process of determining the focus and content of an EIR/EIS and provides an opportunity for public and agency involvement. Scoping helps identify the range of actions, alternatives, environmental effects, and mitigation measures to be analyzed in depth and 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 an NOP (SCH No. 2009022083) on February 23, 2009, and the FRA published an NOI in the *Federal Register* on March 16, 2009, to begin the Tier 2 project-level environmental review process. 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 three public and agency scoping meetings for the Draft EIR/EIS between March 18 and March 26, 2009, in Merced, San Jose, and Gilroy. 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 other means, including presentations, briefings, and workshops. Meetings held as part of the lead agencies' outreach effort are summarized in Section 9.2, Public and Agency Scoping (2009–2010), of this EIR/EIS. The scoping comments received from the

public, agencies, and organizations are available in appendices to the *Final Scoping Report for the San Jose to Merced High-Speed Train Project-Level EIR/EIS*, which can be requested from the Authority (Authority and FRA 2009).

In 2013, the Authority shifted focus to the preparation of a project-level supplemental EIR/EIS for the Central Valley Wye. The Authority reinitiated work on the Project Section in late 2015, adopted the 2016 Business Plan, and conducted additional community outreach and engineering along the corridor. The 2016 Business Plan (Authority 2016a) described the Authority’s decision to shift its early focus from the project sections in Southern California to those in Northern California, with a goal of initiating Central Valley to Silicon Valley (Valley-to-Valley) service in 2025. During the development of the Draft EIR/EIS, between 2016 and 2019, input was solicited from the public, stakeholders, and agencies about project alternatives and to consider refinements of the prior alternatives or the addition of new alternatives responsive to their concerns.

The scoping meetings and comments received on the NOI/NOP helped the lead agencies identify general environmental issues to be addressed in the 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 February 23 to May 1, 2009. A total of 168 written and verbal (i.e., provided to a court reporter at a scoping meeting) comments were received.

The *Final Scoping Report for the San Jose to Merced High-Speed Rail Project Section EIR/EIS* (Authority and FRA 2009) is available by request via the Authority’s website 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:
 - Purpose and need
 - Transportation
 - Air quality
 - Noise and vibration
 - EMF and electromagnetic interference (EMI)
 - Public utilities and energy
 - Biological resources and wetlands
 - Hydrology and water resources
 - Geology, soils, and seismicity
 - Hazardous wastes, materials
 - Safety and security
 - Socioeconomics, communities, and environmental justice
 - Local growth, station planning, and land use
 - Agricultural land
 - Parks, recreation, and open space
 - Aesthetics and visual quality
 - Cultural resources
 - Cumulative impacts
 - Public and agency involvement
- 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 Final EIR/EIS.

S.4 Purpose of and Need for the HSR System and the San Jose to Merced Project Section

S.4.1 Purpose of the High-Speed Rail System

The purpose of the California HSR system is to provide a reliable high-speed electric-powered train system 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 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 Jose to Merced Project Section

The purpose of this project is to implement the San Jose to Merced Project Section of the California HSR system: to provide the public with electric-powered HSR service that provides predictable and consistent travel times between major urban centers and connectivity to airports, mass transit systems, and the highway network in the South San Francisco Bay Area and the Central Valley; and to connect the northern and southern portions of the statewide HSR system.

S.4.3 CEQA Project Objectives for the High-Speed Rail System in California and in the San Jose to Merced 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 lead agency, the Authority is preparing this Final 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
- 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 costs
- Provide intercity travel in a manner considerate and protective of the region's sensitive environmental resources, and reduce emissions and vehicle miles traveled (VMT) for intercity trips

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

The approximately 145-mile-long San Jose to Merced Project Section is an essential component of the statewide HSR system. The Project Section would provide access to a new transportation mode, contribute to increased mobility throughout California, and connect the Bay Area to the rest of the statewide HSR system via three counties: Santa Clara, San Benito, and Merced. As major population and economic centers for California, the South Bay and Central Valley regions contribute significantly to the statewide need for a new intercity transportation service that would connect San Francisco with Los Angeles and the Central Valley. 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 the southern Bay Area and Central Valley systems, is insufficient to meet existing and future travel demand. The current and projected future congestion of the system will continue to result in deteriorating air quality, reduced reliability, and increased travel times. The current transportation system has not kept pace with the increase in population, economic activity, and tourism within the state. 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; some needed expansions may be impractical or may be constrained by physical, regulatory, environmental, political, and other factors.

The need for improvements to intercity travel in California, including intercity travel between the southern San Joaquin Valley, the Bay Area, Sacramento, and Southern California, relates to the following issues:

- Future growth in demand for intercity travel
- Transportation system capacity constraints that will result in increasing congestion and travel delays
- 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
- Reduced mobility because of increasing demand on limited modal connections among the state’s major airports, transit systems, and passenger railways.
- Poor and deteriorating air quality and pressure on natural resources and agricultural lands as a result of expanded highways and airports and urban development pressures
- 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.²

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. All components of the alternatives have been evaluated during an alternatives analysis screening process, which considered the effects of the alternatives on the social, natural, and built environment. As described in Section S.2, Tiered Environmental Review: Final Statewide

² The following legislative mandates are described in detail in Section 3.3.2, Laws, Regulations, and Orders for Air Quality and Greenhouse Gases: Assembly Bill (AB) 1493 (2002), California Executive Order (EO) S-3-05 (2005), AB 32 (2006), EO S-01-07 (2007), Senate Bill (SB) 375 (2008), SB 32 and AB 197 (2016), SB 100 (2018), and EO B-55-18 (2018).

Program EIR/EIS and San Jose to Merced Project Section EIR/EIS, the Authority and FRA relied on program EIR/EIS documents to select the alternatives for further study between the Bay Area and the Central Valley. The four project alternatives chosen for further analysis are consistent with the train technology, alignment corridor, and station locations selected by the Authority and FRA at the conclusion of the Tier 1 EIR/EIS processes for the HSR system. The four alternatives are the result of further consideration of an extensive array of potential alternatives and sub-alternatives, all with the benefit of extensive public, stakeholder, and agency input.

S.5.1 No Project Alternative

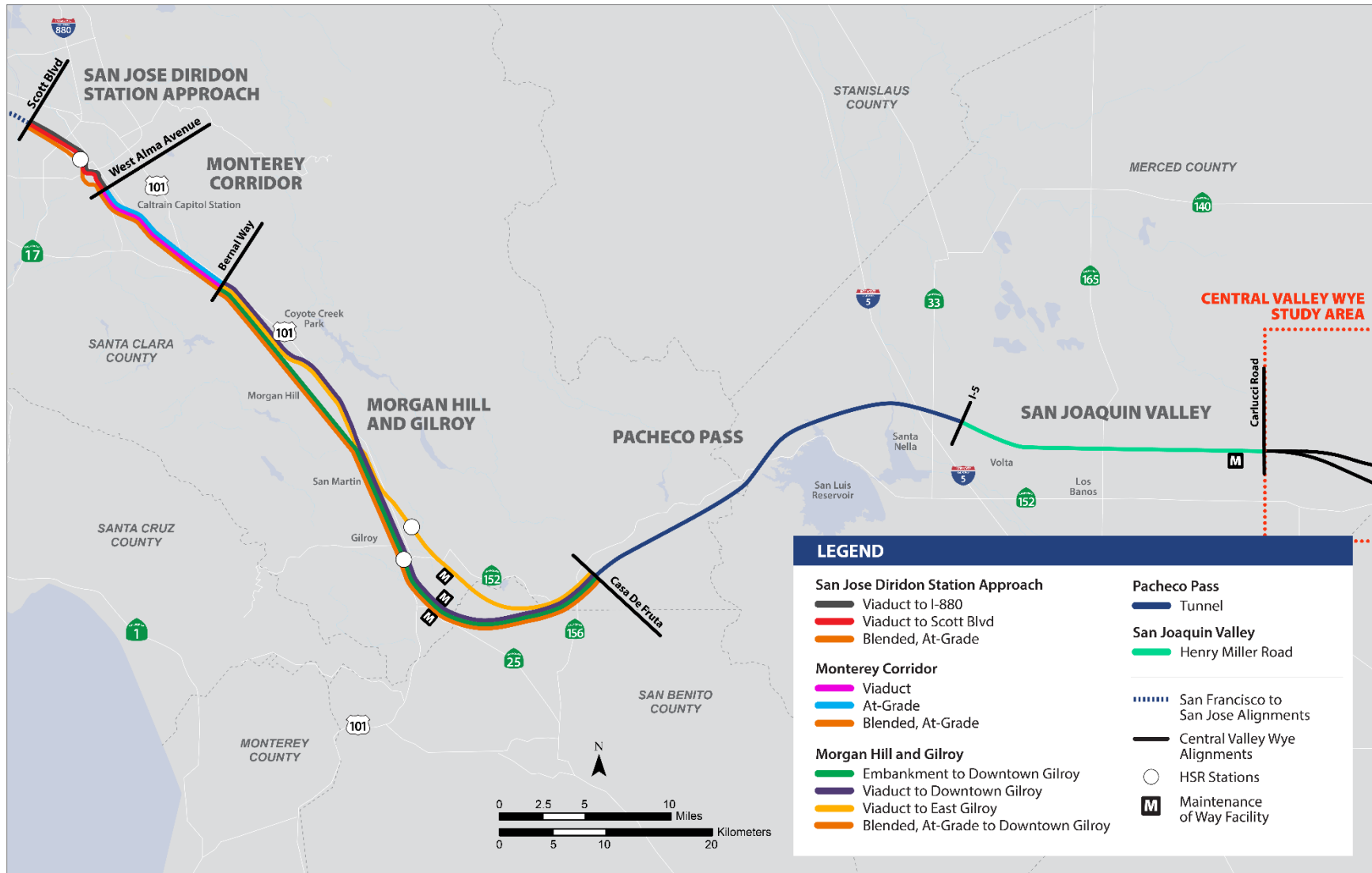
The No Project Alternative is the basis for comparison of the project alternatives. The No Project Alternative represents the state's transportation system (i.e., highway, air, bus, conventional rail) as it is currently and as it would be after implementation of programs or projects that are currently 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)).³ 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 lead agency were not to take the actions necessary to implement HSR service between San Jose and Merced. The No Project Alternative represents 2016 existing conditions in the Project Section RSA and future conditions in 2040, based upon projected growth, programmed and funded improvements to the intercity transportation system, and other reasonably foreseeable projects through the 2040 operational 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.

S.5.2 San Jose to Merced Project Section Alternatives

The Authority has developed four end-to-end alternatives for the project: Alternative 1, Alternative 2, Alternative 3, and Alternative 4, with two design variants intended to optimize train speed. To more clearly describe the location of environmental resources and project impacts, all four alternatives are divided into five geographic subsections. Figure S-3 and Table S-1 show the design options of each alternative by subsection.

³ The Council on Environmental Quality issued new regulations on July 14, 2020, effective September 14, 2020, updating the NEPA implementing procedures at 40 C.F.R. Parts 1500-1508. However, this project initiated NEPA before the effective date and is not subject to the new regulations, relying on the 1978 regulations as they existed prior to September 14, 2020. All subsequent citations to Council on Environmental Quality regulations in this environmental document refer to the 1978 regulations, pursuant to 40 C.F.R. 1506.13 (2020) and the preamble at 85 Fed. Reg. 43340.



Note: The design options for each subsection are described in Chapter 2, Alternatives.
 Source: Authority 2019

JANUARY 2019

Figure S-3 Overview Map of Design Options by Subsection

Table S-1 San Jose to Central Valley Wye Design Options by Subsection

Subsection/Design Options	Alternative 1	Alternative 2	Alternative 3	Alternative 4
San Jose Diridon Station Approach				
Viaduct to Scott Blvd	–	X	X	–
Viaduct to I-880	X	–	–	–
Blended, At-Grade	–	–	–	X
Monterey Corridor				
Viaduct	X	–	X	–
At-Grade	–	X	–	–
Blended, At-Grade	–	–	–	X
Morgan Hill and Gilroy				
Embankment to downtown Gilroy	–	X	–	–
Viaduct to downtown Gilroy	X	–	–	–
Viaduct to east Gilroy	–	–	X	–
Blended, At-Grade to downtown Gilroy	–	–	–	X
Pacheco Pass				
Tunnel	X	X	X	X
San Joaquin Valley				
Henry Miller Rd	X	X	X	X

Source: Authority 2019

X = present; – = absent

The project is an approximately 90-mile portion of the 145-mile-long Project Section. It comprises mostly dedicated HSR system infrastructure, HSR station locations at San Jose Diridon and Gilroy, a MOWF in the Gilroy area, and a maintenance of way siding (MOWS) west of Turner Island Road in the Central Valley. HSR stations at San Jose Diridon and Gilroy would support transit-oriented development (TOD), provide an interface with regional and local mass transit services, and provide connectivity to the South Bay and Central Valley highway network.⁴ The project begins at Scott Boulevard in Santa Clara. The HSR infrastructure and operations transition from the blended system between San Francisco and Santa Clara to a fully dedicated system north of the San Jose Diridon Station, either at Scott Boulevard in Santa Clara (Alternatives 2 and 3) or near Interstate (I-) 880 (Alternative 1); or, in the case of Alternative 4, the blended system extends to downtown Gilroy. The project continues south and east from Gilroy, continuing east through the Pacheco Pass to the Central

Maintenance of Way Facility (MOWF)

MOWFs provide for equipment, materials, and replacement parts storage as well as support quarters and staging areas for the HSR system subdivision maintenance personnel. Each subdivision would cover about 150 miles; the MOWF would be centrally located in the subdivision.

Maintenance of Way Siding (MOWS)

MOWSs provide temporary storage of work trains as they perform maintenance in the vicinity of the track.

Transit-Oriented Development (TOD)

Development of compact, sustainable, pedestrian-oriented communities centered around high-quality transit systems.

⁴ South Bay refers to Santa Clara County.

Valley, to end at Carlucci Road, the western limit of the Central Valley Wye. As shown in Figure S-3, the project comprises the following five subsections:

- San Jose Diridon Station Approach—Extends approximately 6 miles from north of San Jose Diridon Station at Scott Boulevard in Santa Clara to West Alma Avenue in San Jose. This subsection includes Diridon Station.
- Monterey Corridor—Extends approximately 9 miles from West Alma Avenue to Bernal Way in the community of South San Jose. This subsection is entirely within the city of San Jose.
- Morgan Hill and Gilroy—Extends approximately 30 miles from Bernal Way in the community of South San Jose to Casa de Fruta Parkway/State Route (SR) 152 in the community of Casa de Fruta in Santa Clara County.
- Pacheco Pass—Extends approximately 25 miles from Casa de Fruta Parkway/SR 152 to east of I-5 in unincorporated Merced County.
- San Joaquin Valley—Extends approximately 20 miles from I-5 to Carlucci Road in unincorporated Merced County.

S.5.2.1 Common Design Features

Because all four alternatives follow the same general corridor, they must address many of the same concerns regarding local infrastructure. The common requirements to address these concerns are as follows:

- **Frontage road and local roadway crossings**—Where the corridor passes through rural regions, it would affect existing local frontage roads used by small communities and farm operations. Where these frontage roads parallel the HSR alignment, they would be shifted and reconstructed to maintain their functions. Where roads are perpendicular to the proposed HSR, over- or undercrossings would be planned approximately at every 2 miles. Between these crossings, some roads may be closed. A detailed list of these modifications and closures are provided in Appendix 2-A.
- **Irrigation and drainage facilities**—The project would affect existing drainage and irrigation facilities. Depending upon the severity of the impact, existing facilities would be modified, improved, or replaced as necessary to maintain existing drainage and irrigation functions, allow operations and maintenance access for facility owners, and support HSR drainage requirements.
- **Operational facilities**—HSR operational requirements include traction power distribution, ATC, communications and maintenance facilities, and underground or overhead power transmission lines. Working in coordination with power supply companies and accordance with design requirements, the Authority has identified frequency and right-of-way requirements for traction power distribution facilities.
- **State Route 87, State Route 89, State Route 101, State Route 152, Interstate-5, and Interstate-880 adjacency**—The project follows or traverses SR 87, SR 89, SR 101, SR 152, I-5, and I-880, crossing over these routes in some locations and under them in others. In some instances, the at-grade HSR guideway would cross the roadway approaches of these highway overcrossings and interchange elements. Construction of the project would entail replacement of some major state facilities, overcrossings, and interchanges to maintain horizontal and vertical clearances over the highway right-of-way or avoid traffic impacts during construction. These project components are discussed for each alternative in State Highway and Local Roadway Modifications later in this section.
- **UPRR adjacency**—The project between the Monterey Corridor and the Morgan Hill and Gilroy Subsections is designed to follow the existing UPRR corridor adjacent to the UPRR mainline right-of-way under Alternative 2, as well as some portions of it under Alternative 1. Alternative 3 is designed to further minimize interaction with the UPRR right-of-way.

Alternative 4 is designed to maximize use of existing Caltrain and UPRR rights-of-way to reduce additional right-of-way impacts.

From Tamien Station to Bloomfield Ave in Gilroy, the UPRR and proposed HSR tracks run parallel for 24.4 miles in Alternative 1, 31.4 miles in Alternative 2, and 16.4 miles in Alternative 3. Under Alternative 4, UPRR and HSR would run in parallel for 37.4 miles, from De La Cruz Boulevard to Bloomfield Avenue. In several locations, the HSR would be elevated to cross over the UPRR operational right-of-way. In these instances, the HSR would maintain required horizontal and vertical clearance over the UPRR's operational right-of-way to avoid or minimize impacts on other UPRR rights-of-way, spurs, and facilities. All alternatives, except Alternative 4, would be designed to primarily avoid the existing UPRR operations right-of-way and active rail spurs. The interaction with the UPRR right-of-way would vary by alternative as follows:

- Alternative 1 would limit longitudinal encroachments into UPRR right-of-way, but would require acquisition of 28 acres of UPRR right-of-way and another 34 acres for temporary construction.
- Alternative 2 would raise the UPRR tracks onto embankment for the southbound approach into downtown Gilroy and at the HSR station and would require 36 acres of UPRR right-of-way and 257 acres for temporary construction easements.
- Alternative 3 would entail the least amount of longitudinal encroachments or acquisition of other UPRR right-of-way for the East Gilroy Station, but would require 8 acres of UPRR right-of-way and 13 acres for temporary construction easements.
- Alternative 4 would require the most longitudinal encroachments or acquisition of UPRR right-of-way. From Communications Hill (located in the Monterey Corridor Subsection) to the MOWF south of Gilroy, HSR would install two electrified blended HSR tracks and one non-electrified freight track predominantly within existing UPRR right-of-way. The UPRR Hollister subdivision (located southeast of Gilroy) would be realigned to accommodate the MOWF and associated freight and HSR tracks. Within the UPRR right-of-way (south of Communications Hill) would be 99.8 miles of realignment.

Temporary Construction Easements—Temporary construction easements would be required along the length of the proposed alignment, ranging from isolated maximum widths of 486 feet for Alternative 1 to 568 feet for Alternative 2. Permanent right-of-way acquisitions would be required at alignment crossings.

Safety—The system safety and system security program for the development and operation of HSR is described in the Authority's Safety and Security Management Plan (SSMP), which includes the Authority's Safety and Security Policy Statement, roles and responsibilities for safety and security across the project, the program for managing safety hazards and security threats/vulnerabilities, safety and security certification program requirements, and construction safety and security requirements.

State Highway and Local Roadway Modifications

- **State highway underpasses**—Where the HSR alignment is proposed to cross over state highway facilities in various locations on aerial structures, the possibility of encroachment into the California Department of Transportation (Caltrans) right-of-way would depend upon the placement of the HSR aerial structure columns. Temporary closure of the Caltrans right-of-way may be necessary for placement of precast aerial structure sections, during which time traffic would be detoured onto local streets.
- **Roadway overcrossings**—Where the HSR alignment is at grade and runs parallel to state facilities, access would be severed where an at-grade leg of an intersection crosses the HSR alignment. Accordingly, road overcrossings would be necessary for maintaining function of the state highway and local road systems. Intersecting roads would be realigned horizontally and adjusted vertically to cross over the state highway. The possibility of encroachment into the Caltrans right-of-way would depend upon the placement of the overcrossing columns.

The design intent of these crossings is to maintain the existing intersection and traffic patterns during construction. However, when conforming to the existing roads, some short-term closures may be required, and local traffic would utilize one of the other overcrossings or intersections in the vicinity.

- **Ramp modifications**—Ramp modifications would be necessary where the HSR track is on an aerial structure, and the proposed columns directly interfere with the existing alignments of roadways or off-ramps. These ramps would be modified to avoid the proposed columns and accommodate any other roadway realignments that result from the aerial structure columns. Although the modifications would be slight, additional right-of-way may be required for the realigned off-ramps. Roadway traffic would likely use existing facilities while the realigned ramps are being constructed.

S.5.3 Station Area Development

Two stations would be constructed for the project in San Jose and Gilroy. The San Jose Diridon Station would be constructed at the existing Caltrain station. A second station—in the Morgan Hill and Gilroy Subsection—would be constructed in either downtown Gilroy or east Gilroy, depending upon the alternative selected. Conceptual station plans at both stations provide space for a multitude of services, including local and regional transit connectivity, pick-up and drop-off facilities, parking, station buildings for ticketing and support services, and passenger waiting and access area for HSR. Station planning would incorporate pedestrian and bicyclist connectivity; improved station area roadways for facilitating connectivity; expanded sidewalks, pathways, and plazas; rider pick-up and drop-off areas; and automobile parking.

S.5.4 Maintenance Facilities

Three sites for the MOWF are under consideration. The East Gilroy MOWF would be located west of the HSR mainline, south of the community of Old Gilroy, extending from north of Pacheco Pass Highway (SR 152) to north of Bloomfield Avenue. The South Gilroy MOWF would be located in one of two locations—between Carnadero Avenue and Bloomfield Avenue on the east side of the HSR alignment or south of Bloomfield Avenue on the west side of the HSR alignment.

S.6 Impact Avoidance and Minimization Features

The IAMFs are project features (such as standard engineering practices and specific training for construction workers) that have been incorporated into an alternative to avoid or minimize impacts. Table S-2 provides the available IAMFs for this project.

Table S-2 HSR Impact Avoidance and Minimization Features

Impact Avoidance and Minimization Features	
Agricultural Farmlands	
AG-IAMF#1	Restoration of Important Farmland Used for Temporary Staging Areas
AG-IAMF#2	Permit Assistance
AG-IAMF#3	Farmland Consolidation Program
AG-IAMF#4	Notification to Agricultural Property Owners
AG-IAMF#5	Temporary Livestock and Equipment Crossings
AG-IAMF#6	Equipment Crossings
Air Quality	
AQ-IAMF#1	Fugitive Dust Emissions
AQ-IAMF#2	Selection of Coatings
AQ-IAMF#3	Renewable Diesel

Impact Avoidance and Minimization Features	
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
Biological Resources	
BIO-IAMF#1	Project Biologist
BIO-IAMF#2	Agency Access
BIO-IAMF#3	Construction Period WEAP Training
BIO-IAMF#4	Operation and Maintenance Period WEAP Training
BIO-IAMF#5	Prepare and Implement a Biological Resources Management Plan
BIO-IAMF#6	Establish Monofilament Restrictions
BIO-IAMF#7	Prevent Entrapment in Construction Materials and Excavations
BIO-IAMF#8	Delineate Equipment Staging Areas and Traffic Routes
BIO-IAMF#9	Dispose of Construction Spoils and Waste
BIO-IAMF#10	Clean Construction Equipment
BIO-IAMF#11	Maintain Construction Sites
BIO-IAMF#12	Design the Project to be Bird Safe
Cultural Resources	
CUL-IAMF#1	Geospatial Data Layer and Archaeological Sensitivity Map
CUL-IAMF#2	WEAP Training Session
CUL-IAMF#3	Pre-Construction Cultural Resource Surveys
CUL-IAMF#4	Relocation of Project Features when Possible
CUL-IAMF#5	Archaeological Monitoring Plan and Implementation
CUL-IAMF#6	Pre-Construction Conditions Assessment, Plan for Protection of Historic Built Resources, and Repair of Inadvertent Damage
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

Impact Avoidance and Minimization Features	
GEO-IAMF#3	Gas Monitoring
GEO-IAMF#4	Historic or Abandoned Mines
GEO-IAMF#5	Hazardous Minerals
GEO-IAMF#6	Ground Rupture Early Warning Systems
GEO-IAMF#7	Evaluate and Design for Large Seismic Ground Shaking
GEO-IAMF#8	Suspension of Operations during an Earthquake
GEO-IAMF#9	Subsidence Monitoring
GEO-IAMF#10	Geology and Soils
GEO-IAMF#11	Engage a Qualified Paleontological Resources Specialist
GEO-IAMF#12	Perform Final Design Review and Triggers Evaluation
GEO-IAMF#13	Prepare and Implement Paleontological Resources Monitoring and Mitigation Plan
GEO-IAMF#14	Provide WEAP Training for Paleontological Resources
GEO-IAMF#15	Halt Construction, Evaluate, and Treat if Paleontological Resources Are Found
Hazardous Materials and Wastes	
HMW-IAMF#1	Property Acquisition Phase 1 and Phase 2 Environmental Site Assessments
HMW-IAMF#2	Landfill
HMW-IAMF#3	Work Barriers
HMW-IAMF#4	Undocumented Contamination
HMW-IAMF#5	Demolition Plans
HMW-IAMF#6	Spill Prevention
HMW-IAMF#7	Transport of Materials
HMW-IAMF#8	Permit Conditions
HMW-IAMF#9	Environmental Management System
HMW-IAMF#10	Hazardous Materials Plans
Hydrology and Water Resources	
HYD-IAMF#1	Storm Water 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
HYD-IAMF#5	Tunnel Design Features and Construction Methods
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

Impact Avoidance and Minimization Features	
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#2	Irrigation Facility Relocation
PUE-IAMF#3	Public Notifications
PUE-IAMF#4	Utilities and Energy
Safety and Security	
SS-IAMF#1	Construction Safety Transportation Management Plan
SS-IAMF#2	Safety and Security Management Plan
SS-IAMF#3	Hazard Analyses
SS-IAMF#4	Oil and Gas Wells
Socioeconomics and Communities	
SOCIO-IAMF#1	Construction Management Plan
SOCIO-IAMF#2	Compliance with Uniform Relocation Assistance and Real Property Acquisition Policies Act
SOCIO-IAMF#3	Relocation Mitigation Plan
Transportation	
TR-IAMF#1	Protection of Public Roadways during Construction
TR-IAMF#2	Construction Transportation Plan
TR-IAMF#3	Off-Street Parking for Construction-Related Vehicles
TR-IAMF#4	Maintenance of Pedestrian Access
TR-IAMF#5	Maintenance of Bicycle Access
TR-IAMF#6	Restriction on Construction Hours
TR-IAMF#7	Construction Truck Routes
TR-IAMF#8	Construction during Special Events
TR-IAMF#9	Protection of Freight and Passenger Rail during Construction
TR-IAMF#10	Off Peak Hour Employee Work Shift Changes at HMF
TR-IAMF#11	Maintenance of Transit Access
TR-IAMF#12	Pedestrian and Bicycle Safety

EMF = electromagnetic frequency

EMI = electromagnetic interference

HMF = heavy maintenance facility

IAMF = impact avoidance and minimization feature

WEAP = Worker Environmental Awareness Program

The Authority has committed to integrate into the project 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-2 provides the inventory of the measures that are considered to be part of all the 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 within the context of each resource topic. The Authority would implement these features during project design and construction, as relevant to the project extent, by:

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

S.7 No Project Alternative Impacts

Projections show that under the No Project Alternative, the regional population would grow at a faster rate than 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. Population growth in Santa Clara, San Benito, and Merced Counties is projected to continue at an annual average growth rate of 0.8 percent, 1.6 percent, and 1.5 percent per year, respectively, with an estimated population for all three counties totaling approximately 2,804,790 people by 2040 (CDOF 2014, 2016). Housing demand in Santa Clara, San Benito, and Merced Counties is projected to increase at an annual average growth rate of 1.0 percent, 1.5 percent, and 1.1 percent, respectively, with an estimated 990,000 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 Santa Clara County, 0.88 percent in San Benito County, and 0.76 percent in Merced County. Employment for all three counties is projected to reach 1,387,400 jobs by 2040. This growth will translate into continued conversion of currently undeveloped or agricultural lands to residential, small business, and light industrial uses, plus the transportation infrastructure needed to support added development. The exception would be the Pacheco Pass Subsection, which is not expected to experience urban development because of the mountainous terrain and the existing land use protections and general plan designations for the lands in the Pacheco Pass Subsection.

Intraregional long-distance travel in the San Joaquin Valley is expected to increase by 72 percent between 2010 and 2040. Daily VMT in the region could increase from approximately 12 million in 2012 to 24 million in 2040 (Authority 2016a). To accommodate this growth, transportation improvements would be completed to maintain or expand existing capacity. Planned transportation projects include highway projects such as high-occupancy vehicles and express lanes, highway widening, and new interchanges; airport improvements; passenger rail and bus projects; and freight rail improvements. Nontransportation projects primarily include land use plans, utility programs, and residential, commercial, or mixed-use development projects. A full list of anticipated future development projects is provided in Appendix 3.19-A, Cumulative Plans and Non-Transportation Projects List, and Appendix 3.19-B, Cumulative Transportation Projects Lists, in Volume 2 of this Final EIR/EIS.

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

- **Transportation**—Planned transportation development would improve network capacity but would not be enough to meet long-term future demand from population growth.

- **Noise and vibration**—Development would increase existing traffic levels and associated noise. Future freight projects would not be expected to cause higher vibration levels than the existing conditions.
- **Air quality and greenhouse gases**—Development would lead to increases in emissions of SO₂, particulate matter smaller than or equal to 10 microns in diameter (PM₁₀), and PM_{2.5}. These emissions are commonly generated from power plants and other industrial facilities, 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.
- **EMF and EMI**—The generation of EMF and EMI would increase in association 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 species population decline would continue or worsen from changes in land use, vehicle strikes, pollution, and noise and light.
- **Hydrology and water resources**—Development would potentially result in impacts on drainage patterns and stormwater runoff.
- **Hazardous materials and waste**—Development would continue to use or potentially disturb hazardous materials or wastes.
- **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.
- **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**—Development would continue to change visual character of many locations from rural to urban.
- **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 settings. 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 built resources.
- **Geology, soils, and seismicity**—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.
- **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.

S.8 HSR Alternatives Evaluation

The following section provides an overview of the impacts, including benefits common to all four project alternatives. It also compares the differences in capital costs between the alternatives,

and then presents a summary of impacts that differentiates between the alternatives and proposed mitigation to avoid and reduce impacts that would occur under any of the alternatives. Table S-3 shows a detailed summary comparing construction impacts by alternative, Table S-4 shows a detailed summary comparing operations impacts by alternative, and Table S-5 shows a summary of resources subject to significant impacts under CEQA and applicable mitigation measures. Table S-6 provides a summary of the total number of significant and unavoidable impacts under CEQA for each project alternative after mitigation. (These tables appear later in this Summary.)

S.8.1 HSR 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 2016a). By 2029, the initial segment of the line would carry 19.3 million passengers for medium ridership and 26 million passengers for high ridership. By 2040, these figures are expected to increase to a medium ridership of 42.8 million passengers and a high ridership of 56.8 million passengers. Projected growth rates in the three counties through which the project would travel are similar to statewide projected growth. The California Department of Finance projects the population of Santa Clara County, San Benito County, and Merced County to increase by approximately 31 percent, 49 percent, and 52 percent, respectively, by 2040 (CDOF 2014). 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 system would improve air quality, reduce congestion, and improve transportation safety and travel time.

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

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, to the quality of life benefits that residents perceive from access to public transit, and to retail activity stimulated by the greater flow of residents and commuters through the station (Bay Area Council Economic Institute 2008). As a result, concentrated development around multimodal centers is expected to reduce future sprawl and could reduce the likelihood of development and land use changes on the periphery of urban areas. In this way, the HSR system would seek to reduce the displacement or loss of valuable agricultural land.

Implementation of the project would result in a number of benefits to communities, members of the public, infrastructure, the environment, and the economy that would not occur under the No Project Alternative. The design of the project alternatives includes roadway improvements, such as perimeter fencing of the right-of-way, that would reduce the exposure of motorists, pedestrians, and bicyclists to traffic hazards and provide a safety benefit for children and adults. The HSR system would provide a safe and reliable means of intercity travel, operating on a partially grade-separated track and using contemporary safety, signaling, and automatic train control systems. 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 construction, operations, and maintenance. 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

The four end-to-end alternatives illustrated on Figure S-2 share many common elements. Because all four alternatives follow the same general corridor, they must address many of the same concerns regarding local infrastructure. As shown in Table S-1, all four alternatives are identical in the Pacheco Pass and San Joaquin Valley Subsections; Alternatives 2 and 3 use the same design options in the San Jose Diridon Station Approach Subsection; Alternatives 1 and 3 use the same design options in the Monterey Corridor Subsection; and all four alternatives use different design options in the Morgan Hill and Gilroy Subsection. Similarities in design result in common impacts among all alternatives.

Section S.8.3, Comparison of Impacts for the Project Alternatives, provides a comparative description of all impacts. As part of this comparison, Table S-3 and Table S-4 show all impacts from project construction and operations, respectively. Many of these impacts are the same across all alternatives.

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. Table S-3 and Table S-4 (provided at the end of this section) compare the construction impacts and operations impacts, respectively, between the four project alternatives, prior to mitigation. Information for resource impacts that are the same or very similar for all four project alternatives is not provided in these summary tables. 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 in each resource section of impacts that would occur under each of the project alternatives in comparison to the No Project Alternative. 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; therefore, they are not summarized here. Table S-5 presents all of the mitigation measures that would be applied to each project alternative to address significant impacts under CEQA. In addition, the Authority will strive to avoid and minimize impacts further as design progresses to final plans and specifications for construction. Table S-6 provides a summary of the total number of significant and unavoidable impacts under CEQA for each of the project alternatives.

Section S.8.7, Capital and Operation Costs, compares the differences in capital costs for each of the project alternatives. Section S.9, Section 4(f) and Section 6(f), describes Section 4(f) and Section 6(f) properties and any incurred uses on these properties as a result of the project alternatives. Adverse effects on and benefits to environmental justice communities as a result of the project alternatives are described in Section S.10.

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/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.

S.8.3.1 Alternative 1

Alternative 1 would comprise 45.4 miles on viaduct, 21.9 miles of embankment, 2.3 miles in trench, two tunnels totaling 15.0 miles, and 4.3 miles at grade in an excavated hillside cut. Alternative 1 would begin at Scott Boulevard in blended service with Caltrain at grade. Beginning at I-880 on the southbound approach to West Hedding Street, Caltrain tracks would be realigned to accommodate the HSR tracks. Dedicated HSR tracks would diverge from the Caltrain Mainline Track (MT) 2 and MT3 tracks and continue south along the north side of the existing Caltrain corridor, crossing under West Hedding Street. To accommodate the new track configuration, the West Hedding Street roadway overpass would be replaced with a new overpass bridge and a new bridge for Stockton Avenue.

Construction of an elevated station at Gilroy would conflict with the historic Gilroy Caltrain Station and Gilroy City Hall, degrading the visual quality of the landscape unit from moderate to moderately low as viewed by viewers with moderately low sensitivity. Because it would use the highest viaduct, it would result in the greatest visual impacts of the alternatives.

Under Alternative 1, approximately 147 residential units, 217 commercial or industrial businesses, 49 agricultural properties, and 8 community and public facilities would be displaced. Temporary noise impacts at noise-sensitive locations would exceed the residential nighttime 8-hour equivalent sound level criterion of 70 A-weighted decibels and would potentially be exceeded up to 374 feet from the clear-and-grub construction activity and as far as 774 feet from the concrete pour aerial structure activity; for the PG&E upgrades, these criteria could be exceeded as far as 522 feet from the conductor installation construction activity.

Alternative 1 would have a greater potential for impacts on special-status plant species and special-status wildlife species than Alternative 4, but slightly fewer impacts than Alternatives 2 and 3. For a description of special-status species and the impacts to each species, refer to Section 3.7, Biological and Aquatic Resources.

S.8.3.2 Alternative 2

Alternative 2 would comprise 20.9 miles on viaduct, 8.5 miles at grade, 41.0 miles on embankment, two tunnels totaling 15.0 miles, and 3.2 miles in trench. There are two variations of Alternative 2, Skyway Drive Variant A and Skyway Drive Variant B. Under Skyway Drive Variant A, Monterey Road would retain its current at-grade configuration, and a new connector ramp located north corner of the intersection of Skyway Drive and Monterey Road would connect Monterey Road to the depressed Skyway Drive underpass. San Jose Fire Station #18 would have access along the connector ramp. Skyway Drive Variant B would depress Monterey Road to connect to the Skyway Drive underpass. Under this variant, access to the mobile home park north of the intersection of Skyway Drive and Monterey Road would be provided by an access road across the northern portion of the San Jose South Service Yard property. Variant B would not provide access to the fire station.

Alternative 2 would result in greater impacts from temporary road closures, realignments, and modifications than the other alternatives and greater permanent modifications resulting in an increase in travel time on major roads. Because permanent and temporary road closures would cause an increase in travel time, this alternative would result in the greatest interference with emergency response of the alternatives. Construction of Alternative 2 would result in the permanent conversion of 3,303.8 acres to a type of land use that is incompatible with the existing use, the greatest amount of all alternatives; however, the alternative would not substantially alter land use patterns, except in downtown Gilroy (similar to Alternatives 1 and 4).

Additionally, this alternative would have the greatest impacts to passenger rail operations among the alternatives. Construction of Alternative 2 would require the most utility relocations of the alternatives and also produce the greatest amount (325,000 cubic yards) of solid waste from demolition. Alternative 2 would have the potential to result in fewer impacts on paleontological resources than Alternatives 1 or 3 because it would use an embankment from Bernal Way to downtown Gilroy, which would involve substantially less excavation than a viaduct option in

Alternatives 1 and 3; however, Alternative 2 would entail more ground disturbance than Alternative 4. Construction of Alternative 2 would result in 13 completely or partially encompassed known archeological sites and would affect 11 historic built resources, the greatest of the alternatives.

Under Alternative 2, approximately 603 residential units, 348 commercial or industrial businesses, 53 agricultural properties, and 9 community and public facilities would be displaced. Temporary noise impacts at noise-sensitive locations for Alternative 2 would be similar to those under Alternative 1, with fewer noise impacts in the Morgan Hill and Gilroy and Monterey Corridor Subsections.

Alternative 2 would have greater potential for impacts on special-status plant and wildlife species than Alternatives 1 and 4, but slightly fewer impacts than Alternative 3.

S.8.3.3 Alternative 3

Alternative 3 would comprise 43.2 miles on viaduct, 1.8 miles at grade, 24.9 miles on embankment, 2.4 miles in trench, and two tunnels totaling 15.0 miles.

Construction of Alternative 3 would result in the permanent conversion of 3,084.3 acres and would introduce an incompatible land use at the station site in east Gilroy, but with the same project features as Alternative 1, it would not substantially alter land use patterns. Although this alternative would temporarily convert the most acreage of land (approximately 1,807 acres), land use patterns would not be substantially altered. Construction of Alternative 3 would result in the temporary use of 671.9 acres of Important Farmland and the permanent conversion of 1,192.5 acres of Prime Farmland, the greatest among the alternatives. For descriptions of the types of farmland and the impacts to each, refer to Section 3.14.

This alternative would result in the smallest number of utility relocations. Under Alternative 3, approximately 157 residential units, 157 commercial or industrial businesses, 49 agricultural properties, and 5 community and public facilities would be displaced. Temporary noise impacts at noise-sensitive locations for Alternative 3 would be similar to those under Alternative 1, without noise impacts on downtown Gilroy businesses.

Alternative 3 would have the greatest potential for impacts on special-status plant and wildlife species of all alternatives.

S.8.3.4 Alternative 4

Alternative 4 would comprise 15.2 miles on viaduct, 30.3 miles at grade, 25.9 miles on embankment, 2.3 miles in trench, and two tunnels totaling 15.0 miles.

Alternative 4 would have the potential to result in fewer impacts on paleontological resources than the other alternatives because it would use a blended, at-grade profile in the San Jose Diridon Station Approach, Monterey Corridor, and Morgan Hill and Gilroy Subsections, requiring substantially less excavation. Construction of this alternative would result in 90,100 cubic yards of solid waste from demolition activities, the least of all alternatives. Construction of Alternative 4 would result in the permanent conversion of 3,001.4 acres, but, with the same project features as under Alternative 1, would not substantially alter land use patterns except in downtown Gilroy. The payback period for construction energy, which would be 8.7 and 7.4 years under the medium and high ridership scenarios, respectively, would be the longest among the alternatives.

Under Alternative 4, approximately 196 residential units, 69 commercial or industrial businesses, 40 agricultural properties, and 1 community and public facility would be displaced. Temporary noise impacts at noise-sensitive locations for Alternative 4 would be similar to Alternative 1 but would be at-grade and would not include construction activities associated with a viaduct from San Jose to Gilroy.

Alternative 4 would have the least potential for impacts on special-status plant and wildlife species of all the alternatives.

S.8.3.5 Diridon and Tunnel Design Variants

The Authority has developed two design variants intended to optimize train speed. The first is located north and south of Diridon Station and at the station platforms and, if adopted, would apply only to Alternative 4. The second is located from just south of U.S. Highway 101 to the two tunnels east of Gilroy and through the Pacheco Pass and would apply, in part, to all four alternatives.

Diridon Design Variant

The DDV would allow for higher speeds in the approaches and through Diridon Station than the preliminary design for Alternative 4 would provide. The preliminary design is based on the Peninsula Corridor Electrification Project track geometry and restricts speeds approaching and through the station to 15 mph. The DDV would improve the curvature in the alignment to the north of the station between Julian Street and Santa Clara Street and from the south of the station to San Carlos Street. The design variant would also modify the preliminary design of the ends of the platforms, providing for increased speeds of 40 mph, comparable to the design speeds provided by Alternatives 1, 2 and 3.

Tunnel Design Variant

The TDV consists of alterations to all the alternatives (i.e., as compared to the base preliminary designs in Volume 3) of the tunnel and tunnel approaches in the Morgan Hill and Gilroy Subsection (Tunnel 1) and the tunnel and tunnel approaches in the Pacheco Pass Subsection (Tunnel 2) to accommodate an operating speed of 220 mph. Accordingly, the TDV consists of physical changes (described in the next paragraph) and operational changes (i.e., increased speed in the tunnels and the tunnel approaches from 200 mph to 220 mph).

The TDV would not change the horizontal alignment through the tunnels. The superelevation of tracks approaching and through both tunnels would be increased to accommodate the faster operating speeds. The TDV would flatten a set of vertical curves inside Tunnel 2. The locations of the vertical curves are near the highest subsurface location within Tunnel 2. The changes to the vertical curves would modestly increase tunnel depth compared to the Tunnel 2 design of the project alternatives without the TDV. The TDV would also require a minor increase in internal diameter of Tunnel 1 from 28 feet to 28.5 feet. Since the Tunnel 1 and Tunnel 2 location and design are equivalent across Alternatives 1 through 4, these changes could be applied to any of the alternatives.

In addition, the TDV would increase spiral lengths on two horizontal curves south of U.S. Highway 101 in the vicinity of the MOWF under Alternatives 1, 2, and 4, which would result in a minor shift in horizontal alignment (less than 2.5 feet) under those alternatives. The alignment change would not change the right-of-way as currently proposed. Alternative 3 currently meets the geometric requirements for the higher speed north of the tunnels.

The rationale for the preliminary tunnel designs of the alternatives without the TDV was to reduce the cost of the construction of the tunnels by reducing the tunnel diameter, despite the speed limitation.⁵ The Authority has developed the TDV to provide design speeds of 220 mph and has identified how it can achieve speeds without increasing the bored tunnel diameter so that costs of construction are the same. The location of the TDV is identified on Figure 2-56.

⁵ Per the cost reduction strategies authorized under Authority’s Notice to Designers No.10 (Authority 2016b).

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Table S-3 Comparison of Construction Impacts by Alternative

Resource Category	Construction Impacts under the Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Transportation				
Roadways, Freeways, and Intersections				
Impact TR#1: Temporary Congestion/Delay Consequences on Major Roadways, Freeways, and Intersections from Temporary Road Closures, Relocations, and Modifications	<p>Temporary road closures and realignments would result in increases in travel times, delays, and inconvenience to the traveling public.</p> <ul style="list-style-type: none"> San Jose Diridon Subsection—least impact among alternatives. Monterey Corridor Subsection—narrowing Monterey Road would affect 23 intersections. Morgan Hill and Gilroy Subsection—viaduct construction through downtown Gilroy would have fewer impacts than embankment. Pacheco Pass Subsection—impacts would be identical under all four alternatives. San Joaquin Valley—impacts would be identical under all four alternatives, closures and relocations along Henry Miller Road. <p>The CTP would maintain traffic flow on major roadways, freeways, and intersections.</p>	<p>Temporary road closures and realignments would be greatest under Alternative 2.</p> <ul style="list-style-type: none"> San Jose Diridon Subsection—would extend viaduct 2.4 miles farther north, affecting two additional overcrossings. Monterey Corridor Subsection—narrowing Monterey Road would affect 23 intersections. Embankment would require construction of five additional roadway overcrossings. Morgan Hill and Gilroy Subsection—greatest impact among alternatives from embankment construction through urban area. Pacheco Pass Subsection—Same as Alternative 1. San Joaquin Valley—Same as Alternative 1. <p>The CTP would maintain traffic flow on major roadways, freeways, and intersections.</p>	<p>Temporary road closures and realignments would result in the least disruption of roadways under Alternative 3.</p> <ul style="list-style-type: none"> San Jose Diridon Subsection—Same as Alternative 2. Monterey Corridor Subsection—narrowing Monterey Road would affect 23 intersections. Morgan Hill and Gilroy Subsection—least impact among alternatives from viaduct construction through rural area. Pacheco Pass Subsection— Same as Alternative 1. San Joaquin Valley— Same as Alternative 1. <p>The CTP would maintain traffic flow on major roadways, freeways, and intersections.</p>	<p>Temporary road closures and realignments would result in increases in travel times, delays, and inconvenience to the traveling public.</p> <ul style="list-style-type: none"> San Jose Diridon Subsection—similar impacts as Alternative 1. Monterey Corridor Subsection— least impact among alternatives because Monterey Road would not be narrowed. Morgan Hill and Gilroy Subsection—at-grade construction through downtown Gilroy would have fewer impacts than embankment. Pacheco Pass Subsection—impacts would be identical under all alternatives. San Joaquin Valley— Same as Alternative 1. <p>The CTP would maintain traffic flow on major roadways, freeways, and intersections.</p>
Impact TR#2: Temporary Congestion/Delay Consequences on Major Roadways, Freeways, and Intersections from Construction Vehicles	Project features such as the CTP and establishment of designated construction truck routes will control and manage construction vehicle traffic to minimize impacts on local vehicle circulation, delays, reductions in LOS, operations hazards, or loss of access to residences and community facilities.	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1
Impact TR#3: Permanent Congestion/Delay Consequences on Roadways and Freeways from Permanent Road Closures and Relocations	18 permanent road closures and 26 permanent roadway modifications would increase vehicle traffic and degrade the LOS on US 101 in two segment locations from reduced capacity on Monterey Road.	30 permanent road closures and 45 permanent roadway modifications would increase vehicle traffic and degrade the LOS on US 101 in two segment locations from reduced capacity on Monterey Road.	17 permanent road closures and 24 permanent roadway modifications would increase vehicle traffic and degrade the LOS on US 101 in two segment locations from the reduced capacity on Monterey Road.	15 permanent road closures and 34 permanent roadway modifications would increase vehicle traffic congestion but would not degrade the LOS on US 101.
Impact TR#4: Permanent Congestion/Delay Consequences on Intersections from Permanent Road Changes	Permanent road closures and modifications would affect 14 intersections operating at LOS E or F, including 13 intersections in Monterey Corridor and 1 intersection in Morgan Hill and Gilroy in the Existing Plus Project conditions. With proposed mitigation, effects will be reduced at 4 of these intersections in Monterey Corridor and 1 intersection in Morgan Hill and Gilroy.	Permanent road closures and modifications would affect 17 intersections operating at LOS E or F, including 13 intersections in Monterey Corridor and 4 intersections in Morgan Hill and Gilroy in the Existing Plus Project conditions. With proposed mitigation, effects will be reduced at 6 intersections in Monterey Corridor and 4 intersections in Morgan Hill and Gilroy.	Same as Alternative 1	Permanent road closures and modifications would affect 2 intersections operating at LOS E or F in Morgan Hill and Gilroy in the Existing Plus Project conditions. Proposed mitigation will not reduce effects at these intersections.
Impact TR#5: Continuous Permanent Impacts on Vehicle Miles Traveled	By 2029, the project would reduce overall total VMT in Santa Clara County by 159 million miles, interregional VMT in San Benito County by 99 million miles, and interregional VMT in Merced County by 125 million miles. By 2040, the project would reduce overall total VMT in Santa Clara County by 230 million miles, interregional VMT in San Benito County by 170 million miles, and interregional VMT in Merced County by 200 million miles. If fully built out, the HSR project is forecast to reduce annual state-wide VMT by 5.7 billion in 2029 and 7.2 billion in 2040.	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1

Resource Category	Construction Impacts under the Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Parking				
Impact TR#8: Temporary Construction-Related Effects on Parking	Some public parking may require temporary closure during construction; project features will limit impacts 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.	Same as Alternative 1	Same as Alternative 1 for San Jose Diridon Station and SAP Center. For East Gilroy Station, all parking demands would be met by project parking facilities.	Same as Alternative 1, except that temporary effects on parking at the San Jose Diridon Station and SAP Center would be much smaller (displacement of up to 397 parking spaces without the DDV and 432 parking spaces with the DDV vs. displacement of up to 2,083 spaces) and permanent displacement of existing spaces would be less (up to 213 spaces without the DDV and 277 spaces with the DDV vs. up to 473 spaces). Temporary displacement of special event parking during construction would be replaced on a 1:1 basis.
Transit				
Impact TR#10: Temporary Impacts on Bus Transit	For all project alternatives, construction vehicles or temporary roadway closures would result in interference with bus routes and bus stops.	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1
Impact TR#11: Temporary Impacts on Passenger Rail Operations	Station construction in San Jose and Gilroy, and relocation of tracks in the San Jose Diridon Station Approach Subsection would result in temporary disruptions of Caltrain, ACE, Capitol Corridor, and Amtrak services. Alternative 1 would modify the tracks leading to the Caltrain College Park Station resulting in closure for 1 to 2 years.	Station construction in San Jose and Gilroy and relocation of tracks in the San Jose Diridon Station Approach, Monterey Corridor, and Morgan Hill and Gilroy Subsections would result in temporary disruptions of Caltrain, ACE, Capitol Corridor, and Amtrak passenger rail services. The construction of new grade separations and the temporary relocation of Caltrain stations in the Monterey Corridor and the Morgan Hill and Gilroy Subsections would also result in disruption to existing passenger rail. This alternative would have the most impacts on passenger rail operations among the alternatives.	Station construction in San Jose and relocation of tracks in the San Jose Diridon Station Approach Subsections would result in temporary disruptions of Caltrain, ACE, Capitol Corridor, and Amtrak passenger rail services. This alternative would have the least disruption of passenger rail service.	Station construction in San Jose and Gilroy and relocation of tracks in the San Jose Diridon Station Approach, Monterey Corridor, and Morgan Hill and Gilroy Subsections would result in temporary disruptions of Caltrain, ACE, Capitol Corridor, and Amtrak services. The temporary relocation and reconstruction of Caltrain stations in the Monterey Corridor and Morgan Hill and Gilroy Subsections would also result in disruption to passenger rail service. This alternative would have the second-most impacts on passenger rail operations among the alternatives.
Impact TR#12: Permanent Impacts on Bus Transit	Five high-frequency bus routes would experience delays from reduction of capacity on Monterey Road.	Same as Alternative 1	Same as Alternative 1	One high-frequency bus route would experience delays from reduction of capacity due to road closures in and near the Downtown Gilroy Station area.
Nonmotorized Travel				
Impact TR#17: Temporary Impacts on Pedestrian and Bicycle Access	Pedestrian and bicycle access would be temporarily impeded, but project features will maintain safe and adequate access.	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1
Impact TR#18: Permanent Impacts on Pedestrian and Bicycle Access	Construction would require changes to pedestrian and bicycle facilities, but the project would be designed to maintain safe and accessible facilities.	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1
Freight Rail Service				
Impact TR#20: Temporary Impacts on Freight Rail Operations	Station construction in San Jose and Gilroy and relocation of tracks in the San Jose Diridon Station Approach Subsection would result in temporary disruptions of freight rail services. Disruptions in other subsections would be limited.	Station construction in San Jose and Gilroy and relocation of tracks in the San Jose Diridon Station Approach, Monterey Corridor, and Morgan Hill and Gilroy Subsections would result in temporary disruptions of freight rail services. The construction of new grade separations in the Monterey Corridor and Morgan Hill and Gilroy Subsections would result in the disruption to existing freight rail. This alternative would have the greatest impact on freight rail of the alternatives.	Station construction in San Jose and relocation of tracks in the San Jose Diridon Station Approach Subsection would result in temporary disruptions of freight rail services. This alternative would result in the least disruption of freight rail service.	Station construction in San Jose and Gilroy and relocation of tracks in the San Jose Diridon Station Approach, Monterey Corridor, and Morgan Hill and Gilroy Subsections would result in temporary disruptions of freight rail services. The construction of relocated Caltrain stations in the Monterey Corridor and Morgan Hill and Gilroy Subsections would result in disruption to existing freight rail. This alternative would have the second-most impact on freight rail of the alternatives.

Resource Category	Construction Impacts under the Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Air Quality and Greenhouse Gases¹				
Air Quality				
Impact AQ#1: Temporary Direct and Indirect Impacts on Air Quality within the SFBAAB	Temporary construction activity would generate NO _x emissions in excess of the General Conformity <i>de minimis</i> threshold. Maximum annual NO _x emissions of 106 tons would occur in 2024. Annual construction emissions peak in 2024 ¹ due to concurrent construction of all four subsections within the SFBAAB, as well as construction of the Gilroy MOWF, San Jose Diridon Station, and Downtown Gilroy Station. Emissions of all other pollutants would be below the respective General Conformity <i>de minimis</i> thresholds.	Same as Alternative 1. Maximum annual NO _x emissions of 155 tons would occur in 2024, which is the year with the greatest amount of total construction activity in the SFBAAB.	Same as Alternative 1. Maximum annual NO _x emissions of 114 tons would occur in 2024, which is the year with the greatest amount of total construction activity in the SFBAAB.	Same as Alternative 1. Maximum annual NO _x emissions of 156 tons would occur in 2024, which is the year with the greatest amount of total construction activity in the SFBAAB.
Impact AQ#2: Temporary Direct and Indirect Impacts on Air Quality within the NCCAB	Temporary construction activity would generate criteria pollutants, but those emissions would not degrade air quality resources in the NCCAB because the RSA is considered attainment for all criteria pollutants and there are no federally regulated General Conformity <i>de minimis</i> thresholds.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Impact AQ#3: Temporary Direct and Indirect Impacts on Air Quality within the SJVAB	Temporary construction activity would generate NO _x emissions in excess of the General Conformity <i>de minimis</i> threshold, which could degrade air quality resources in the SJVAB. Maximum annual NO _x emissions of 56 tons would occur in 2024. Annual construction emissions peak in 2024 due to concurrent construction of the two subsections within the SJVAB, as well as construction of the Los Banos MOWS. Emissions of all other pollutants would be below the respective General Conformity <i>de minimis</i> thresholds.	Same as Alternative 1. Maximum annual NO _x emissions of 56 tons would occur in 2024, which is the year with the greatest amount of total construction activity in the SJVAB.	Same as Alternative 1. Maximum annual NO _x emissions of 56 tons would occur in 2024, which is the year with the greatest amount of total construction activity in the SJVAB.	Same as Alternative 1. Maximum annual NO _x emissions of 56 tons would occur in 2024, which is the year with the greatest amount of total construction activity in the SJVAB.
Impact AQ#4: Temporary Direct Impacts on Implementation of an Applicable Air Quality Plan	Emissions of NO _x from temporary construction activity in excess of the General Conformity <i>de minimis</i> thresholds could impede implementation of ozone plans in the SFBAAB and SJVAB.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Impact AQ#5: Temporary Direct Impacts on Localized Air Quality—Criteria Pollutants	Temporary construction activity would violate the 1-hour NO ₂ CAAQS and NAAQS, annual PM ₁₀ CAAQS, annual PM _{2.5} CAAQS and NAAQS, and 24-hour PM _{2.5} NAAQS. Emissions concentrations would also exceed the 24-hour and annual PM ₁₀ SIL and 24-hour and annual PM _{2.5} SIL.	Same as Alternative 1.	Temporary construction activity would violate the annual PM ₁₀ CAAQS, annual PM _{2.5} CAAQS and NAAQS, and 24-hour PM _{2.5} NAAQS. Emissions concentrations would also exceed the 24-hour and annual PM ₁₀ SIL and 24-hour and annual PM _{2.5} SIL.	Temporary construction activity would violate the 1-hour NO ₂ CAAQS and NAAQS, annual and 24-hour PM ₁₀ CAAQS, annual PM _{2.5} CAAQS and NAAQS, and 24-hour PM _{2.5} NAAQS. Emissions concentrations would also exceed the 24-hour and annual PM ₁₀ SIL and 24-hour and annual PM _{2.5} SIL.
Impact AQ#6: Temporary Direct Impacts on Localized Air Quality—Exposure to Diesel Particulate Matter and PM _{2.5} (Health Risk)	Temporary construction activity would not generate DPM or PM _{2.5} concentrations in excess of established health risk thresholds. The maximum increase in potential cancer risk (5.0 per million) would occur in the San Joaquin Valley Subsection.	Same as Alternative 1. The maximum increase in potential cancer risk (5.0 per million) would occur in the Monterey Corridor and San Joaquin Valley Subsection.	Same as Alternative 1. The maximum increase in potential cancer risk (9.4 per million) would occur in the Morgan Hill and Gilroy Subsection.	Same as Alternative 1 without the DDV. The maximum increase in potential cancer risk (6.1 per million) for Alternative 4 without the DDV would occur in the Monterey Corridor Subsection. For Alternative 4 with the DDV, the incremental cancer risk would be 8.4 per million.
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, as well as fugitive dust control practices, 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 4.3 million square feet. There would be limited potential for exposure of sensitive receptors to Valley fever associated with movement of 51.5 million cubic yards of soil and disturbance of 813 acres.	Same as Alternative 1. There would be limited potential for exposure of sensitive receptors to asbestos or LBP associated with demolition of 7.1 million square feet. There would be limited potential for exposure of sensitive receptors to Valley fever associated with movement of 60.4 million cubic yards of soil and disturbance of 1,047 acres.	Same as Alternative 1. There would be limited potential for exposure of sensitive receptors to asbestos or LBP associated with demolition of 4.0 million square feet. There would be limited potential for exposure of sensitive receptors to Valley fever associated with movement of 58.7 million cubic yards of soil and disturbance of 870 acres.	Same as Alternative 1. There would be limited potential for exposure of sensitive receptors to asbestos or LBP associated with demolition of 2.0 million square feet. There would be limited potential for exposure of sensitive receptors to Valley fever associated with movement of 52.2 million cubic yards of soil and disturbance of 1,048 acres.

Resource Category	Construction Impacts under the Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Impact AQ#8: Temporary Direct Impacts on Localized Air Quality—Exposure to Odors	There would be limited potential for odors generated by construction to affect sensitive receptors or result in nuisance complaints.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Impact AQ#9: Continuous Permanent Direct Impacts on Air Quality within the SFBAAB, NCCAB, and SJVAB	Long-term operation of the HSR system would reduce regional criteria pollutant emissions, relative to No Project conditions, resulting in a regional and local air quality benefit. Annual reductions would range from 23 to 54 tons of VOC, 332 to 1,120 tons of CO, 208 to 447 tons of NO _x , 22 to 48 tons of SO ₂ , 25 to 69 tons of PM ₁₀ , and 11 to 26 tons of PM _{2.5} , depending on the ridership scenario.	Same as Alternative 1. Annual reductions would range from 23 to 54 tons of VOC, 332 to 1,120 tons of CO, 208 to 447 tons of NO _x , 22 to 48 tons of SO ₂ , 18 to 61 tons of PM ₁₀ , and 10 to 25 tons of PM _{2.5} , depending on the ridership scenario.	Same as Alternative 1. Annual reductions would range from 23 to 54 tons of VOC, 330 to 1,119 tons of CO, 208 to 447 tons of NO _x , 22 to 48 tons of SO ₂ , 23 to 66 tons of PM ₁₀ , and 10 to 26 tons of PM _{2.5} , depending on the ridership scenario.	Same as Alternative 1. Annual reductions would range from 23 to 54 tons of VOC, 332 to 1,120 tons of CO, 208 to 447 tons of NO _x , 22 to 48 tons of SO ₂ , 16 to 59 tons of PM ₁₀ , and 9 to 25 tons of PM _{2.5} , depending on the ridership scenario.
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 1.	Same as Alternative 1.	Same as Alternative 1.
Impact AQ#11: Continuous Permanent Direct Impacts on Localized Air Quality—Carbon Monoxide Hot Spots (NAAQS Compliance)	Increased traffic would not result in localized CO hot spots or exceedances of the CO NAAQS or CAAQS.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Impact AQ#12: Continuous Permanent Direct Impacts on Localized Air Quality—Exposure to Mobile Source Air Toxics	Operation 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 impacts.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Impact AQ#13: Continuous Permanent Direct Impacts on Localized Air Quality—Particulate Matter Hot Spots (NAAQS Compliance)	The project is not considered to be 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 1.	Same as Alternative 1.	Same as Alternative 1.
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 relocated freight service and station and maintenance facility operation would not expose sensitive receptors to pollutant health risks in exceedance of BAAQMD's thresholds.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
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 1.	Same as Alternative 1.	Same as Alternative 1.
Greenhouse Gases				
Impact AQ#16: Temporary Direct and Indirect Impacts on Global Climate Change—Greenhouse Gas Emissions	GHG emissions generated during temporary construction of 14,870 metric tons CO ₂ e per year would be offset by reductions achieved through project operations in 8 to 10 months (relative to 2029 No Project conditions).	GHG emissions generated during temporary construction of 18,635 metric tons CO ₂ e per year would be offset by reductions achieved through project operations in 9 to 13 months (relative to 2029 No Project conditions).	GHG emissions generated during temporary construction of 15,082 metric tons CO ₂ e per year would be offset by reductions achieved through project operations in 8 to 10 months (relative to 2029 No Project conditions).	GHG emissions generated during temporary construction of 20,043 metric tons CO ₂ e per year would be offset by reductions achieved through project operations in 10 to 14 months (relative to 2029 No Project conditions).
Impact AQ#17: Continuous Permanent Direct and Indirect Impacts on Global Climate Change—Greenhouse Gas Emissions	Long-term operation of the HSR system would reduce GHG emissions, relative to No Project conditions, resulting in a statewide and regional GHG benefit. Annual reductions would range from 1.1 million metric tons CO ₂ e to 1.6 million metric tons CO ₂ e, depending on the ridership scenario.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.

Resource Category	Construction Impacts under the Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
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 374 feet from the clear-and-grub construction activity and up to 774 feet from the concrete pour aerial structure activity. For the PG&E upgrades, these criteria would be exceeded as far away as 522 feet from reconductoring activity. These distances would be applicable to all four project alternatives.	Similar to Alternative 1, with fewer noise impacts in Morgan Hill, Gilroy and Monterey Corridor Subsections.	Similar to Alternative 1, without noise impacts on downtown Gilroy businesses.	Similar to Alternative 1, but no concrete pour aerial structure activity from San Jose to Gilroy. This would have more impacts in Morgan Hill.
Vibration				
Impact NV#9: Temporary Exposure of Sensitive Receptors and Buildings to Construction Vibration	Potential annoyance from nighttime vibratory methods within 300 feet of residential structures. Potential building damage from impact pile driving within 50 feet of structures. Potential perceptible vibration in occupied buildings within 100 feet of tunnel boring operations for tunnel construction.	Similar to Alternative 1 but potentially more vibratory compaction at embankments and at grade at the Monterey Corridor and Morgan Hill and Gilroy Subsections; less vibratory compaction in San Jose to Scott Blvd touchdown.	Similar to Alternative 1 in Gilroy and in Monterey Corridor Subsection, but eastern alignment in Gilroy and Morgan Hill would affect fewer structures; similar to Alternative 2 in the Monterey Corridor Subsection through San Jose.	Similar to Alternative 1 east of Gilroy; most vibratory compaction at embankments and at-grade portions of all project alternatives; construction in existing right-of-way would require more nighttime work to minimize service disruptions.
EMF and EMI				
Impact EMF/EMI#1: Temporary Impacts from Use of Construction Equipment	Construction activities would occur more than 50 feet from facilities with known sensitive equipment. Therefore, these facilities would not be exposed to EMF generated by construction equipment. No individuals would be exposed to EMF levels that exceed human health standards. EMF generated during construction would be below levels known to disrupt agricultural activities.	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. Construction activities would occur within 15 feet of the Butterfield Professional Center, a facility with known sensitive equipment. EMF generated during construction would be below levels known to disrupt agricultural activities.	Same as Alternative 1	Same as Alternative 1
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 212 major utility lines within the RSA for Alternative 1.	Same as Alternative 1, except there are 303 major utility lines within the RSA for Alternative 2.	Same as Alternative 1, except there are 202 major utility lines within the RSA for Alternative 3.	Same as Alternative 1, except there are 404 major utility lines within the RSA for Alternative 4.
Impact PUE#2: Temporary Impacts from Water Use	Construction would require 4,339 acre-feet of water, which is 10 percent of the current water usage for the land within the project footprint.	Construction would require 4,205 acre-feet of water which is 9 percent of the current water usage for the land within the project footprint.	Construction would require 4,555 acre-feet of water, which is 10 percent of the current water usage for the land within the project footprint.	Construction would require 4,426 acre-feet of water, which is 10 percent of the current water usage for the land within the project footprint.
Impact PUE#3: Reduced Access to Existing Utilities in the HSR Right-of-Way	Access to utilities would be provided during and after construction of all project alternatives.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Impact PUE#4: Existing Major Utilities Requiring Relocation or Removal	Relocation of 158 major utility lines and protection in place of 46 utility lines; removal, extension, realignment/ abandonment of 8 utility lines. Displacement of 3 percolation ponds comprising 51 acres at SCRWA WWTP.	Relocation of 235 major utility lines and protection in place of 61 major utility lines; removal, extension, realignment/ abandonment of 7 utility lines. Displacement of 3 percolation ponds comprising 51 acres at SCRWA WWTP.	Relocation of 150 major utility lines and protection in place of 45 major utility lines; removal, extension, realignment/ abandonment of 7 utility lines. No impact on the SCRWA WWTP.	Relocation of 176 major utility lines and protection in place of 165 major utility lines; removal, extension, realignment/ abandonment of 17 utility lines. No impact on the SCRWA WWTP.

Resource Category	Construction Impacts under the Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Impact PUE#5: Temporary Impacts from Construction of New Utility Infrastructure	Alternative 1 includes the construction of three TPSSs and co-located electric utility switching stations; each TPSS site occupying up to 2 acres; TPSS Site 4 would be built at one of two alternative sites in Gilroy. Alternative 1 includes reconductoring of three 115-kV power lines; construction of new potable water and wastewater lines to stations and maintenance facilities; construction of new stormwater management infrastructure in the Morgan Hill and Gilroy Subsection. New storm drainage infrastructure would be built in the Pacheco Pass Subsection.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Impact PUE#6: Temporary Impacts from Stormwater and Wastewater Generation during Construction	Construction would require 4,339 acre-feet of water resulting in potential generation of 0.41 mgd of wastewater, which is less than 0.2 percent of the total wastewater treatment capacity within the RSA.	Construction would require 4,205 acre-feet of water resulting in potential generation of 0.39 mgd of wastewater, which is less than 0.2 percent of the total wastewater treatment capacity within the RSA.	Construction would require 4,555 acre-feet of water resulting in potential generation of 0.45 mgd of wastewater, which is less than 0.25 percent of the total wastewater treatment capacity within the RSA.	Construction would require 4,426 acre-feet of water resulting in potential generation of 0.40 mgd of wastewater, which is less than 0.2 percent of the total wastewater treatment capacity within the RSA.
Impact PUE#7: Temporary Generation of Solid Waste and Hazardous Waste during Construction	Construction would result in 199,300 cubic yards of solid waste from demolition activities.	Construction would result in 325,000 cubic yards of solid waste from demolition activities.	Construction would result in 184,800 cubic yards of solid waste from demolition activities.	Construction would result in 90,100 cubic yards of solid waste from demolition activities.
Energy				
Impact PUE#12: Temporary Consumption of Energy during Construction	Construction would require 22,745 billion Btu.	Construction would require 28,755 billion Btu.	Construction would require 24,015 billion Btu.	Construction would require 29,290 billion Btu.
Biological and Aquatic Resources²				
Special-Status Species				
Impact BIO#1: Permanent Conversion or Degradation of Habitat for Special-Status Plant Species	The project would remove or disturb habitat for 54 special-status plant species, 8 of which are listed under the FESA or CESA, and could degrade habitat outside of but adjacent to the project footprint. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on special-status plants and their habitat under all alternatives.			
Habitat for all special-status plants (nonoverlapping)	1,639.4	Habitat for all special-status plants (nonoverlapping)	1,639.4	Habitat for all special-status plants (nonoverlapping)
Impact BIO#2a: Permanent Conversion or Degradation of Habitat for and Mortality of Bay Checkerspot Butterfly	The project would remove or disturb habitat (including critical habitat) for Bay checkerspot butterfly, 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. Increased shadows from construction of the viaduct in the Morgan Hill and Gilroy Subsection could alter flight behavior. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on Bay checkerspot butterfly under Alternative 1.	Impacts under Alternative 2 would be similar to Alternative 1 but would not have shadow impacts on flight behavior because it would be constructed on an embankment instead of viaduct. The area of affected habitat would be the same as Alternative 1.	Impacts under Alternative 3 would be similar to Alternative 1, but would affect slightly more habitat than Alternative 1.	Impacts under Alternative 4 would be similar to Alternative 1, but would affect less habitat.
Habitat for Bay checkerspot butterfly	32.4	42.5	32.4	25.4
Designated critical habitat for Bay checkerspot butterfly	26.0	34.8	26.0	21.0
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. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on monarch butterfly under Alternative 1.	Impacts under Alternative 2 would be the same as under Alternative 1.	Impacts under Alternative 3 would be the same as under Alternative 1.	Impacts under Alternative 4 would be the same as under Alternative 1.

Resource Category	Construction Impacts under the Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Habitat for monarch butterfly	5,345.8	5,606.8	5,548.8	5,092.3
Impact BIO#3: Permanent Conversion or Degradation of Habitat for and Mortality of Vernal Pool Crustaceans	The project would or disturb habitat for Conservancy fairy shrimp, longhorn fairy shrimp, vernal pool fairy shrimp, and vernal pool tadpole shrimp, and could degrade vernal pool habitat outside of but adjacent to the project footprint. Activities could also result in mortality of individuals, if present in affected habitat. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on vernal pool crustaceans under all alternatives.			
Habitat for vernal pool fairy shrimp			27.6	
Habitat for vernal pool tadpole shrimp			27.6	
Habitat for longhorn fairy shrimp			27.6	
Habitat for Conservancy fairy shrimp			27.6	
Impact BIO#4: Removal or Pruning of Elderberry Plants Potentially Supporting Valley Elderberry Longhorn Beetle	The project may remove elderberry plants potentially occupied by valley elderberry longhorn beetle and could degrade habitat outside of but adjacent to the project footprint. Removal of occupied elderberry plants would result in mortality of individuals. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on valley elderberry longhorn beetle under all alternatives.			
Habitat potentially supporting valley elderberry longhorn beetle			158.9	
Impact BIO#5: Permanent Conversion or Degradation of Habitat for and Mortality of Crotch Bumble Bee	The project would convert and disturb habitat and could result in the mortality of individual bees if underground nest colonies or overwintering queens are present in the project footprint at the time of construction. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on Crotch bumble bee under all alternatives.			
Habitat potentially supporting Crotch bumble bee	1,583.6	1,616.3	1,592.8	1,539.7
Impact BIO#6: Permanent Conversion of Habitat for and Direct Mortality of Steelhead and Pacific Lamprey, and Permanent Conversion of Essential Fish Habitat for Pacific Coast Salmon	The project would remove or disturb stream habitat for CCC and SCCC steelhead, Pacific lamprey, and designated EFH for Pacific Coast (Chinook and coho) salmon, and could degrade habitat downstream of the project footprint at affected stream crossings. Pile-driving and dewatering activities could also result in mortality of individuals, if present in affected habitat. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on special-status fish under all alternatives.			
Habitat for CCC/SCCC steelhead	34.0	36.1	46.8	31.1
Designated freshwater EFH for Pacific Coast salmon	9.8	10.2	9.8	6.6
Habitat for Pacific lamprey	207.4	213.1	212.6	200.5
Designated critical habitat for CCC/SCCC steelhead	8.2	9.4	9.4	7.5
Impact BIO#7: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Tiger Salamander	The project would remove or disturb habitat (including critical habitat) for California tiger salamander, 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. Construction BMPs, WEAP training, and biological monitoring during construction, would minimize direct and indirect impacts on California tiger salamander under all alternatives.			
Habitat for California tiger salamander	3,159.7	3,392.7	3,404.3	2,968.6
Designated critical habitat for California tiger salamander			278.5	
Impact BIO#8: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Red-Legged Frog	The project would remove or disturb habitat (including critical habitat) for California red-legged frog, 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. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on California red-legged frog under all alternatives.			
Habitat for California red-legged frog	2,837.6	3,333.5	3,001.6	2,469.7
Designated critical habitat for California red-legged frog	923.6	923.6	923.0	923.6

Resource Category	Construction Impacts under the Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Impact BIO#9: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Foothill Yellow-Legged Frog	The project would remove or disturb habitat for foothill yellow-legged frog, 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. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on foothill yellow-legged frog under all alternatives.			
Habitat for foothill yellow-legged frog	133.0	131.2	132.9	127.7
Impact BIO#10: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Western Spadefoot	The project extent would remove or disturb habitat for western spadefoot, 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. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on western spadefoot under all alternatives.			
Habitat for western spadefoot	740.8	740.8	760.9	740.8
Impact BIO#11: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Western Pond Turtle	The project would remove or disturb habitat for 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. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on western pond turtle under all alternatives.			
Habitat for western pond turtle	3,901.0	4,388.2	3,811.5	3,517.2
Impact BIO#12: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Blunt-Nosed Leopard Lizard	The project would remove or disturb habitat for blunt-nosed leopard lizard, 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. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on blunt-nosed leopard lizard under all alternatives.			
Habitat for blunt-nosed leopard lizard	696.3			
Impact BIO#13: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Joaquin Coachwhip, Northern California Legless Lizard, and Coast Horned Lizard	The project would remove or disturb habitat for San Joaquin coachwhip, northern California legless lizard, and coast horned lizard, 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. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on these species under all alternatives.			
Habitat for San Joaquin coachwhip	855.9	855.9	855.8	855.9
Habitat for northern California legless lizard	19.8	19.8	19.7	19.8
Habitat for coast horned lizard	1,227.1	1,227.1	1,226.8	1,227.1
Impact BIO#14: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Giant Garter Snake	The project would remove or disturb habitat for giant 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. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on giant garter snake under all alternatives.			
Habitat for giant garter snake	568.0			
Impact BIO#15: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Short-Eared Owl and Grasshopper Sparrow	The project would remove or disturb habitat for short-eared owl and grasshopper sparrow, and could degrade habitat outside of but adjacent to the project footprint. Activities could also destroy or cause abandonment of active nests, if present in affected habitat. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on these species under all alternatives.			
Habitat for short-eared owl	514.9			
Habitat for grasshopper sparrow	945.8	945.8	945.7	945.8
Impact BIO#16: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Mountain Plover and Western Snowy Plover (Interior Population)	The project would remove or disturb habitat for mountain plover, and could degrade habitat outside of but adjacent to the project footprint. Activities could also destroy or cause abandonment of active western snowy plover nests, if present in affected habitat, and disturb wintering mountain plovers. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on these species under all alternatives.			
Habitat for mountain plover	907.6			
Habitat for western snowy plover	35.1			

Resource Category	Construction Impacts under the Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Impact BIO#17: Permanent Conversion or Degradation of Habitat for and Direct Mortality or Disturbance of Burrowing Owl	The project would remove or disturb habitat for burrowing owl. Activities could also result in mortality of individuals by crushing occupied burrows or collapsing burrow entrances and preventing escape. Activities could also disturb nesting pairs and cause them to abandon eggs or young. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on burrowing owl under all alternatives.			
Habitat for burrowing owl	2,176.8	2,441.1	2,366.3	2,014.6
Impact BIO#18: Permanent Conversion or Degradation of Habitat for and Disturbance of Golden Eagle and Bald Eagle	The project would remove or disturb habitat for golden eagle and bald eagle. Activities within 0.5 mile of active nests could cause nesting pairs to abandon eggs or young. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct impacts on these species under all alternatives.			
Habitat for golden eagle	1,552.5	1,581.5	1,561.8	1,505.9
Habitat for bald eagle	536.8	548.8	526.6	515.7
Impact BIO#19: Injury or Disturbance of California Condor	The project would be constructed at the edge of the California condor's range; however, individuals could fly over, forage, or land during construction activities. Construction debris and other materials could be ingested or cause entanglement. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct impacts on California condor under all alternatives.			
Impact BIO#20: Permanent Conversion or Degradation of Habitat for and Disturbance of Special-Status Raptors (American Peregrine Falcon, Northern Harrier, White-Tailed Kite) and Other Raptors	The project would remove or disturb habitat for American peregrine falcon, northern harrier, white-tailed kite, and other raptors. Activities within 500 feet of active nests could cause nesting pairs to abandon eggs or young. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct impacts on these species under all alternatives.			
Habitat for American peregrine falcon	4,594.7	5,287.7	4,682.6	4,012.5
Habitat for northern harrier	2,481.1	2,751.3	2,675.0	2,356.6
Habitat for white-tailed kite	3,218.4	3,478.5	3,412.9	2,971.9
Impact BIO#21: Permanent Conversion or Degradation of Habitat for and Disturbance of Swainson's Hawks	The project would remove or disturb habitat for Swainson's hawk. Activities within 0.5 mile of active nests could cause nesting pairs to abandon eggs or young. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct impacts on Swainson's hawk under all alternatives.			
Habitat for Swainson's hawk	1,534.4	1,743.5	1,534.4	1,480.8
Impact BIO#22: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Purple Martin, Olive-Sided Flycatcher, and Loggerhead Shrike	The project would remove or disturb habitat for purple martin, olive-sided flycatcher, and loggerhead shrike. Activities could also destroy or cause abandonment of active nests, if present in affected habitat. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on these species under all alternatives.			
Habitat for loggerhead shrike	3,275.8	3,535.8	3,471.7	3,029.2
Habitat for purple martin	443.8	443.8	442.0	443.8
Habitat for olive-sided flycatcher	463.6	463.6	461.7	463.6
Impact BIO#23: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Least Bell's Vireo, Yellow Warbler, and Yellow-Breasted Chat	The project would remove or disturb habitat for least Bell's vireo, yellow warbler, and yellow-breasted chat, and could degrade habitat outside of but adjacent to the project footprint. Activities could also destroy or cause abandonment of active nests, if present in affected habitat. Construction BMPs, WEAP training, restoration and revegetation of disturbed areas, and invasive weed control measures will minimize direct and indirect impacts on these species under all alternatives.			
Habitat for least Bell's vireo	119.3	124.5	120.7	105.3
Habitat for yellow warbler	54.2	55.1	53.5	45.3
Habitat for yellow-breasted chat	47.1	47.1	46.3	44.1
Impact BIO#24: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Tricolored Blackbird and Yellow-Headed Blackbird	The project would remove or disturb habitat for tricolored blackbird and yellow-headed blackbird, and could degrade habitat outside of but adjacent to the project footprint. Activities could also destroy or cause abandonment of active nests, if present in affected habitat. Construction BMPs, pre-construction nest surveys, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on these species under all alternatives.			
Habitat for tricolored blackbird	2,630.3	2,906.9	2,836.6	2,498.2

Resource Category	Construction Impacts under the Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Habitat for yellow-headed blackbird	10.6			
Impact BIO#25: Permanent Conversion or Degradation of Habitat for and Disturbance of Sandhill Crane	The project would remove or disturb habitat for sandhill crane, and could degrade habitat outside of but adjacent to the project footprint. Activities could also disturb wintering sandhill cranes, if present in affected habitat. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on sandhill crane under all alternatives.			
Habitat for greater sandhill crane	524.5			
Habitat for lesser sandhill crane	669.1			
Impact BIO#26a: Loss of Breeding, Foraging, and Dispersal Habitat for and Direct Mortality or Disturbance of Mountain Lion	The project would remove or disturb habitat for mountain lion and could degrade habitat outside of but adjacent to the project footprint. Construction activities could disrupt or prohibit the gene flow between mountain lion subpopulations. Activities could also result in mortality of individuals by crushing occupied dens and preventing escape. Activities could also disturb individuals and impair breeding, feeding, or sheltering behavior. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on mountain lion under all alternatives.			
Habitat for mountain lion	3,713.9	4,007.5	3,913.0	3,542.2
Impact BIO#26b: Loss of Denning and Dispersal Habitat for and Direct Mortality or Disturbance of San Joaquin Kit Fox	The project would remove or disturb habitat for San Joaquin kit fox, and could degrade habitat outside of but adjacent to the project footprint. Activities could also result in mortality of individuals by crushing occupied burrows or collapsing burrow entrances and preventing escape. Activities could also disturb individuals and impair breeding, feeding, or sheltering behavior. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on San Joaquin kit fox under all alternatives.			
Habitat for San Joaquin kit fox	2,881.6	2,881.6	2,914.4	2,881.0
Impact BIO#27: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Fresno Kangaroo Rat	The project would remove or disturb habitat for Fresno kangaroo rat. Activities could also result in mortality of individuals, if present in affected habitat. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct impacts on Fresno kangaroo rat under all alternatives.			
Habitat for Fresno kangaroo rat	105.1			
Impact BIO#28: Loss of Denning and Dispersal Habitat for and Direct Mortality or Disturbance of American Badger	The project would remove or disturb habitat for American badger, and could degrade habitat outside of but adjacent to the project footprint. Activities could also result in mortality of individuals by crushing occupied burrows or collapsing burrow entrances and preventing escape. Activities could also disturb individuals and impair breeding, feeding, or sheltering behavior. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on American badger under all alternatives.			
Habitat for American badger	1,173.1	1,204.7	1,178.5	1,129.1
Impact BIO#29: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Francisco Dusky-Footed Woodrat and Ringtail	The project would remove or disturb habitat for San Francisco dusky-footed woodrat and ringtail. Activities could also result in mortality of individuals, if present in affected habitat. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct impacts on San Francisco dusky-footed woodrat and ringtail under all alternatives.			
Habitat for San Francisco dusky-footed woodrat and ringtail	502.4	512.8	513.3	479.9
Impact BIO#30: Loss of Roost Sites for and Direct Mortality or Disturbance of Special-Status Bats	The project would remove roosting habitat for pallid bat, Townsend's big-eared bat, western mastiff bat, and western red bat. Activities could also destroy or cause abandonment of occupied roost sites, if present in affected habitat. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct impacts on these species under all alternatives.			
Habitat for pallid bat	4,128.3	4,813.3	4,205.2	3,559.3
Habitat for Townsend's big-eared bat	2,120.9	2,370.4	2,318.0	1,850.5
Habitat for western mastiff bat	3,415.9	4,102.6	3,492.8	2,858.9
Habitat for western red bat	4,594.7	5,287.7	4,682.6	4,012.5

Resource Category	Construction Impacts under the Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Non-Special-Status Species				
Impact BIO#33: Mortality of Non-Special-Status Terrestrial Wildlife	The project could result in mortality of non-special-status terrestrial wildlife by crushing or mangling small ground-dwelling animals hidden underground or in dense vegetation, inadvertently releasing hazardous materials into aquatic habitat, or removing vegetation and structures that support non-special-status birds and bats. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct impacts on non-special-status wildlife under Alternative 1.	Impacts under Alternative 2 would be the same as under Alternative 1. There are no non-special-status wildlife species or activity types unique to one alternative; all have the same potential to result in direct impacts.	Impacts under Alternative 3 would be the same as under Alternative 1. There are no non-special-status wildlife species or activity types unique to one alternative; all have the same potential to result in direct impacts.	Impacts under Alternative 4 would be the same as under Alternative 1. There are no non-special-status wildlife species or activity types unique to one alternative; all have the same potential to result in direct impacts.
Impact BIO#34: Removal or Degradation of Habitat for and Disturbance of Waterfowl and Shorebirds	The project would remove or disturb habitat for waterfowl and shorebirds in two Audubon IBAs, and could degrade habitat outside of but adjacent to the project footprint. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on waterfowl and shorebird habitat under Alternative 1.	Impacts under Alternative 2 would be the same as under Alternative 1 because its footprint is identical where it crosses the Audubon IBAs.	Impacts under Alternative 3 would be similar to but greater than under Alternative 1 because Alternative 3 would cross more of the 10-year Soap Lake floodplain and agricultural lands east of Gilroy.	Impacts under Alternative 4 would be the same as under Alternative 1 because its footprint is identical where it crosses the Audubon IBAs.
Special-Status Plant Communities				
Impact BIO#35: Permanent Conversion or Degradation of Special-Status Plant Communities	The project would remove or disturb the following special-status plant communities, and could degrade special-status plant communities adjacent to the project footprint. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on special-status plant communities under all alternatives.			
Alkali marsh			9.7	
Alkali scrub wetland			0.9	
Alkali vernal pool			27.1	
California annual grassland	1,138.4	1,166.4	1,144.0	1,091.9
California sycamore woodland			12.6	
Freshwater marsh	2.3	2.4	11.3	2.3
Mixed chaparral	19.6	19.6	19.5	19.6
Mixed riparian	26.3	27.6	30.3	20.9
Palustrine forested wetland	31.9	31.5	26.3	27.9
Seasonal wetland	16.2	16.4	13.9	11.6
Vernal pools			0.4	
Total area of special-status plant communities affected	1,269.4	1,299.0	1,281.3	1,209.9
Aquatic Resources				
Impact BIO#37: Permanent Conversion or Degradation of Aquatic Resources Considered Jurisdictional under Section 404 of the Federal Clean Water Act or Regulated by the State	The project would remove or disturb federally protected wetland and nonwetland cover types (i.e., aquatic resources), and could degrade aquatic resources outside of but adjacent to the project footprint. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on aquatic resources under all alternatives.			
Wetlands	58.2 (P) 19.3 (T)	58.1 (P) 19.6 (T)	67.8 (P) 11.9 (T)	56.2 (P) 13.6 (T)
Nonwetlands	42.3 (P) 68.3 (T)	49.9 (P) 69.9 (T)	43.0 (P) 68.8 (T)	40.4 (P) 64.7 (T)

Resource Category	Construction Impacts under the Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Total jurisdictional aquatic resources (permanent and temporary impacts total)	188.0	197.4	191.5	174.8
Impact BIO#38: Permanent Conversion or Degradation of Resources Regulated under California Fish and Game Code Section 1600 et seq.	The project would remove or disturb riparian habitat and aquatic resources subject to regulation under Section 1600 et seq., which may have a substantial adverse effect on fish and wildlife species. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on aquatic resources under all alternatives.			
Riparian habitat	55.1	56.1	54.5	46.4
Rivers, lakes, and streams	126.2	137.0	112.2	105.1
Total aquatic resources	181.3	193.1	166.7	151.5
Protected Trees				
Impact BIO#40: Removal of Trees Protected under Municipal Tree Ordinances	The project may remove or prune trees protected under municipal tree ordinances. Ground disturbance could result in increased invasive weed cover that reduce the viability and regeneration of protected trees. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on protected trees under all alternatives.			
Wildlife Corridors				
Impact BIO#42: Temporary Disruption of Wildlife and Wildlife Movement	The project would temporarily affect wildlife and wildlife movement by creating temporary barriers to movement (e.g., construction fencing and dewatering), creating noise and vibration that alters or delays animal movements as they attempt to avoid the work area, and introducing ALAN during nighttime construction that alters or delays animal movements as they avoid lit areas. The project could affect gene flow between subpopulations of mountain lions by temporarily precluding mountain lion movements. Wildlife exclusion fencing, and construction work windows would minimize temporary direct and indirect impacts on wildlife movement under all alternatives.	Impacts under Alternative 2 would be less than under Alternative 1 because Alternative 2 would stay within instead of circumvent downtown Morgan Hill, thus avoiding agricultural lands and staying farther from Coyote Creek, a known wildlife movement corridor. Alternative 2 would have the lowest temporary impact on wildlife movement of the four alternatives.	Impacts under Alternative 3 would be greater than those under Alternative 1 because Alternative 3 would cross more land protected to conserve wildlife movement and more of the Santa Cruz to Gabilan Range modeled wildlife corridor in the Soap Lake 10-year floodplain than the other alternatives. Alternative 3 would have the greatest temporary impact on wildlife movement of the four alternatives.	Impacts under Alternative 4 would be similar to those under Alternative 2.
Impact BIO#43: Permanent Impacts on Wildlife Movement	The project would create a barrier to local and regional wildlife movement and fragment habitat. The project could affect the gene flow between subpopulations of mountain lions by precluding mountain lion movements. Dedicated wildlife crossings and modification of viaducts and drainage culverts to facilitate wildlife movement as proposed in the WCA would minimize permanent direct impacts on wildlife movement.	Impacts on terrestrial wildlife movement under Alternative 2 would be greater than under Alternative 1 because the alignment profile is at grade (rather than viaduct) through most portions of the Monterey Corridor and Morgan Hill and Gilroy Subsections, precluding the movement of several species.	Impacts under Alternative 3 would be greater than under Alternatives 1 and 2 because Alternative 3 would cross more of the Soap Lake floodplain and more undeveloped agricultural lands than these alternatives, and it would also result in more in-water impacts on aquatic species movement due to greater impacts on Llagas Creek.	Impacts under Alternative 4 would be similar to those under Alternative 2.
Conservation Areas				
Impact BIO#51: Permanent Conversion or Degradation of Conservation Areas	The project would remove or disturb conservation area lands, and could degrade conservation area lands outside of but adjacent to the project footprint. Construction BMPs, WEAP training, and biological monitoring during construction would minimize direct and indirect impacts on jurisdictional aquatic resources under all alternatives.			
Acres of conservation areas affected	535.8	564.8	595.7	539.0
Number of conservation areas affected	11	14	11	9

Resource Category	Construction Impacts under the Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Habitat Conservation Plans				
Impact BIO#53: Conflict with Santa Clara Valley Habitat Plan	<p>The project could conflict with the following conservation actions of the SCVHP:</p> <ul style="list-style-type: none"> Action LAND-L4 requires the acquisition and enhancement of natural and semi-natural landscapes between the Santa Teresa Hills and Metcalf Canyon to the south that will contribute to providing connectivity between the Santa Cruz Mountains and Diablo Range to promote the movement of covered and other native species at many spatial scales. Action LAND-WP7 requires the acquisition of habitat near Santa Teresa Hills and Tulare Hill to provide connectivity between populations in the Diablo Range and the Santa Cruz foothills. Action LAND-R3 requires the acquisition in fee title of or obtaining conservation easements on lands that protect at least 40 acres of existing California sycamore woodland so that this very rare and threatened land cover type is preserved in the study area. <p>Potential conflicts with Actions LAND-L4 and LAND-WP7 are not expected in that the project would not interfere with land acquisition because the project alternatives would be located in areas outside the areas identified for acquisition. There would be a potential conflict with Action LAND-R3 because the SCVHA is in the process of obtaining a conservation easement to protect California sycamore woodland along Pacheco Creek at the Pacheco Creek Open Space Regional Reserve, and the project would have permanent and temporary direct impacts within the area targeted for protection.</p>			
Impact BIO#54: Conflict with Santa Clara Valley Greenprint	<p>The project would not conflict with the Santa Clara Valley Greenprint. Strategy 3 of the Greenprint includes the goal of protecting and maintaining connections between large open-space parcels to provide large habitat blocks, critical linkages, and climate resilience. The project would cross three of ten conservation focus areas identified under Strategy 3: Coyote Valley, Upper Pajaro River, and Coyote Creek. However, the Greenprint does not identify quantitative goals or strategies for these areas. In addition, Alternative 3 would affect protected parcels identified by the Greenprint as important for agricultural land protection (Bloomfield North and Bloomfield South easements), but these parcels are not included in its habitat conservation goals.</p> <p>Since the project (all alternatives) would not prevent the successful implementation of any Greenprint strategy, and since the project would not preclude implementation of the Greenprint in any of the conservation focus areas that would be affected by the project (all alternatives), nor would the impacts on conservation parcels result in a substantial impact on Greenprint implementation, the project alternatives would not conflict with implementation of the Greenprint.</p>			
Impact BIO#55: Conflict with Coyote Valley Linkage	<p>Construction of the project alternatives would result in potential conflicts with two recommended wildlife crossing modifications proposed under the Coyote Valley Linkage: a wildlife overpass at Metcalf Canyon Road or at Bailey Road and a wildlife undercrossing at Blanchard Road. HSR would not prohibit implementation of the Coyote Valley Linkage Plan under any alternative; however, it would increase the complexity of construction and incrementally increase the length of the proposed crossings (except under Alternative 4).</p>			
Hydrology and Water Resources				
Surface Water Hydrology				
Impact HYD#1: Temporary Impacts on Drainage Patterns and Stormwater Runoff during Construction	Changes to surface water hydrology that result in erosion and sedimentation would occur in 94 waterbodies with minor disturbances, and construction activities would occur in 232 waterbodies. Maintaining drainage patterns to the extent feasible, a SWPPP under the CGP, and adhering to regulatory permits would minimize potential impacts on surface water hydrology.	Impacts under Alternative 2 would be similar to Alternative 1; however, two fewer waterbodies would have minor disturbances (92) and 14 more waterbodies would be disturbed by construction activities (246).	Impacts under Alternative 3 would be similar to Alternative 1; however, the same quantity of waterbodies would have minor disturbances (94) and two fewer waterbodies would be disturbed by construction activities (230).	Impacts under Alternative 4 would be similar to Alternative 1; however, two fewer waterbodies would have minor disturbances (92) and seven fewer waterbodies would be disturbed by construction activities (225).
Impact HYD#2: Permanent Impacts on Drainage Patterns and Stormwater Runoff during Construction	Grading, cut-and-fill slopes, impervious surfaces, new bridges and culverts, and realigned or modified waterbodies would result in minimal changes to drainage patterns and stormwater runoff. New rail and roadway crossings would maintain drainage patterns of 152 waterbodies; 132 waterbodies would be realigned or filled; there would be 52,944,372 cubic yards of cut and fill; and 1,419.2 acres of impervious surface would be constructed or reconstructed. Maintaining drainage patterns and pre-construction flow rates, a stormwater management and treatment plan, and the design of realigned or modified waterbodies would minimize permanent impacts on surface water hydrology.	Impacts under Alternative 2 would be similar to Alternative 1; however, the same quantity waterbodies would have new railroad and roadway crossings (152), 11 more waterbodies would be realigned or filled (143), there would be more cut and fill (53,181,504 cubic yards), and the largest amount of impervious surface would be constructed (1,642.1 acres).	Impacts under Alternative 3 would be similar to Alternative 1; however, fewer waterbodies would have seven fewer new railroad and roadway crossings (145), four fewer waterbodies would be filled or realigned (128), and a smaller area of impervious surface would be constructed (1,358.9 acres), but it would require the most cut and fill (55,524,808 cubic yards).	Impacts under Alternative 4 would be similar to Alternative 1; however, 11 fewer waterbodies would have new railroad and roadway crossings (141), 11 fewer waterbodies would be filled or realigned (121), a smaller area of impervious surface would be constructed 919.3 acres), and it would require the least cut and fill (52,674,633 cubic yards).

Resource Category	Construction Impacts under the Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Surface Water Quality				
Impact HYD#4: Temporary Impacts on Surface Water Quality during Construction	Grading, excavation, work in waterbodies, temporary stream diversion, and other activities that would disturb, destabilize, and stockpile soil would result in temporary impacts on surface water quality. Runoff from 4,936 acres of disturbed soil would be controlled to prevent elevated turbidity and sedimentation in receiving waterbodies. Construction activities would occur in 232 waterbodies, 139 of which would be temporarily diverted and dewatered, which would physically disturb waterbodies and may require removal of riparian vegetation. Applying construction site BMPs in accordance with a SWPPP and the CGP and adhering to regulatory permit conditions would reduce temporary water quality impacts.	Impacts under Alternative 2 would be similar to Alternative 1; however, construction would disturb a larger area of soil (5,642 acres); disturb the bed, banks, and vegetation in 14 more waterbodies (246); and require temporarily diverting and dewatering 10 more waterbodies (149).	Impacts under Alternative 3 would be similar to Alternative 1; however, construction would disturb a larger area of soil (5,031 acres); disturb the bed, banks, and vegetation in two fewer waterbodies (230); and require temporarily diverting and dewatering two fewer waterbodies (137).	Impacts under Alternative 4 would be similar to Alternative 1; however, however, construction would disturb the smallest area of soil (4,336 acres); disturb the bed, banks, and vegetation in the seven fewer waterbodies (225); and require temporarily diverting and dewatering the six fewer waterbodies (133).
Impact HYD#5: Permanent Impacts on Surface Water Quality during Construction	Land use change, impervious surfaces, and realigned or filled waterbodies would permanently affect surface water quality. Alternative 1 would construct or reconstruct 1,419.2 acres of impervious surfaces, much of which would be new impervious surface associated with a viaduct between San Jose and Gilroy. Implementing a stormwater management and treatment plan would manage the quality and quantity of runoff generated by impervious surfaces. However, 132 waterbodies would be realigned or filled, resulting in permanent conversion or loss of aquatic resources and riparian vegetation.	Impacts under Alternative 2 would be similar to Alternative 1; however, Alternative 2 would construct the largest area of impervious surface (1,642.1 acres) from the construction of grade separations in the Morgan Hill and Gilroy Subsection and would fill, realign, or modify the 11 more waterbodies (143).	Impacts under Alternative 3 would be similar to Alternative 1; however, Alternative 3 would add or replace a smaller area of impervious surfaces (1,358.9 acres) and fill, realign, or modify four fewer waterbodies (128).	Impacts under Alternative 4 would be similar to Alternative 1; however, Alternative 4 would create the smallest area of new or reconstructed impervious surfaces (919.3 acres) and fill, realign, or modify the 11 fewer waterbodies (121) by using existing Caltrain infrastructure between San Jose and Gilroy.
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 minimally affect groundwater quality and volume. Impacts would be reduced by adhering to the RWQCBs' dewatering requirements; a construction management plan; coordination with utility providers and the RWQCBs; and implementing BMPs and project features regarding the management, transport, and disposal of construction waste and materials.	Impacts under Alternative 2 would be greater than Alternative 1, because more excavations due to the trenches, road improvements, and additional structures could potentially result in more dewatering.	Impacts under Alternative 3 would be similar to Alternative 1, as a comparable number of structures would require excavation and potential dewatering.	Impacts under Alternative 4 would be slightly less than under Alternative 1, because there would be fewer structures requiring excavation and therefore potentially less dewatering would be required.
Impact HYD#9: Permanent Impacts on Groundwater Quality and Volume during Construction	New impervious surfaces in groundwater subbasins (1,303.0 acres) and recharge zones in the Santa Clara and Llagas Area subbasins (314.0 and 158.8 acres, respectively), shallow subsurface structures, and relocating or protecting 4 public drinking water supply wells would minimally affect groundwater quality and volume. Alternative 1 would reduce groundwater percolation capacity at the Gilroy Wastewater Treatment Ponds. Permanent stormwater BMPs and coordination with the RWQCBs and water utility providers would minimize impacts, but not avoid impacts entirely.	Impacts under Alternative 2 would be similar to Alternative 1; however, the largest area of impervious surface would be constructed in groundwater subbasins (1,533.7 acres) and recharge zones, eight more public drinking water supply wells (12) would be protected or relocated, and percolation capacity at the Gilroy Wastewater Treatment Ponds would be reduced.	Impacts under Alternative 3 would be less than Alternative 1; as a smaller area of impervious surface would be constructed in groundwater subbasins (1,241.4 acres), a smaller area of impervious surface would be constructed in groundwater recharge zones, one public drinking water supply well would be protected or relocated (5), and percolation capacity at the Gilroy Wastewater Treatment Ponds would not be reduced.	Impacts under Alternative 4 would be similar to Alternative 1; as the smallest area of impervious surface would be constructed in groundwater subbasins (802.9 acres), the smallest area of impervious surface would be constructed in groundwater recharge zones, eight more public drinking water supply wells would be protected or relocated (12), and percolation capacity at the Gilroy Wastewater Treatment Ponds would not be reduced.

Resource Category	Construction Impacts under the Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Impact HYD#10: Temporary Impacts on Groundwater and Surface Water Hydrology during Tunnel Construction	Tunnel construction activities have the potential to substantially decrease groundwater supplies and reduce groundwater contributions to surface water flows. The highest potential for these impacts to occur are along Tunnel 2 in the highest elevations of the Pacheco Pass corridor near the Santa Clara/Merced County boundary as well as at the Ortigalita fault zone. In these areas, there is potential for substantial drawdown of groundwater resources and effects on interconnected surface water resources, even with project features that govern tunnel construction methods and tunnel waterproofing specifications.	Impacts under Alternative 2 would be the same as Alternative 1, because they share the same proposed tunnels.	Impacts under Alternative 3 would be the same as Alternative 1, because they share the same proposed tunnels.	Impacts under Alternative 4 would be the same as Alternative 1, because they share the same proposed tunnels.
Impact HYD#11: Permanent Impacts on Groundwater and Surface Water Hydrology from Tunnel Construction	The proposed tunnels would be designed to be as watertight as possible by installing a single-pass or double-pass liner to withstand full hydrostatic groundwater pressures and resist groundwater inflows after construction of the tunnels has been completed. Substantial permanent impacts on groundwater and surface water hydrology would be avoided, because the tunnels would be designed to be watertight and avoid permanent drawdown of groundwater resources.	Impacts under Alternative 2 would be the same as Alternative 1, because they share the same specifications for waterproofing the proposed tunnels.	Impacts under Alternative 3 would be the same as Alternative 1, because they share the same specifications for waterproofing the proposed tunnels.	Impacts under Alternative 4 would be the same as Alternative 1, because they share the same specifications for waterproofing the proposed tunnels.
Floodplains				
Impact HYD#14: Temporary Impacts on Floodplain Hydraulics during Construction	Construction would require temporary fill in existing 100-year floodplains. Potential temporary floodplain impacts would be minimized by monitoring weather forecasts, coordinating with water and irrigation districts regarding planned releases from dams, and removing temporary fill from waterbodies and floodplains when flooding may occur.	Impacts under Alternative 2 would be similar to Alternative 1; however, different floodplains would be affected by different alignments in the Morgan Hill and Gilroy Subsection and a larger footprint.	Impacts under Alternative 3 would be similar to Alternative 1; however, different floodplains would be affected by different alignments in the Morgan Hill and Gilroy Subsection.	Impacts under Alternative 4 would be similar to Alternative 1; however, different floodplains would be affected by different alignments in the Morgan Hill and Gilroy Subsection and a smaller footprint.
Impact HYD#15: Permanent Impacts on Floodplain Hydraulics during Construction	Construction would require cut and fill in floodplains, including bridges, culverts, roadways, embankments, viaducts, trenches, stations, maintenance facilities, realignment and modification of waterbodies, and utility upgrades. The development and implementation of a flood protection plan and coordination with the U.S. Army Corps of Engineers would minimize permanent impacts on floodplains, including the Soap Lake floodplain south of Gilroy. ¹	Impacts under Alternative 2 would be similar to Alternative 1; however, Alternative 2 would cross different floodplains.	Impacts under Alternative 3 would be similar to Alternative 1; however, Alternative 3 would increase the 100-year water surface elevation of the Llagas Creek floodway near east Gilroy by approximately 0.4 foot.	Impacts under Alternative 4 would be similar to Alternative 1; however, Alternative 4 would cross different floodplains.
Geology, Soils, Seismicity, and Paleontological Resources				
Impact GEO#1: Construction in Unstable Soils	Project features will minimize direct and indirect risks to life and property from differential ground movement caused by ground subsidence, collapsible soil, landslides, soft soil by conducting site condition assessments, subsidence monitoring, controlling groundwater withdrawal, and implementing geotechnical engineering practices in accordance with relevant design guidelines and standards such as AREMA, FHWA, and Caltrans. A CMP will also be developed to specify how and where these techniques will be implemented.	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1

Resource Category	Construction Impacts under the Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Impact GEO#2: Inadvertent Disturbance of Naturally Occurring Asbestos during Construction	Project features will minimize direct and indirect risks caused by exposure of construction workers to NOA by conforming with regulatory requirements for construction and grading operations in areas with NOA and employing measures to reduce the potential for NOA to become airborne during ground-disturbing activities and by proper testing and disposal of excavated material that may contain NOA. A CMP will also be developed to specify how and where these techniques will be implemented.	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1
Impact GEO#3: Exposure to In-Situ Gas	Project features will minimize direct and indirect risks to life and property from exposure inhalation or explosion of hazardous in-situ gas by conforming with OSHA regulatory requirements for excavations, installing gas monitoring, collecting, and ventilating systems, and using explosion-proof equipment. A CMP will also be developed to specify how and where these techniques will be implemented.	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1
Impact GEO#4: Tunneling in Areas with Sheared or Weak Bedrock	Project features will minimize direct and indirect risks to life and property from unstable sheared or weak bedrock by assessing geotechnical conditions prior to construction, using tunneling techniques to safely tunnel when crushing and squeezing conditions are expected, and reinforcing tunnels to handle external stresses. A CMP will also be developed to specify how and where these techniques will be implemented.	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1
Impact GEO#5: Construction on Expansive Soil	Project features will assess soil conditions and treat expansive soils through appropriate engineering measures, thereby minimizing direct and indirect risks to life and property from differential ground movement caused by expansive soil. Engineering measures will include treatment with soil additives to reduce shrink-swell potential or excavation and replacement in accordance with relevant guidelines and standards such as AREMA, FHWA, and Caltrans. A CMP will also be developed to specify how and where these techniques will be implemented.	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1
Impact GEO#6 Excavating in Areas with Shallow Bedrock or Shallow Groundwater	Project features will minimize direct and indirect risks to life and property by conforming with geotechnical guidelines and standards such as AREMA, FHWA, and Caltrans, undertaking geotechnical investigations so that contractor would use safe equipment and techniques, and developing a CMP pertaining to excavations, shallow bedrock, and groundwater conditions.	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1
Impact GEO#7: Exposure of Concrete and Steel to Corrosive Soils	Project features will minimize direct and indirect risks to life and property from corrosive soils by conforming to guidelines specified by relevant transportation and building codes such as AREMA, FHWA, Caltrans, and CBC. and developing a CMP that will include standard engineering and construction methods to avoid or minimize the impacts of corrosive soil during construction.	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1
Impact GEO#8: Excavation and Grading Impacts on Soil Erosion	Project features will minimize substantial soil erosion or the loss of topsoil that would adversely affect the viability of the ecosystem or productivity of farming through the adoption of BMPs that protect exposed soil, include soil stabilization through the use of stabilizers, mulches, revegetation, and covering exposed work areas with biodegradable geotextiles.	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1

Resource Category	Construction Impacts under the Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Impact GEO#9: Primary Seismic Hazards during Construction	Project features will minimize direct and indirect risks to life and property from surface fault rupture and ground shaking during construction. All HSR components would be designed for the impacts of earthquakes and seismic ground shaking. Project features include seismic studies, the implementation of a CMP that will include design measures to minimize or avoid exposure of people or structures to impacts, including worker safety protocols for seismic events that could occur during construction, and compliance with guidelines and standards such as AREMA, FHWA, Caltrans, and CBC.	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1
Impact GEO#10: Secondary Seismic Hazards during Construction	Project features will minimize direct and indirect risks to life and property resulting from ground deformation from secondary seismic hazards during construction. These project features include conforming to guidelines specified by relevant transportation and building agencies including assessing geotechnical conditions prior to construction and applying geotechnical engineering practices such as ground improvement and foundation design as well as applying construction safety measures like evacuation plans. A CMP will also be developed to specify how and where these practices and measures will be implemented.	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1
Paleontological Resources				
Impact GEO#14: Destruction of Paleontological Resources during Construction	Construction of the project could affect eight geologic units identified as having high or undetermined paleontological potential. Excavation that extends deep enough to encounter sensitive geologic units underlying areas mapped as low-potential younger alluvium have the potential to result in impacts on paleontological resources. Alternative 1 would result in more ground disturbance in paleontologically sensitive geologic units in the Morgan Hill and Gilroy Subsection than Alternative 2 and Alternative 3 as it traverses to east Gilroy. Viaduct and embankment elements under Alternative 1 include more ground disturbance in paleontologically sensitive geologic units than Alternative 4 in the San Jose Diridon Station Approach, Monterey Corridor, and Morgan Hill and Gilroy Subsections.	Alternative 2 would have the potential to result in fewer impacts on paleontological resources than Alternatives 1 or 3 because it would use an embankment from Bernal Way to downtown Gilroy, which would involve substantially less excavation than Alternatives 1 and 3. Viaduct and embankment elements under Alternative 2 include more ground disturbance in paleontologically sensitive geologic units than Alternative 4 in the San Jose Diridon Station Approach, Monterey Corridor, and Morgan Hill and Gilroy Subsections.	Viaduct elements in Alternative 3 would result in less ground disturbance in paleontologically sensitive geologic units in the Morgan Hill and Gilroy Subsection than viaduct elements in Alternative 1, but would have more ground disturbance than the embankment under Alternative 2. Viaduct and embankment elements under Alternative 3 also include more ground disturbance in paleontologically sensitive geologic units than Alternative 4 in the San Jose Diridon Station Approach, Monterey Corridor, and Morgan Hill and Gilroy Subsections.	Alternative 4 would result in less ground disturbance in paleontologically sensitive geologic units than Alternatives 1, 2, or 3 because it would use a blended, at-grade profile in the San Jose Diridon Station Approach, Monterey Corridor, and Morgan Hill and Gilroy Subsections, which would involve substantially less excavation than the viaducts and embankments proposed under the other alternatives.
Hazardous Materials and Waste				
Impact HMW#1: Temporary and Intermittent 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 will require compliance with regulations that control the transport, use, and storage of hazardous materials; proper permitting; and the implementation of written hazard communication and spill prevention plans to avoid worker and public exposure to hazardous materials.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Impact HMW#2: Temporary Impacts from Construction on or near Potential Environmental Concern Sites	Construction of the project could affect 21 medium- and high-risk PEC sites within the PEC RSA. Project features will include characterizing contamination before it is disturbed, managing required disturbances, stopping work if undocumented contamination is discovered, and implementing engineering controls to limit spread and exposure to hazardous materials.	Similar to Alternative 1, but construction could affect 28 medium- and high-risk PEC sites within the PEC RSA.	Similar to Alternative 1, but construction could affect 17 medium- and high-risk PEC sites within the PEC RSA.	Similar to Alternative 1, but construction could affect 29 medium- and high-risk PEC sites within the PEC RSA.

Resource Category	Construction Impacts under the Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Impact HMW#3: Temporary Direct Effects from Inadvertent Disturbance of Former or Current Railways during Construction	The risk assessment determined that the potential for disturbing former railways is low in the Pacheco Pass and San Joaquin Valley Subsections and high in the San Jose Diridon Station Approach, Monterey Corridor, and Morgan Hill and Gilroy Subsections. Project features will include a CMP that addresses provisions for the disturbance of undocumented contamination and the implementation of a hazardous waste plan for handling, transport, containment, and storage of hazardous materials.	Alternative 2 parallels a larger portion of current railway in the Morgan Hill and Gilroy Subsection, and therefore has a slightly higher risk than Alternative 1.	Similar to Alternative 1.	Alternative 4 follows a larger portion of current railway in the Morgan Hill and Gilroy Subsection, and therefore has the highest risk of all the alternatives.
Impact HMW#4: Temporary Impacts from Inadvertent Disturbance of Lead-Based Paint during Construction	The risk assessment determined that the potential for encountering structures with LBP is low in the Pacheco Pass and San Joaquin Valley Subsections and moderate in the other subsections. Project features will include implementation of a hazardous waste plan for transport, containment, and storage of hazardous materials and preparation of demolition plans with provisions for lead abatement and control measures to minimize potential exposure of the public and constructions workers to lead.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Impact HMW#5: Temporary Impacts from Inadvertent Disturbance of Asbestos-Containing Materials during Construction	The risk assessment determined that the potential for encountering structures or soils containing asbestos materials is high in the San Jose Diridon Station Approach and Monterey Corridor Subsections, moderate in the Morgan Hill and Gilroy Subsection, and low in the remaining two subsections. Project features will include implementation of a hazardous waste plan for transport, containment, and storage of hazardous materials and preparation of demolition plans with provisions for ACM abatement and control measures to minimize potential exposure of the public and constructions workers to asbestos. Plans will require handling of materials be done by licensed asbestos contractors.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Impact HMW#6: Temporary Impacts from Inadvertent Disturbance of Pesticides during Construction	The risk assessment determined that the risk of encountering pesticides is high in the Morgan Hill and Gilroy and San Joaquin Valley Subsections and low in the remaining subsections. Pesticides are a relatively confined contaminant with a low likelihood of mobilization, and project features will include measures to mitigate undocumented contaminants encountered during earth-disturbing activities.	Same as Alternative 1.	Alternative 3 passes through slightly more agricultural land than Alternatives 1, 2, and 4 in the Morgan Hill and Gilroy Subsection; accordingly, Alternative 3 has a slightly higher risk of exposure to potentially pesticide-contaminated soils.	Same as Alternative 1.
Impact HMW#7: Temporary Impacts from Inadvertent Disturbance of Polychlorinated Biphenyls during Construction	There are pole-mounted transformers within RSA under which PCB concentrations may be found. The risk assessment determined that the risk of encountering PCBs is moderate in all subsections. Project features will require preparation of a CMP for disturbances of undocumented contamination, work stoppage until a contaminant can be characterized, and implementation of appropriate controls to limit exposure to PCBs and development of a hazardous materials and waste plan describing responsible parties and procedures and BMPs for transport, containment, and storage of contaminated materials.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.

Resource Category	Construction Impacts under the Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Impact HMW#8: Temporary Impacts from Inadvertent Disturbance of Aerially Deposited Lead during Construction	The risk assessment determined that the risk of encountering ADL is moderate in the San Jose Diridon Station Approach, Monterey Corridor, and Morgan Hill and Gilroy Subsections and low in the remaining subsections. Project features will include identification and characterization of areas potentially contaminated with ADL prior to construction, preparation of a CMP with provisions for the disturbance of undocumented contamination and restricting handling of contaminated soils to personnel trained in their management, wetting of soils during construction, and the provision of a hazardous materials and waste plan describing responsible parties and procedures and BMPs for transport, containment, and storage of contaminated materials.	There is a slightly higher risk of ADL exposure in the Morgan Hill and Gilroy Subsection under Alternative 2 than under Alternatives 1, 3, and 4.	Same as Alternative 1.	Same as Alternative 1.
Impact HMW#9: Temporary Impacts from Soil Disturbing Activities in Areas of Naturally Occurring Asbestos during Construction	The risk assessment determined that the risk of encountering NOA is moderate in the Monterey Corridor, Morgan Hill and Gilroy, and Pacheco Pass Subsections, and low in the remaining subsections. Project features will 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 1.	Same as Alternative 1.	Same as Alternative 1.
Impact HMW#10: Temporary Impacts from Inadvertent Disturbance of Undocumented Hazardous Materials or Wastes during Construction	Project features will include preparation of a CMP, placing work barriers prior to construction in areas suspected of contamination and during construction if contamination is encountered, stopping work if undocumented contamination is encountered, and characterization and removal of contaminated materials prior to resuming work.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Hazardous Material and Waste Impacts on Sensitive Receptors				
Impact HMW#12: Intermittent Impacts from Hazardous Materials and Wastes Activities in Proximity to Schools During Construction	Project construction would occur within 0.25 mile of 43 schools. Project features will require compliance with federal, state, and local regulations; selection of materials to minimize potential for exposure; and use of HMBPs and environmental management plans to identify, track, and document the locations of hazardous materials and to promote proper handling, storage, and transport of hazardous materials. Proper implementation of the materials storage procedures as outlined in the HMBP will limit the extent of any spilled material within a storage area to that storage facility.	Similar to Alternative 1, but construction would occur within 0.25 mile of 47 schools.	Similar to Alternative 1, but construction would occur within 0.25 mile of 41 schools.	Similar to Alternative 1, but construction would occur within 0.25 mile of 40 schools.
Safety and Security				
Emergency Response and Services				
Impact S&S#1: Temporary Impacts on Emergency Access and Response Times from Temporary Roadway and Highway Closures, Relocations, and Modifications	Travel time on Monterey Road would increase throughout construction areas for the duration of construction activities, resulting in delays in emergency vehicle access and response time. Access roads and driveways at Morgan Hill Charter School would be closed or modified, impeding emergency access to the school.	Temporary construction activity would result in the same road closures and relocations as Alternative 1. Construction of Skyway Drive Variant A would not impede vehicle access to San Jose Fire Station 18. Construction of Skyway Drive Variant B would impede vehicle access to San Jose Fire Station 18.	Same as Alternative 1, except no effects on Morgan Hill Charter School.	Travel time on Monterey Road would increase throughout construction areas for the duration of construction activities, resulting in delays in emergency vehicle access and response time. Effects under Alternative 4 would be less due to the lack of roadway narrowing on Monterey Road.
Impact S&S#2: Temporary Impacts on Emergency Access and Response Times from Construction Vehicles	Project features will manage construction vehicle traffic and the project would not affect emergency vehicle access and response.	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1

Resource Category	Construction Impacts under the Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Community Safety and Security				
Impact S&S#5: Temporary Exposure to Criminal Activity at Construction Sites	Construction sites would not result in criminal activity risks that would interfere with emergency services. The risk of criminal activity on construction sites would be minimized by storing equipment and materials in secured areas and using security personnel and security lighting to monitor equipment after work hours.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Impact S&S#6: Temporary Exposure to Construction Site Hazards	Construction equipment, construction activities, and high-risk facilities would not result in safety hazards. The project would comply with all legal requirements and include an effective safety plan to reduce the potential of construction site hazards and accidents.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Impact S&S#7: Temporary Exposure to Construction-Related Traffic Hazards	Temporary construction activities would result in 10 temporary road closures and realignments affecting Caltrans facilities. Emergency vehicle access would be maintained during construction and road closures would be staggered so that the next adjacent road to the north and south of a road temporarily closed for construction would remain open to accommodate detoured traffic.	Same as Alternative 1.	Same as Alternative 1.	Temporary construction activities would result in 8 temporary road closures and realignments affecting Caltrans facilities. Emergency vehicle access would be maintained during construction and road closures would be staggered so that the next adjacent road to the north and south of a road temporarily closed for construction would remain open to accommodate detoured traffic.
Impact S&S#10: Temporary Exposure to Valley Fever	Construction would not lead to increased risk of exposure to Valley fever. The fugitive dust control plan and SSMP would minimize the exposure of the public or construction workers to Valley fever.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Impact S&S#11: Temporary Exposure to Risk from High-Risk Facilities	There are 129 high-risk utility facilities within the RSA prior to construction. 75 high-risk facilities would be relocated or removed during construction. The SSMP would identify high-risk facilities that could be affected by construction and remove, relocate, or protect-in-place pipelines, electrical systems, and other buried and overhead high-risk facilities within the project footprint.	There are 123 high-risk utility facilities within the RSA prior to construction. 78 high-risk facilities would be relocated or removed during construction. Construction worker protection would be the same as Alternative 1.	There are 127 high-risk utility facilities within the RSA prior to construction. 69 high-risk facilities would be relocated or removed during construction. Construction worker protection would be the same as Alternative 1.	There are 173 high-risk utility facilities within the RSA prior to construction. 80 high-risk facilities would be relocated or removed during construction. Construction worker protection would be the same as Alternative 1.
Socioeconomics and Communities				
Communities and Neighborhoods				
Impact SOCIO #1: Temporary Disruption or Division of Established Communities from Project Construction	Construction activity would disrupt existing circulation and access patterns for residents, businesses, and agricultural properties but would not physically divide existing communities. Monterey Road would be permanently reduced from six to four lanes between Capitol Expressway and Blossom Hill Road.	Same as Alternative 1, except construction activity would result in greater changes in access in the Monterey Corridor Subsection because of the need for new grade separations.	Same as Alternative 1, except disruption would occur in east Gilroy instead of downtown Gilroy for Alternatives 1 and 2.	Similar to Alternative 1, except there would be fewer disruptions in access in the Monterey Corridor Subsection and no need for narrowing of Monterey Road. Alternative 4 would have no grade separations.
Impact SOCIO #2: Permanent Disruption or Division of Established Communities	HSR infrastructure, including a viaduct rising up to 80 feet, would introduce permanent visual changes and disrupt the existing visual character along the project by adding a view of transportation infrastructure and precast yards for construction of 40 miles of viaduct.	Same as Alternative 1, except would add a view of transportation infrastructure and precast yards for construction of 18 miles of viaduct.	Same as Alternative 1, except would add a view of transportation infrastructure and precast yards for construction of 39 miles of viaduct.	Similar to Alternative 2, except the visual intrusion of HSR infrastructure would be less because of the at-grade, blended profile of Alternative 4.
Disruption or Division of Established Communities from Changes to Air Quality, Noise and Vibration, and Community Safety and Security (See Table 3.12-23 and Impact SOCIO#1)	Reductions in air quality could disrupt community activities, particularly outdoor activities at gathering places such as parks. Construction noise could exceed established noise thresholds and affect sensitive receptors such as schools, residences, daycare facilities, and hospitals. No changes in community safety and security.	Similar to Alternative 1, except construction noise impacts would be less than under Alternatives 1 and 3 because extensive pile driving would not be required in the Monterey Corridor and Morgan Hill and Gilroy Subsections.	Same as Alternative 1.	Impacts would be less than Alternatives 1, 2, and 3 because extensive pile driving would not be required and there would be fewer excavation and construction activities.

Resource Category	Construction Impacts under the Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Children's Health and Safety				
Impact SOCIO #4: Construction Impacts on Children's Health and Safety	Construction could result in long-term health impacts on children living, learning, and playing in the RSA.	Similar to Alternative 1, except that noise impacts along Monterey Road through downtown Gilroy would be less because of construction of embankment rather than viaduct, but emissions would be greater than under Alternatives 1, 3, and 4 because of a greater amount of earthwork and trenching.	Same as Alternative 1	Similar to Alternative 1, except that noise impacts along Monterey Road through downtown Gilroy would be less because of construction of an at-grade profile between San Jose and downtown Gilroy. There would be reduced emissions during construction because of the at-grade profile
Property Displacements and Relocations				
Impact SOCIO #6: Permanent Displacement and Relocation of Residential Properties	Construction of the project would displace 147 residential units. Sufficient available relocation properties exist in the region, but some residences in unincorporated Merced County and Volta may be unable to relocate within the same community.	Construction of the project would displace 603 residential units. Sufficient available relocation properties exist in the region, but some residences in Morgan Hill, San Martin, Gilroy, unincorporated Merced County, and Volta may be unable to relocate within the same community.	Construction of the project would displace 157 residential units. Sufficient available relocation properties exist in the region, but some residences in unincorporated Merced County and Volta may be unable to relocate within the same community.	Construction of the project would displace 68 residential units. Sufficient available relocation properties exist in the region, but some residences in unincorporated Merced County and Volta may be unable to relocate within the same community.
Impact SOCIO #7: Permanent Displacement and Relocation of Commercial and Industrial Facilities	Construction of the project would displace 217 businesses. Sufficient available relocation properties exist in the region, but some businesses in unincorporated Santa Clara County, San Martin, Gilroy, and unincorporated Merced County may be unable to relocate within the same community.	Construction of the project would displace 348 businesses. Sufficient available relocation properties exist in the region, but some businesses in unincorporated Santa Clara County, Morgan Hill, San Martin, Gilroy, and unincorporated Merced County may be unable to relocate within the same community.	Construction of the project would displace 157 businesses. Sufficient available relocation properties exist in the region, but some businesses in unincorporated Santa Clara County, San Martin, and unincorporated Merced County may be unable to relocate within the same community.	Construction of the project would displace 66 businesses. With the DDV, there would be partial acquisition of one additional commercial parcel and displacement of one additional commercial building. Sufficient available relocation properties exist in the region, but some businesses in San Martin, Gilroy, and unincorporated Merced County may be unable to relocate within the same community.
Impact SOCIO #8: Permanent Displacement and Relocation of Agricultural Properties	Construction of the project would displace 49 agricultural properties (including dairies). Sufficient available relocation properties exist in the region.	Construction of the project would displace 53 agricultural properties (including dairies). Sufficient available relocation properties exist in the region.	Construction of the project would displace 49 agricultural properties (including dairies). Sufficient available relocation properties exist in the region.	Construction of the project would displace 40 agricultural properties (including dairies). Sufficient available relocation properties exist in the region.
Impact SOCIO #9: Permanent Displacement and Relocation of Community and Public Facilities	Construction of the project would displace 8 community and public facilities.	Construction of the project would displace 9 community and public facilities, depending on the Skyway Drive variant selected.	Construction of the project would displace 6 community and public facilities.	Construction of the project would displace 1 community and public facility.
Economic Impacts				
Impact SOCIO #10: Construction Impacts on Employment	Construction of the project would provide 14,780 direct and indirect jobs, representing an increase in employment demand for the region.	Construction of the project would provide 12,650 direct and indirect jobs, representing an increase in employment demand for the region.	Construction of the project would provide 15,180 direct and indirect jobs, representing an increase in employment demand for the region.	Construction of the project would provide 10,670 direct and indirect jobs, representing an increase in employment demand for the region.
Construction Impacts on Population Growth (See Section 3.18, Regional Growth).	Construction of the project would not result in substantial direct population growth.	Same as Alternative 1, except that the indirect population growth would be anticipated to be greater because of the greater number of employment opportunities.	Same as Alternative 1, except that the indirect population growth would be anticipated to be greater because of the greater number of employment opportunities.	Same as Alternative 1, except that indirect population growth would be anticipated to be less because of the smaller number of employment opportunities.
Construction Impacts on School District Funding from Changes in Bus Transportation Costs (See Table 3.12-23)	Construction of the project would not result in changes in bus transportation costs.	Same as Alternative 1, except that the need for construction of grade separations would result in more extensive roadway closures and greater delays.	Same as Alternative 1, except that road closures would occur in east Gilroy rather than in downtown Gilroy.	Same as Alternative 1
Impact SOCIO #11: Construction Impacts on School District Funding from Student Relocations	Residential displacements would result in a maximum of 86 student relocations, representing a maximum of 1% of the total enrollment overall.	Same as Alternative 1, except residential displacements would result in a maximum of 318 student relocations, representing a maximum of 1% of the total enrollment overall.	Same as Alternative 1, except that residential displacements would result in a maximum of 91 student relocations, representing a maximum of 1% of the total enrollment overall.	Same as Alternative 1, except that residential displacements would result in a maximum of 47 student relocations, representing a maximum of 1% of the total enrollment overall.
Impact SOCIO #11: Construction Impacts on School District Funding from Reduced Property Tax Revenues	Decrease in property tax revenues from 147 residential displacements and a maximum of 86 student relocations would represent 0.000002% of total annual school funding sources.	Decrease in property tax revenues from 603 residential displacements and a maximum of 318 student relocations would represent 0.000005% of total annual school funding sources.	Decrease in property tax revenues from 157 residential displacements and 91 student relocations would represent 0.000002% of total annual school funding sources.	Decrease in property tax revenues from 68 residential displacements and 47 student relocations would represent 0.000001% of total annual school funding sources.

Resource Category	Construction Impacts under the Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Impact SOCIO #12: Construction Impacts on Agriculture Economy	Construction activities associated with Alternative 1 would require the temporary use of approximately 617.6 acres of Important Farmland, the permanent conversion of 1,035.5 of Important Farmland and 162.9 acres of waste management lands, an estimated total annual reduction in crop revenues of \$7.2 million and annual dairy production loss of \$5.4 million, and an estimated reduction of 92 agricultural and dairy jobs.	Construction activities associated with Alternative 2 would require the temporary use of approximately 658.7 acres of Important Farmland, the permanent conversion of 1,181.3 acres of Important Farmland and 244.3 acres of waste management lands, an estimated total annual reduction in crop revenues of \$7.3 million and annual dairy production loss of \$5.4 million, and an estimated reduction of 95 agricultural and dairy jobs.	Construction activities associated with Alternative 3 would require the temporary use of 672 acres of Important Farmland, permanent conversion of 1,192.5 acres of Important Farmland and 252.8 acres of waste management lands, an estimated total annual reduction in crop revenues of \$7.8 million and annual dairy production loss of \$5.4 million, and an estimated reduction of 107 agricultural and dairy jobs.	Construction activities associated with Alternative 4 would require the temporary use of 458.9 acres of Important Farmland, permanent conversion of 1,032.6 acres of Important Farmland and 147 acres of waste management lands, an estimated total annual reduction in crop revenues of \$7.1 million and annual dairy production loss of \$5.4 million, and an estimated reduction of 90 agricultural and dairy jobs.
Impact SOCIO #14: Construction Impacts on Property Taxes	Property tax revenues would be reduced by 0.004% overall because of property acquisitions. Other aspects of construction may result in reduction in property values that cannot be quantified because of increased noise, light, and glare.	Same as Alternative 1, except that property tax revenues would be reduced by 0.006% overall because of property acquisitions. Other aspects of construction may result in reduction in property values that cannot be quantified because of increased noise, light, and glare.	Same as Alternative 1, except that property tax revenues would be reduced by 0.004%. Also Alternative 3 would not be anticipated to experience a beneficial effect on property values in the area of the East Gilroy Station because additional transit-oriented development would not occur in this area.	Same as Alternative 1, except that property tax revenues would be reduced by 0.003%. Also property values would be less likely to be affected along Monterey Road in the Monterey Corridor Subsection because Monterey Road would not be narrowed.
Impact SOCIO #15: Construction Impacts on Sales Tax Revenues	An increase in sales tax revenues of \$61.6 million is expected for Santa Clara, San Benito, and Merced Counties and the communities in the region as a result of construction of Alternative 1.	An increase in sales tax revenues of \$52.8 million is expected for Santa Clara, San Benito, and Merced Counties and the communities in the region as a result of construction of Alternative 2.	An increase in sales tax revenues of \$63.3 million is expected for the Santa Clara, San Benito, and Merced Counties and the communities in the region as a result of construction of Alternative 3.	An increase in sales tax revenues of \$40.1 million is expected for the Santa Clara, San Benito, and Merced Counties and the communities in the region as a result of construction of Alternative 4.
Impact SOCIO #16: Temporary Impact on Private Recreational Waterfowl Hunting	Project construction would not affect the overall economic viability of waterfowl hunting activities in the GEA.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Station Planning, Land Use, and Development				
Alteration of Land Use Patterns				
Impact LU#1: Temporary Alteration of Land Use Patterns from Land Use Conversion or Introduction of Incompatible Land Uses	Construction of the project would temporarily convert 1,521.5 acres, but land use patterns would not be substantially altered.	Construction of the project would temporarily convert 1,807.2 (1,807.7) ³ acres, but land use patterns would not be substantially altered.	Construction of the project would temporarily convert 1,531.4 acres, but land use patterns would not be substantially altered.	Construction of the project would temporarily convert 1,109.7 acres, but land use patterns would not be substantially altered.
Impact LU#2: Temporary Alteration of Land Use Patterns from Increased Traffic, Noise, Air Quality Emissions, and Visual Changes	Seven precasting yards would be required as well as 20 additional miles of aerial profile. The project would provide continuous property access by maintaining traffic flow; managing fugitive dust emissions, noise, and vibration; and restoring construction staging areas to their original condition.	Alternative 2 would include 20 additional miles of embankment rather than aerial profile. Project features would be the same as Alternative 1.	Same as Alternative 1.	Alternative 4 would be constructed entirely within the existing rail corridor through downtown Gilroy. Four precasting yards would be required. Temporary indirect impacts on land use patterns would be less than under Alternatives 1 through 3.
Impact LU#3: Temporary and Permanent Alteration of Land Use Patterns from Roadway Closures and Modifications	Seventeen permanent road modifications and seven new grade separations. Road closures and modifications would not result in large-scale relocations leading to altered land use patterns.	Twenty-nine permanent road closures and 32 new grade separations. Similar to Alternative 1, although substantially more road closures and grade separations.	Seventeen permanent road closures and 10 new grade separations, similar to Alternative 1.	Fifteen permanent road closures and six new grade separations, similar to Alternative 1.
Impact LU#4: Permanent Alteration of Land Use Patterns from Land Use Conversion and Introduction of Incompatible Uses	Construction of Alternative 1 would result in the permanent conversion of 2,996.4 acres, but the project would improve connectivity to neighboring communities. For the majority of the alignment, Alternative 1 would not substantially alter land use patterns.	Construction of Alternative 2 would result in the permanent conversion of 3,303.8 (3,306.3) ³ acres but, with the same project features as under Alternative 1, would not substantially alter land use patterns.	Construction of Alternative 3 would result in the permanent conversion of 3,084.3 acres and introduce an incompatible use at the station site in east Gilroy, and with the same project features as Alternative 1, would substantially alter land use patterns.	Construction of Alternative 4 would result in the permanent conversion of 3,003.0 acres but, with the same project features as under Alternative 1, would not substantially alter land use patterns.
Inducement of Population Growth beyond Planned Levels				
Impact LU#6: Temporary Induced Population Growth	Population growth that might be induced by increased employment opportunities for construction would not be considered substantial or exceed planned levels locally or regionally. The increase in employment would be beneficial to the local economy.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.

Resource Category	Construction Impacts under the Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Agricultural Farmlands				
Important Farmland				
Impact AG#1: Temporary Use of Important Farmland	Project construction would result in the temporary use of 617.6 acres of Important Farmland. IAMFs to require the Authority to provide advance written notice to agricultural property owners or leaseholders immediately adjacent to the disturbance limits for the project footprint (AG-IAMF#4) and to require the Authority to restore affected Important Farmland after construction (AG-IAMF#1) will minimize potential temporary impacts on Important Farmland and accordingly the alternative would not result in the permanent conversion of important farmland to nonagricultural use.	Project construction would result in the temporary use of 658.6 acres of Important Farmland. The same IAMFs would be incorporated into the project design as Alternative 1.	Project construction would result in the temporary use of 671.9 acres of Important Farmland. This would be the greatest impact among the alternatives. The same IAMFs would be incorporated into the project design as Alternative 1.	Project construction would result in the temporary use of 460.9 acres of Important Farmland. This would be the least impact among the alternatives. The same IAMFs would be incorporated into the project design as Alternative 1.
Impact AG#2: Permanent Conversion of Important Farmland to Nonagricultural Use	Project construction would result in permanent conversion of 1,035.5 acres of Important Farmland to nonagricultural use. The score for each county on Form NRCS-CPA-106 would be below the LESA threshold of 160. ⁴ No federal direction is required.	Project construction would result in permanent conversion of 1,181.3 acres of Important Farmland to nonagricultural use. The score for each county on Form NRCS-CPA-106 would be below the LESA threshold of 160. ⁴ No federal direction is required.	Project construction would result in permanent conversion of 1,192.5 acres of Important Farmland. This would be the greatest impact among the alternatives. The score for each county on Form NRCS-CPA-106 would be below the LESA threshold of 160. ⁴ No federal direction is required.	Project construction would result in permanent conversion of 1,032.6 acres of Important Farmland. This would be the least impact among the alternatives. The score for each county on Form NRCS-CPA-106 would be below the LESA threshold of 160. ⁴ No federal direction is required.
Impact AG#3: Permanent Creation of Remnant Parcels of Important Farmland	Project construction would result in permanent conversion of 162.9 acres of Important Farmland through the creation of remnant parcels. AG-IAMF#3 will minimize the impact on Important Farmland by providing for continued agricultural use on the maximum feasible amount of remnant parcels through the sale of remnant parcels to neighboring landowners for consolidation with adjacent farmland properties. However, permanent conversion would still result.	Project construction would result in permanent conversion of 244.3 acres of Important Farmland through the creation of remnant parcels. The same IAMFs would be incorporated into the project design as Alternative 1.	Project construction would result in permanent conversion of 252.8 acres of Important Farmland through the creation of remnant parcels. This would have the greatest impact among the alternatives. The same IAMFs would be incorporated into the project design as Alternative 1.	Project construction would result in permanent conversion of 147.0 acres of Important Farmland through the creation of remnant parcels. This would have the least impact among the alternatives. The same IAMFs would be incorporated into the project design as Alternative 1.
Impact AG#4: Temporary Disruption of Agricultural Infrastructure Serving Important Farmland	Project construction would temporarily disrupt 215 electrical lines and 20 pipelines or canals. PUE-IAMF#4 will involve coordination with service providers to minimize or avoid interruptions in service, PUE-IAMF#2 will involve installation of new facilities before disconnecting old facilities, and PUE-IAMF#3 will involve advance notification of service disruptions to customers to minimize the impacts on utilities and irrigation infrastructure. TR-IAMF#2 will minimize traffic disruption with a temporary construction plan to require detours and signage, AG-IAMF#5 will provide for temporary livestock and equipment crossings, and AG-IAMF#4 will provide advance notification to adjacent agricultural property owners or leaseholders. These IAMFs will minimize potential temporary impacts on Important Farmland and the alternative would not result in permanent conversion of Important Farmland to nonagricultural use as a result of disruption of utilities, irrigation infrastructure, or roads. Project construction could potentially temporarily disrupt agricultural drainage infrastructure. This disruption would result in conversion of Important Farmland to nonagricultural use.	Project construction would temporarily disrupt 231 electrical lines and 20 pipelines or canals. The same IAMFs would be incorporated into the project design as Alternative 1.	Project construction would temporarily disrupt 210 electrical lines and 17 pipelines or canals. The same IAMFs would be incorporated into the project design as Alternative 1.	Project construction would temporarily disrupt 207 electrical lines, and 18 pipelines or canals. The same IAMFs would be incorporated into the project design as Alternative 1.

Resource Category	Construction Impacts under the Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Impact AG#5: Permanent Disruption of Agricultural Infrastructure Serving Important Farmland	<p>Project construction would result in the permanent closure of 10 roads and 7 permanent farm road modifications.</p> <p>PUE-IAMF#2 will provide that any new irrigation facilities would be installed and operational before existing facilities would be disconnected. AG-IAMF#6 will provide for permanent equipment crossings, minimizing the impact of road closures on agricultural operations. TR-IAMF#2 will provide for road crossings in rural areas every 1 to 2 miles. These IAMFs will minimize the impact of agricultural infrastructure disruption on Important Farmland as a result of disruption of utilities, irrigation infrastructure, or roads.</p> <p>Project construction could potentially permanently disrupt agricultural drainage infrastructure. This disruption would result in conversion of Important Farmland to nonagricultural use.</p> <p>From Station 3148+60 to Station 3154 (near Casa de Fruta), embankment could interfere with operation of parcel-specific irrigation infrastructure, potentially resulting in conversion of Important Farmland to nonagricultural use.</p>	<p>Project construction would result in the permanent closure of 16 roads and 8 permanent farm road modifications. The same IAMFs would be incorporated into the project design as Alternative 1.</p>	<p>Project construction would result in the permanent closure of 12 roads and 31 permanent farm road modifications. This would be the greatest impact among the alternatives. The same IAMFs would be incorporated into the project design as Alternative 1.</p>	<p>Project construction would result in the permanent closure of 12 roads and 3 permanent farm road modifications. This would be the least impact among the alternatives. The same IAMFs would be incorporated into the project design as Alternative 1.</p>
Impact AG#6: Permanent Interference with Aerial Spraying Activities for Important Farmland	<p>Project construction would involve building widely spaced towers that would not result in changes in aerial spraying patterns leading to the conversion of Important Farmland to nonagricultural use.</p>	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Impact AG#7: Permanent Induced Wind Interference with Agricultural Activities on Important Farmland	<p>The wind at the edge of the HSR right-of-way during project operations would not be strong enough to interfere with agricultural activities such as insect pollination or aerial pesticide application, and would not result in indirect permanent conversion of Important Farmland to nonagricultural use.</p>	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Farmland Protected by Williamson Act Contracts				
Impact AG#8: Reduction of Important Farmland Protected by Williamson Act Contracts and Agricultural Conservation Easements	<p>The project would not affect implementation of the Williamson Act. While it would affect Important Farmland within agricultural conservation easements, this effect has already been accounted for under Impact AG#2 and Impact AG#3.</p>	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
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	<p>The use and user experience at 33 resources would be affected by noise, vibration, and air emissions.</p>	<p>The use and user experience of 42 resources would be affected by noise, vibration, and air emissions. Use of the gardens at Villa Mira Monte and the amphitheater at the Morgan Hill Community and Cultural Center would be impaired by construction noise for approximately 1 year during two phases of construction (concrete pour/aerial structure and track installation) and by vibration impacts.</p>	<p>The use and user experience at 35 resources would be affected by noise, vibration, and air emissions.</p>	<p>The use and user experience at 37 resources would be affected by noise, vibration, and air emissions. Use of the gardens at Villa Mira Monte and the amphitheater at the Morgan Hill Community and Cultural Center would be impaired by construction noise for approximately 6 months during one phase of construction (track installation) and by vibration impacts.</p>
Impact PK#2: Temporary Changes to Access or Use of Parks	<p>Access to 10 resources would be limited during construction because of TCEs and placement of equipment.</p>	<p>Access to 15 resources would be limited during construction because of TCEs and placement of equipment.</p>	<p>Access to 13 resources would be limited during construction because of TCEs and placement of equipment.</p>	<p>Access to five resources would be limited during construction because of TCEs and placement of equipment.</p>
Impact PK#3: Temporary Visual Changes That Could Create a Perceived Barrier to Access or Continued Use of Parks, Recreation, and Open Space	<p>Depending on location, viewers could see staging areas, worker parking, and equipment and materials storage areas. Construction of the project would not create a perceived barrier to use.</p>	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.

Resource Category	Construction Impacts under the Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Impact PK#4: Permanent Changes Affecting Access to or Circulation in Parks, Recreational Facilities, and Open Space Resources	There would be permanent changes affecting access or circulation at Highway 87 Bikeway North, Coyote Creek Trail, and Fisher Creek Trail (Planned).	Same as Alternative 1.	Same as Alternative 1.	There would be permanent changes affecting access or circulation at Highway 87 Bikeway North and Fisher Creek Trail (Planned).
Impact PK#5: Permanent Visual Changes That Could Create a Perceived Barrier to Access or Continued Use of Parks, Recreation, and Open Space Resources	There would be no permanent visual changes that would create a perceived barrier to access or use.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Impact PK#6: Permanent Acquisition of Parks, Recreation, and Open Space Resources	Construction would result in permanent acquisition of portions of seven resources. All parks and trails will remain useable with incorporation of project features and mitigation measures.	Construction would result in permanent acquisition of portions of 10 resources. All parks and trails will remain useable with incorporation of project features and mitigation measures.	Construction would result in permanent acquisition of portions of nine resources. All parks and trails will remain useable with incorporation of project features and mitigation measures.	Construction would result in permanent acquisition of portions of four resources. All parks and trails will remain useable with incorporation of project features and mitigation measures.
School District Play Areas				
Impact PK#9: Temporary Changes from Exposure to Noise, Vibration, and Construction Emissions on Use and User Experience of School District Play Areas	Construction would result in temporary changes from noise, vibration, and emissions on resource use and user experience.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Impact PK#10: Temporary Changes to Access or Use of School District Play Areas	Construction would result in temporary changes to access or use.	Same as Alternative 1.	Same as Alternative 1.	No changes in access would occur.
Impact PK#11: Temporary Visual Changes That Could Create a Perceived Barrier to Access or Continued Use of School Play Areas	Depending on location, viewers could see staging areas, worker parking, and equipment and materials storage areas. Construction of the project would not create a perceived barrier to use.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
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 1.	Same as Alternative 1.	Same as Alternative 1.
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 1.	Same as Alternative 1.	Same as Alternative 1.
Impact PK#14: Permanent Acquisition of School District Play Areas	Construction would result in the partial acquisition of South Valley Middle School (8 percent of the total play area).	Construction would result in the partial acquisition of San Martin/Gwinn Elementary School (1% percent of the total play area) and South Valley Middle School (22 percent of the total play area).	No school district play areas would be affected.	No school district play areas would be affected.
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 as construction proceeds along the length of the HSR alignment, including the use of precast yards for construction of 45.4 miles of viaduct, resulting in the greatest impact.	Construction activities would temporarily degrade visual quality as construction proceeds along the length of the HSR alignment, including the use of precast yards for construction of 20.9 miles of viaduct.	Construction activities would temporarily degrade visual quality as construction proceeds along the length of the HSR alignment, including the use of precast yards for construction of 43.2 miles of viaduct, resulting in a greater impact than Alternatives 2 and 4.	Construction activities would temporarily degrade visual quality as construction proceeds along the length of the HSR alignment, resulting in the least impact.
Impact AVQ#2: 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 baseline visual quality (moderately high) of the area would not be affected, resulting in the least impact.	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 baseline visual quality of the landscape unit would be reduced from moderately high to moderate.	Same as Alternative 2.	Same as Alternative 1.

Resource Category	Construction Impacts under the Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Impact AVQ#3: Permanent Direct Impacts on Visual Quality—Diridon Station Landscape Unit	HSR infrastructure, including aerial structures rising up to 60 feet, would introduce permanent changes to the visual character of the Diridon Landscape Unit, reducing visual quality from moderate to moderately low, predominantly affecting travelers and commercial viewer groups (moderate sensitivity).	Same as Alternative 1	Same as Alternative 1.	Track shifts and platform modifications to allow for HSR service to be blended with Caltrain service would not change the visual quality of the Diridon Landscape Unit, resulting in the least impact.
Impact AVQ#4: Permanent Direct Impacts on Visual Quality—San Jose Station Approach Landscape Unit	HSR infrastructure, including a viaduct rising up to 60 feet, would introduce permanent changes to the existing visual character of the San Jose Station Approach 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.	Same as Alternative 1.	Same as Alternative 1.	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 San Jose Station Approach Landscape Unit, resulting in the least impact.
Impact AVQ#5: Permanent Direct Impacts on Visual Quality—Communications Hill Landscape Unit	The expansion of railway infrastructure and elimination of vegetation between Communications Hill Park and the rail right-of-way in the Communications Hill Landscape Unit (moderately high visual quality) would introduce permanent changes for the residential and recreational viewers (high sensitivity) by visually encroaching upon the park, degrading visual quality at KVP 9. For the entire landscape unit, the effect would be neutral because of few sensitive viewers.	Same as Alternative 1.	Same as Alternative 1.	Track shifts 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 Communications Hill Landscape Unit, resulting in the least impact.
Impact AVQ#6: Permanent Direct Impacts on Visual Quality—Monterey Highway San Jose Landscape Unit	Construction of the HSR viaduct would be visible over existing noise barriers and landscaping that currently shield residential views to Monterey Road and the UPRR/Caltrain tracks and would introduce permanent changes for the residential and recreational (high sensitivity) viewers, resulting in the greatest impact.	Reconstruction of Monterey Road and associated landscaping would improve visual quality from moderate to high in an area with travelers with moderate sensitivity.	Same as Alternative 1.	Track shifts and modifications to the Capitol and Blossom Hill Caltrain Stations to allow for HSR service to be blended with Caltrain service would not change the visual quality of the Monterey Highway San Jose Landscape Unit, resulting in the least impact.
Impact AVQ#7: Permanent Direct Impacts on Visual Quality—Coyote Valley Landscape Unit	Alternative 1 would run on an elevated structure in the median of Monterey Road. Construction of the viaduct would alter the existing visual character of agricultural landscape, degrading the visual quality of the landscape unit from moderately high to moderate for moderately high viewers, resulting in the greatest impact.	Alternative 2 would run at grade in the right-of-way of Monterey Road and require the removal of Keesling’s Shade Trees. Design improvements and landscaping would reduce visual conflicts and maintain the existing visual quality of the landscape, resulting in no impact on visual quality.	Same as Alternative 1.	Track shifts and modifications to allow for HSR service to be blended with Caltrain service would not change the visual quality of the Coyote Valley Landscape Unit, resulting in a lesser impact than Alternatives 1 and 3.
Impact AVQ#8: Permanent Direct Impacts on Visual Quality—US 101 Landscape Unit	Alternative 1 would extend 4.7 miles through the US 101 Landscape Unit (moderate visual quality) predominantly affecting views from travelers along US 101 (moderate viewer sensitivity). Alternative 1 would affect fewer viewers than Alternative 3 because of its shorter length.	Does not pass through the landscape unit; therefore, there would be no impact.	Alternative 3 would extend 5.7 miles through the US 101 Landscape Unit (moderate visual quality), predominantly affecting views from travelers along US 101 (moderate viewer sensitivity). Alternative 3 would affect more viewers because of its longer length, resulting in the greatest impact.	Same as Alternative 2.
Impact AVQ#9: Permanent Direct Impacts on Visual Quality—Morgan Hill—San Martin Landscape Unit	Construction of a viaduct from US 101 to the UPRR/Caltrain corridor south of San Martin would contrast in scale and material with the existing moderate visual character of residential neighborhoods and agricultural land, degrading the visual quality of the landscape unit to moderately low as viewed by moderately sensitive viewers, resulting in a greater impact than Alternatives 3 or 4.	The addition of at-grade tracks along the UPRR/Caltrain corridor would not block distant views, but views would still be restricted across the railway corridor because of grade-separated road over- and undercrossings. In contrast to Alternatives 1 and 3, the at-grade tracks and associated infrastructure would not dominate the local visual environment, degrading the visual quality of the landscape unit from moderate to moderately low as viewed by moderately sensitive viewers. However, impacts would occur along the entire length of the railway corridor, resulting in the greatest impact.	Same as Alternative 1, except Alternative 3 would leave the UPRR/Caltrain corridor for the US 101 corridor south of San Martin on an aerial structure. The deviation in alignment from that described for Alternative 1 would not produce any unique impacts.	Track shifts and modifications to the Morgan Hill and San Martin Caltrain Stations to allow for HSR service to be blended with Caltrain service would increase the visual quality of the Morgan Hill—San Martin Landscape Unit, resulting in the least impact.

Resource Category	Construction Impacts under the Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Impact AVQ#10: Permanent Direct Impacts on Visual Quality—Downtown Gilroy Landscape Unit	Primarily on viaduct up to 50 feet above grade along the UPRR corridor, Alternative 1 would substantially contrast with the established character of residential areas and block views of surrounding hills. Construction of an elevated station at Gilroy would conflict with the historic Gilroy Caltrain Station and Gilroy City Hall, degrading the visual quality of the landscape unit from moderate to moderately low as viewed by viewers with moderately low sensitivity. Because it would use the highest viaduct, it would result in the greatest impacts.	Following the same alignment as Alternative 1, Alternative 2 would run primarily on embankment up to 20 feet above grade, partially blocking views and introducing changes to commercial and residential views. Matching the height of surrounding buildings, the scale of the embankment would not contrast with the existing landscape. However, the elevated HSR station platforms would visually dominate the historic Gilroy Caltrain Station and Gilroy City Hall, degrading the visual quality of the landscape unit from moderate to moderately low as viewed by viewers with moderately low sensitivity, resulting in greater impacts than Alternatives 3 or 4.	Alternative 3 would not pass through the Downtown Gilroy Landscape Unit, resulting in no impact.	Track shifts and modifications to the Gilroy Caltrain Station to allow for HSR service to be blended with Caltrain service would not change the visual quality of the Downtown Gilroy Landscape Unit.
Impact AVQ 11: Permanent Direct Impacts on Visual Quality—Pajaro-San Felipe Landscape Unit	Viaducts to carry the HSR across the Pajaro River, Soap Lake floodplain, and intersecting roadways and embankments connecting the viaducts would introduce views of large-scale infrastructure to the agricultural setting and limit distant views. The South Gilroy MOWF would introduce an industrial use into an agricultural area. These actions would degrade the visual quality of the landscape unit, resulting in the least impact.	Same as Alternative 1.	On viaduct and embankment, Alternative 3 would contrast with the visual setting of existing agricultural areas. The East Gilroy Station and MOWF would contrast with the established character of residential areas, schools, and historic buildings in Old Gilroy and disrupt the existing agricultural setting, degrading visual quality in the landscape unit, resulting in the greatest impact.	Similar to Alternative 1 with the same impact on visual quality.
Impact AVQ#12: Permanent Direct Impacts on Visual Quality—Pacheco Pass Landscape Unit	Viaducts rising up to 60 feet, along with other HSR infrastructure such as tunnel portals and terracing of hillsides, would contrast with the agricultural and open space setting and have an impact on the visual quality of travelers' views, degrading the visual quality of the landscape unit from high to moderately high as viewed by travelers with moderately high sensitivity.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Impact AVQ#13: Permanent Direct Impacts on Visual Quality—San Luis Landscape Unit	Construction of HSR tunnels would not be visible to viewers, resulting in no change to visual quality in the landscape unit.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Impact AVQ#14: Permanent Direct Impacts on Visual Quality—Romero Landscape Unit	Construction of the HSR viaduct would introduce modern infrastructure into a natural setting but would not degrade visual quality in the landscape unit.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Impact AVQ#15: Permanent Direct Impacts on Visual Quality—Henry Miller Landscape Unit	Construction of the HSR viaduct would introduce modern infrastructure into a natural setting, but it would not lower the visual quality in the landscape unit.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Impact AVQ#16: Indirect Impacts on Visual Quality from HSR Stations	Land use development around HSR stations in San Jose and downtown Gilroy would be expected to maintain the existing visual character of the community through implementation of sound design principles in the Authority's "zone of responsibility" around each station, resulting in the least impact.	Same as Alternative 1.	Same as Alternative 1 for the San Jose Diridon Station. Even with application of sound design principles in the "zone of responsibility," land use development around the East Gilroy Station would alter the land use patterns in an agricultural area, thereby degrading the existing visual quality of the area, resulting in no impact on visual quality in the Diridon Station Landscape Unit but in the greatest impact in the Pajaro-San Felipe Landscape Unit.	Same as Alternative 1.
State Scenic Highways				
Impact AVQ#17: Impacts on State Scenic Highways	Where all project alternatives cross I-5, the HSR embankment and grade-separation would be similar to existing highway infrastructure and would not affect the visual quality of the highway. The project would not be visible from SR 152 and would not degrade visual quality in the landscape unit.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.

Resource Category	Construction Impacts under the Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Light and Glare				
Impact AVQ#18: Temporary Direct Impacts on Nighttime Light Levels	Lighting for tunnel portal construction sites in the Pajaro-San Felipe, Pacheco Creek Valley, and Romero Valley Landscape Units would create a new source of substantial light for up to 5 years, reducing visual quality for the duration of construction.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Impact AVQ#19: Permanent Direct Impacts on Nighttime Light Levels at Fixed Locations	Alternative 1 would cause permanent visual impacts from the increase in lighting levels at HSR facilities in rural agricultural settings where existing nighttime light levels are low, including an MOWF south of Gilroy and an MOWS in the San Joaquin Valley, resulting in the least impact.	Same as Alternative 1.	Same as Alternative 1, except an HSR station and an MOWF would be built east of Gilroy and would increase the fixed sources of light in an existing agricultural area with low nighttime light levels, resulting in the greatest impact	Same as Alternative 1.
Impact AVQ#20: Permanent Direct Impacts on Nighttime Light Levels from Trains	Spillover light levels in residential areas would affect highly sensitive residential viewers, especially from trains passing on 45.4 miles of viaducts, degrading visual quality where sensitive viewers are present, resulting in the greatest impact.	Light spillover from viaducts would occur along 20.9 miles of elevated track, degrading visual quality where sensitive viewers are present, resulting in lesser impacts than Alternatives 1 and 3	Light spillover from viaducts would occur along 43.2 miles of elevated track, degrading visual quality where sensitive viewers are present, resulting in a greater impact than Alternatives 2 and 4.	Light from HSR trains in urbanized areas would be similar to existing light from passenger and freights trains, degrading visual quality where sensitive viewers are present, resulting in the least impact.
Cultural Resources				
Archeological Resources				
Impact CUL#1: Permanent Disturbance of Unknown Archeological Sites	Possible as-yet recorded resources damaged or destroyed. Because of limited access to private lands within the APE, all alternatives have the potential to damage previously unidentified archaeological sites prior to construction or buried sites found during construction. Alternative 1 has the third largest amount of archaeologically sensitive acres including land in the existing right-of-way and new acquisition areas: General Sensitivity: 622 acres Buried Sensitivity: 3,251 acres	Possible as-yet recorded resources damaged or destroyed. Because of limited access to private lands within the APE, all alternatives have the potential to damage previously unidentified archaeological sites prior to construction or buried sites found during construction. Alternative 2 has the largest amount of archaeologically sensitive acres including land in the existing right-of-way and new acquisition areas: General Sensitivity: 683 acres Buried Sensitivity: 3,828 acres	Possible as-yet recorded resources damaged or destroyed. Because of limited access to private lands within the APE, all alternatives have the potential to damage previously unidentified archaeological sites prior to construction or buried sites found during construction. Alternative 3 has the second largest amount of archaeologically sensitive acres including land in the existing right-of-way and new acquisition areas: General Sensitivity: 625 acres Buried Sensitivity: 3,386 acres	Possible as-yet recorded resources damaged or destroyed. Because of limited access to private lands within the APE, all alternatives have the potential to damage previously unidentified archaeological sites prior to construction or buried sites found during construction. Alternative 4 has the fewest archaeologically sensitive acres including land in the existing right-of-way and new acquisition areas: General Sensitivity: 568 acres Buried Sensitivity: 2,713 acres
Impact CUL#2: Permanent Disturbance of Known Archeological Sites	25 archaeological sites adversely affected. Of these, 10 completely or partially encompassed; 15 narrow rights-of-way or sliver acquisitions.	31 archaeological sites adversely affected. Of these, 13 completely or partially encompassed; 18 narrow rights-of-way or sliver acquisitions.	28 archaeological sites adversely affected. Of these, 12 completely or partially encompassed; 16 narrow rights-of-way or sliver acquisitions	25 archaeological sites adversely affected. Of these, 10 completely or partially encompassed; 15 narrow rights-of-way or sliver acquisitions
Impact CUL#3: Temporary Public Access and Disturbance of Archeological Resources	None anticipated.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.

Resource Category	Construction Impacts under the Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Historic Built Resources				
Impact CUL#4: Permanent Demolition, Destruction, Relocation, or Alteration of Built Resources or Setting	<p>7 built resources adversely affected. These include: Resource ID 0497; Resource ID 0522; Resource ID 0585; Resource ID 3001; Resource ID 3458; Resource ID 4310; Resource ID 4317</p> <p>Of these, 5 built resources would be demolished, relocated, or destroyed. In most cases demolition or destruction would result from introduction of HSR right-of-way or roadway right-of-way; 1 built resource would experience compromised integrity due to the loss of character-defining features; and the setting of 1 resource would be altered by introduction of HSR right-of-way, which would change the historic context.</p>	<p>11 built resources adversely affected. These include: Resource ID 0141; Resource ID 0497; Resource ID 0522; Resource ID 0585; Resource ID 1863; Resource ID 1909; Resource ID 3001; Resource ID 3402; Resource ID 3458; Resource ID 4310; Resource ID 4317</p> <p>Of these, 7 built resources would be demolished or destroyed. In most cases demolition would result from introduction of HSR right-of-way or roadway right-of-way; 2 built resources would experience compromised integrity due to the loss of character-defining features; and the setting of 2 resources would be altered by introduction of HSR right-of-way, which would change the historic context.</p>	<p>7 built resources adversely affected. These include: Resource ID 0141; Resource ID 0497; Resource ID 0522; Resource ID 0585; Resource ID 3001; Resource ID 4310; Resource ID 4317</p> <p>Of these, 4 built resources would be demolished. In most cases demolition would result from introduction of HSR right-of-way or roadway right-of-way; 1 built resource would experience compromised integrity due to the loss of character-defining features; and the setting of 2 resources would be altered by introduction of HSR right-of-way, which would change the historic context.</p>	<p>5 built resources adversely affected. These include: Resource ID 0497; Resource ID 2127; Resource ID 3458; Resource ID 4310; Resource ID 4317</p> <p>Of these, 3 built resources would be demolished. In most cases demolition would result from introduction of HSR right-of-way or roadway right-of-way; 1 built resource would experience compromised integrity due to the loss of character-defining features; and the setting of 1 resource would be altered by introduction of HSR right-of-way, which would change the historic context.</p>
Impact CUL#5: Temporary Noise and Vibration Impacts on Built Resources Caused by Construction Activities	0 built resources adversely affected.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.

¹ The analysis assumed that project construction would take place from 2018 to 2026. As construction is expected to take place later than these dates, the construction emissions estimates are conservative, as future emissions rates will be lower due to the implementation of cleaner and newer equipment.

² For Section 3.7, permanent conversion and degradation impacts include both temporary and permanent impacts. Refer to Section 3.7 for more information on the ecological impacts of the project on aquatic resources and associated species.

³ Alternative 2 has two design variants: Skyway Drive Variant A is presented first, with Skyway Drive Variant B shown in parentheses.

⁴ LESA scores are not aggregated over an entire alternative, but instead are calculated for the alternative within each county.

ACE = Altamont Corridor Express
 ACM = asbestos-containing material
 ADL = aerially deposited lead
 ALAN = artificial light at night
 APE = area of potential effects
 AREMA = American Railway Engineering and Maintenance-of-Way Association
 BAAQMD = Bay Area Air Quality Management District
 BMP = best management practice
 Btu = British thermal unit
 C.F.R. = Code of Federal Regulations
 CAAQS = California Ambient Air Quality Standards
 Caltrans = California Department of Transportation
 CBC = California Building Code
 CCC = central California coast
 CESA = California Endangered Species Act
 CGP = construction general permit
 CMP = construction management plan
 CO = carbon monoxide
 CO_{2e} = carbon dioxide equivalent

CTP = construction transportation plan
 dBA = A-weighted decibel
 DDV = Diridon design variant
 DPM = diesel particulate matter
 EFH = essential fish habitat
 EMF = electromagnetic frequency
 EMI = electromagnetic interference
 FESA = federal Endangered Species Act
 FHWA = Federal Highway Administration
 GEA = Grasslands Ecological Area
 GHG = greenhouse gas
 HMBP = hazardous materials business plan
 HSR = high-speed rail
 IAMF = impact avoidance and minimization measure
 IBA = Important Bird Area
 kV = kilovolt
 KVP = key viewpoint
 LBP = lead-based paint
 LESA = land evaluation and site assessment

LOS = level of service
 mgd = million gallons per day
 MOWS = maintenance of way siding
 MOWF = maintenance of way facility
 MSAT = mobile source air toxics
 NAAQS = National Ambient Air Quality Standards
 NCCAB = North Central Coast Air Basin
 NO₂ = nitrogen dioxide
 NOA = naturally occurring asbestos
 NO_x = nitrogen oxide
 OSHA = Occupational Health and Safety Administration
 PCB = polychlorinated biphenyl
 PEC = potential environmental concern
 PG&E = Pacific Gas and Electric Company
 PM₁₀ = particulate matter less than or equal to 10 microns in diameter
 PM_{2.5} = particulate matter less than or equal to 2.5 microns in diameter
 RSA = resource study area
 RWQCB = Regional Water Quality Control Board
 SCCC = south central California coast

SCRWA = South County Regional Wastewater Authority
 SCVHP = Santa Clara Valley Habitat Plan
 SFBAAB = San Francisco Bay Area Air Basin
 SIL = significant impact levels
 SJVAB = San Joaquin Valley Air Basin
 SO₂ = sulfur dioxide
 SSMP = safety and security management plan
 SWPPP = stormwater pollution prevention plan
 TCE = temporary conservation easement
 TDV = tunnel design variant
 TPSS = traction power substation
 UPRR = Union Pacific Railroad
 US = U.S. Highway
 VMT = vehicle miles traveled
 VOC = volatile organic compounds
 WCA = wildlife corridor assessment
 WWTP = wastewater treatment plant

Table S-4 Comparison of Operations Impacts by Alternative

Resource Category	Operations Impacts under the Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Transportation				
Roadways, Freeways, and Intersections				
Impact TR#6: Continuous Permanent Congestion/Delay Consequences on Freeway Operations	A lane reduction along Monterey Road would affect two freeway segments along US 101 in southern San Jose from congestion.	Same as Alternative 1	Same as Alternative 1	No lane reduction along Monterey Road. Less traffic would shift to US 101 than under the other project alternatives and no freeway segments would be affected.
Impact TR#7: Permanent Continuous Congestion/Delay Consequences on Intersection Operations	Increased project extent traffic and changes to the roadway network would affect 46 intersections operating at LOS E or F in 2029 and 49 intersections in 2040 in the San Jose Station Approach, Monterey Corridor, and Morgan Hill and Gilroy Subsections. With the proposed mitigation, this will be reduced to 23 intersections operating at LOS E or F in 2040 in the San Jose Diridon Station Approach and Monterey Corridor Subsections.	Increased project extent traffic and changes to the roadway network would affect 49 intersections operating at LOS E or F in 2029 and 55 intersections in 2040, resulting in the most intersection operations effects of the four alternatives. With the proposed mitigation, this will be reduced to 24 intersections operating at LOS E or F in 2040 in the San Jose Diridon Station Approach, Monterey Corridor, and Morgan Hill and Gilroy Subsections.	Increased project extent traffic and changes to the roadway network would affect 41 intersections operating at LOS E or F in 2029 and 44 intersections in 2040. With the proposed mitigation, this will be reduced to 23 intersections operating at LOS E or F in 2040 in the San Jose Diridon Station Approach and Monterey Corridor Subsections.	Increased project extent traffic and changes to the roadway network would affect 27 intersections operating at LOS E or F in 2029 and 32 intersections in 2040 in the San Jose Station Approach, Monterey Corridor, and Morgan Hill and Gilroy Subsections. With the proposed mitigation, this will be reduced to 22 intersections operating at LOS E or F in 2040 in San Jose Diridon Station Approach, Monterey Corridor, and Morgan Hill and Gilroy Subsections.
Parking				
Impact TR#9: Permanent Effects Related to Parking	No permanent loss of parking would occur related to the San Jose Diridon Station or Downtown Gilroy Station. 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. Projected parking demands would be met by project parking facilities at the Downtown Gilroy Station.	Same as Alternative 1	Same as Alternative 1 for San Jose Diridon Station and SAP Center. For East Gilroy Station, all parking demands would be met by project parking facilities.	Permanent displacement of parking spaces near San Jose Diridon Station/SAP Center would also be replaced on a 1:1 basis.
Transit				
Impact TR#13: Continuous Permanent Impacts on Bus Services	10 high-frequency bus routes in the San Jose Diridon Station area, along Monterey Road and in the Downtown Gilroy Station area would be delayed because of project-related trips and roadway network changes.	Same as Alternative 1	10 high-frequency bus routes in the San Jose Diridon Station area and along Monterey Road would be delayed because of project-related trips and roadway network changes.	10 high-frequency bus routes in the San Jose Diridon Station area, along Monterey Road and in the Downtown Gilroy Station area would be delayed because of project-related trips and roadway network changes. This alternative would have the most impacts because of additional delays on at-grade crossings.
Impact TR#14: Continuous Permanent Impacts on Passenger Rail and Bus Access	Passenger rail and bus access will be accommodated by project design and project features. The project would not affect the performance of these services.	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1
Impact TR#15: Continuous Permanent Impacts on Transit Ridership	Transit ridership would increase but would not hinder service by other transit providers or be inconsistent with transit plans and policies.	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1
Impact TR#16: Continuous Permanent Impacts on Passenger Rail System Capacity	Caltrain average service times would increase slightly from the blending of service with HSR between Scott Boulevard and I-880, but a regular interval schedule would be maintained. The project would not materially decrease the performance of passenger rail services.	HSR would only operate on dedicated tracks and would not affect other passenger rail service capacity.	Same as Alternative 2	Same as Alternative 1 for blending with Caltrain north of Diridon. Blending service with Caltrain south of Diridon would not impair existing capacity.
Nonmotorized Travel				
Impact TR#19: Continuous Permanent Impacts on Pedestrian and Bicycle Access	Operations would introduce nonmotorized trips around station areas, but the project would be designed to maintain or enhance pedestrian and bicycle access, providing safe and accessible facilities.	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1

Resource Category	Operations Impacts under the Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Freight Rail Service				
Impact TR#21: Continuous Permanent Impacts on Freight Rail Capacity	Shared track with freight between Scott Boulevard and CP Coast would result in disruptions to freight service and would result in temporal displacement but would not likely divert freight rail service to other modes.	This alternative would not include any shared track and would have no impact on freight service because of sharing of track.	Same as Alternative 2	Same as Alternative 1 for shared track with freight between Scott Blvd. and CP Coast. Freight would have separate track south of CP Coast and capacity would be maintained
Impact TR#22: 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 between CP Coast and Scott Boulevard	The project would not include any shared tracks with freight and thus would have no impacts related to the OCS and freight heights.	Same as Alternative 2	Same as Alternative 1
Noise and Vibration				
Noise¹				
Impact NV#2: Intermittent Permanent Exposure of Sensitive Receptors to Noise from Train Operations	Permanent noise impacts from 2029 Plus Project conditions: <ul style="list-style-type: none"> 310 (313) moderate noise impacts 47 (51) severe noise impacts Permanent noise impacts from 2040 Plus Project conditions: <ul style="list-style-type: none"> 1,200 (1,195) moderate noise impacts 337 (347) severe noise impacts 	Permanent noise impacts from 2029 Plus Project conditions: <ul style="list-style-type: none"> 599 (601) moderate noise impacts 38 (43) severe noise impacts Permanent noise impacts from 2040 Plus Project conditions: <ul style="list-style-type: none"> 1,844 (1,838) moderate noise impacts 755 (766) severe noise impacts 	Permanent noise impacts from 2029 Plus Project conditions: <ul style="list-style-type: none"> 227 (233) moderate noise impacts 34 (37) severe noise impacts Permanent noise impacts from 2040 Plus Project conditions: <ul style="list-style-type: none"> 834 (845) moderate noise impacts 222 (233) severe noise impacts 	Permanent noise impacts from 2029 Plus Project conditions: <ul style="list-style-type: none"> 1,001 (1,004) moderate noise impacts 190 (197) severe noise impacts Permanent noise impacts from 2040 Plus Project conditions: <ul style="list-style-type: none"> 1,666 (1,658) moderate noise impacts 1,212 (1,224) severe noise impacts
Impact NV#3: Intermittent Permanent Exposure of Sensitive Receptors to Noise from HSR Passenger Station Parking	Noise contribution from parking facilities: <ul style="list-style-type: none"> 29 dBA L_{dn} at San Jose Diridon Station 40 dBA L_{dn} at the Downtown Gilroy Station This additional noise would be substantially lower than noise from HSR trains.	Same as Alternative 1	Noise contribution from parking facilities: <ul style="list-style-type: none"> 29 dBA L_{dn} at San Jose Diridon Station 28 dBA L_{dn} at the East Gilroy Station This additional noise would be substantially lower than noise from HSR trains.	Same as Alternative 1
Impact NV#4: Intermittent Permanent Exposure of Sensitive Receptors to Noise from HSR Maintenance Facilities	40 dBA L _{dn} contribution from train movements at the South Gilroy MOWF, which is substantially lower than the noise from operating HSR trains. No additional impact is projected.	Same as Alternative 1	47 dBA L _{dn} contribution from train movements at the East Gilroy MOWF, which is substantially lower than the noise from operating HSR trains. No additional impact is projected.	45 dBA L _{dn} contribution from train movements at the Alternative 4 South Gilroy MOWF, which is substantially lower than the noise from operating HSR trains. No additional impact is projected.
Impact NV#5: Intermittent Permanent Human Annoyance from Onset of Passing HSR Trains	Operations would not cause human annoyance from the startle effect of HSR train passbys within dedicated sections of the alignment because the threshold for sudden onset noise would occur within the right-of-way, which would be fenced to prohibit public access.	Same as Alternative 1	Same as Alternative 1	Operations would cause initial human annoyance from the startle effect of HSR train passbys at one location within 23 feet of the tracks in Morgan Hill. Effects south and east of Gilroy would be the same as Alternative 1.
Impact NV#6: Permanent Exposure of Sensitive Receptors to Vehicular Traffic Noise Increases	Roadway segments with an anticipated increase in traffic noise of ≥3 dB compared to existing conditions include: <p>2029 Plus Project conditions</p> <ul style="list-style-type: none"> 4 segments near San Jose 2 segments along Monterey Road 1 segment near South Gilroy MOWF <p>2040 Plus Project conditions</p> <ul style="list-style-type: none"> 5 segments near San Jose 6 segments along Monterey Road 1 segment near South Gilroy MOWF 	Same as Alternative 1	Roadway segments with an anticipated increase in traffic noise of ≥3 dB compared to existing conditions include: <p>2029 Plus Project conditions</p> <ul style="list-style-type: none"> 4 segments near San Jose 2 segments along Monterey Road <p>2040 Plus Project conditions</p> <ul style="list-style-type: none"> 5 segments near San Jose 6 segments along Monterey Road 1 segment near East Gilroy MOWF 	Roadway segments with an anticipated increase in traffic noise of ≥3 dB compared to existing conditions include: <p>2029 Plus Project conditions</p> <ul style="list-style-type: none"> 3 segments near San Jose 3 segments along Monterey Road <p>2040 Plus Project conditions</p> <ul style="list-style-type: none"> 4 segments near San Jose 6 segments along Monterey Road 1 segment near Downtown Gilroy Station 1 segment near South Gilroy MOWF
Impact NV#7: Intermittent Permanent Livestock Stress from Passing HSR Trains	Livestock within 30 feet from the edge of the HSR right-of-way would experience stress associated with exposure to noise levels above the recommended thresholds.	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1. Also, livestock at two locations between San Jose and Gilroy within 65 feet of edge of HSR right-of-way would experience stress associated with exposure to noise levels from sounding of HSR horns.

Resource Category	Operations Impacts under the Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Impact NV#8: Permanent Exposure of Sensitive Receptors to Traction Power Facility Noise	The substation facilities would generate noise, but would not cause additional noise impacts beyond those from trains and horns.	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1
Vibration				
Impact NV#10: Intermittent Permanent Exposure of Sensitive Receptors to Vibration from Operations	81 permanent vibration impacts (before mitigation); potential to reduce all or most of these impacts to below the threshold with mitigation.	143 permanent vibration impacts (before mitigation); potential to reduce all or most of these impacts to below the threshold with mitigation.	140 permanent vibration impacts (before mitigation); potential to reduce all or most of these impacts to below the threshold with mitigation.	1,203 permanent vibration impacts (before mitigation); potential to reduce all but 15 of these impacts to below the threshold with mitigation.
EMF and EMI				
Impact EMF/EMI#2: Permanent Human Exposure to EMFs	HSR operations would expose the general public and HSR employees and passengers to EMF inside and outside the HSR system. Inside the HSR system, EMF exposure levels would be below the most restrictive MPE limits. Outside the HSR system, EMF levels would not exceed the MPE thresholds for humans.	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1 without the design variants. With the design variants, HSR train operations would generate slightly higher EMFs in the DDV and TDV areas than the alternatives without the DDV and TDV.
Impact EMF/EMI#3: Exposure of People with Implanted Medical Devices to EMFs	EMF levels generated inside traction power distribution and interconnection facilities and produced by emergency standby generators would be above the recommended limits for people with implanted medical devices. However, the public and workers with implanted medical devices would be restricted from accessing these facilities.	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1
Impact EMF/EMI#4: Livestock and Poultry Exposure	Several studies documented that EMFs do not affect livestock or poultry productivity and would therefore not disrupt nearby agricultural activities. The three livestock and poultry operations in the RSA would be unaffected by operation of HSR trains.	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1
Impact EMF/EMI#5: Interference with Sensitive Equipment	The RSA includes one facility with sensitive equipment; however, this facility would not be exposed to a magnetic shift greater than 2 mG.	The RSA includes three facilities with sensitive equipment, two of which would be exposed to a magnetic shift greater than 2 mG. The Authority would coordinate with third parties to identify sensitive equipment at the known receptors and, if necessary, identify appropriate mitigation, including performing tests to confirm equipment is not adversely affected.	The RSA includes two facilities with sensitive equipment, although neither would be exposed to a magnetic shift greater than 2 mG.	The RSA includes three facilities with sensitive equipment, two of which would be exposed to a magnetic shift greater than 2 mG. Coordination with third parties would be the same as under Alternative 2.
Impact EMF/EMI#6: EMI Effects on Schools	Dedicated frequency blocks for the HSR system and compliance with FCC regulations for all HSR equipment would not generate interference at the 12 schools within the Alternative 1 RSA.	Same as Alternative 1 for the 15 schools within the Alternative 2 RSA.	Same as Alternative 1 at the 11 schools within the Alternative 3 RSA.	Same as Alternative 1 at the 15 schools within the Alternative 4 RSA.
Impact EMF/EMI#7: Potential for Corrosion of Underground Pipelines and Cables and Adjoining Rail	The project would ground adjacent ungrounded linear metal structures or insulate metallic pipes to prevent current flow that could result in corrosion.	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1
Impact EMF/EMI#8: Potential for Nuisance Shocks	The project would ground nearby ungrounded linear metal structures or insulate purposely electrified fences to prevent current flow.	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1
Impact EMF/EMI#9: Effects on Adjacent Existing Rail Lines	There are 24.4 miles of parallel UPRR track susceptible to EMI impacts under Alternative 1. Project features include working with the engineering departments of adjacent parallel railroads to modify or upgrade their signal systems to prevent interference from HSR generated EMI.	There are 31.4 miles of parallel UPRR track susceptible to EMI impacts under Alternative 2. Project features would be the same as Alternative 1.	There are 16.4 miles of parallel UPRR track susceptible to EMI impacts under Alternative 3. Project features would be the same as Alternative 1.	There are 33.0 miles of parallel UPRR track susceptible to EMI impacts under Alternative 4. Project features would be the same as Alternative 1.

Resource Category	Operations Impacts under the Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Impact EMF/EMI#10: EMI Effects on Airports	The project alternatives would pass within 1,600 feet of San Jose International Airport and within 1,400 feet of San Martin Airport. HSR communications equipment would use dedicated frequency allocations, and relevant FAA engineering offices would be consulted during project design to confirm no interference.	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1
Public Utilities and Energy				
Impact PUE#8: Continuous Permanent Impacts from Water Use	Operations would consume 224,200 gpd including operation of stations and maintenance facilities. Project features will effectively recycle and reuse water where possible and reduce overall consumption	Same as Alternative 1.	Operations would consume 223,800 gpd; East Gilroy Station water consumption would be approximately 500 gpd less than for the Downtown Gilroy Station. Other water consumption would be the same as Alternative 1.	Same as Alternative 1.
Impact PUE#9: Continuous Permanent Impacts from Wastewater Generation	Operations would generate 224,200 gpd of wastewater including the operation of stations and maintenance facilities. Wastewater would be disposed of properly and handled safely and would not exceed the available treatment capacity of local wastewater facilities.	Same as Alternative 1.	Operations would generate 223,800 gpd of wastewater; East Gilroy Station wastewater generation would be approximately 500 gpd less than for the Downtown Gilroy Station. Other wastewater generation would be the same as Alternative 1.	Same as Alternative 1.
Impact PUE#10: Continuous Permanent Impacts on Storm Drainage Facilities	The impact on stormwater drainage facilities would not require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.	Same as for Alternative 1	Same as for Alternative 1	Same as for Alternative 1
Impact PUE#11: Continuous Permanent Generation of Solid Waste and Hazardous Waste	Operations would generate approximately 2,560 cubic yards of solid waste annually. Solid waste and hazardous waste generation from operations would not exceed available disposal capacity.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Energy				
Impact PUE#13: Continuous Permanent Impacts from Energy Consumption during Operations	Operations would result in a net decrease in regional energy consumption of 6,335,230 MMBtu per year for medium ridership scenario and a net decrease of 6,709,070 MMBtu per year for the high ridership scenario in 2040. It would take approximately 7.6 years and 6.4 years of regional energy reductions to recoup the energy consumed during construction under the medium and high ridership scenarios, respectively.	Same as Alternative 1, with the exception of the payback period for construction energy, which would be 9.6 and 8.1 years under the medium and high ridership scenarios, respectively.	Same as Alternative 1, with the exception of the payback period for construction energy, which would be 8.0 and 6.8 years under the medium and high ridership scenarios, respectively.	Same as Alternative 1, with the exception of the payback period for construction energy, which would be 9.8 and 8.3 years under the medium and high ridership scenarios, respectively.
Biological Resources				
Special-Status Species				
Impact BIO#31: Intermittent Disturbance or Degradation of Habitat for Special-Status Plants during Operations	O&M activities may occasionally remove or disturb and degrade habitat for special-status plants in and adjacent to the project footprint. Annual WEAP training for maintenance personnel would minimize intermittent direct and indirect impacts on special-status plants under Alternative 1.	Impacts under Alternative 2 would be the same as under Alternative 1. There are no special-status plant species or activity types unique to one alternative; all have the same potential to result in intermittent direct and indirect impacts.	Impacts under Alternative 3 would be the same as under Alternative 1. There are no special-status plant species or activity types unique to one alternative; all have the same potential to result in intermittent direct and indirect impacts.	Impacts under Alternative 4 would be the same as under Alternative 1. There are no special-status plant species or activity types unique to one alternative; all have the same potential to result in intermittent direct and indirect impacts.

Resource Category	Operations Impacts under the Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Impact BIO#32: Intermittent Disturbance or Degradation of Habitat for Special-Status Wildlife during Operations	O&M activities may occasionally remove or disturb habitat for special-status wildlife in and adjacent to the project footprint. Impacts would be the same as during construction but would occur where activities were conducted in or adjacent to modeled habitat. Annual environmental awareness training for maintenance personnel would minimize intermittent direct and indirect impacts on special-status wildlife under Alternative 1. Operations effects on special-status wildlife individuals (i.e., injury or mortality) are addressed in the discussion of effects on wildlife movement.	Impacts under Alternative 2 would be the same as under Alternative 1. There are no special-status wildlife species or activity types unique to one alternative; all have the same potential to result in intermittent direct and indirect impacts.	Impacts under Alternative 3 would be the same as under Alternative 1. There are no special-status wildlife species or activity types unique to one alternative; all have the same potential to result in intermittent direct and indirect impacts.	Impacts under Alternative 4 would be the same as those under Alternative 2. There are no special-status wildlife species or activity types unique to one alternative; all have the same potential to result in intermittent direct and indirect impacts.
Non-Special-Status Species				
Operations impacts on non-special-status species are addressed in the discussion of impacts on wildlife corridors.				
Special-Status Plant Communities				
Impact BIO#36: Intermittent Disturbance Degradation of Special-Status Plant Communities during Operations	O&M activities may occasionally remove or disturb and degrade special-status plant communities in and adjacent to the project footprint. Annual environmental awareness training for maintenance personnel would minimize intermittent direct and indirect impacts on special-status plant communities under all alternatives.			
Aquatic Resources				
Impact BIO#39: Intermittent Disturbance and Degradation of Aquatic Resources during Operations	O&M activities may occasionally remove or disturb and degrade aquatic resources in and adjacent to the project footprint. Annual environmental awareness training for maintenance personnel would minimize intermittent direct and indirect impacts on aquatic resources under all alternatives.			
Protected Trees				
Impact BIO#41: 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.			
Wildlife Corridors				
Impact BIO#44: Intermittent Noise Disturbance of Wildlife Using Corridors during Operations	Noise from project operations could disturb and startle birds, particularly in the UPR and GEA IBAs, as well as cause varying degrees of hearing damage, leading to impacts on bioenergetic and reproductive success, as well as increasing the risk of train strike. Increasing the speeds from 200 mph to 220 mph in the Soap Lake area, as facilitated by the TDV, would increase the distances to the various effect thresholds for bird noise impacts. Additionally, noise would contribute to masking of acoustic information for terrestrial wildlife species, including mountain lion, Fresno kangaroo rat, and San Joaquin kit fox, leading to reduced habitat suitability.	Impacts under Alternative 2 would be the same as under Alternative 1 because both would have the same alignment and profile in the IBAs and within areas where terrestrial wildlife habitat is the most suitable.	Impacts under Alternative 3 would be greater than under the other alternatives because Alternative 3 would traverse more of the Soap Lake 10-year floodplain.	Impacts under Alternative 4 would be similar to but slightly greater than those under Alternatives 1 and 2 because of the presence of the MOWF at the edge of the Soap Lake 10-year floodplain.
Impact BIO#45: Intermittent Vibration Disturbance of Wildlife Using Corridors during Operations	Vibration associated with project operations are likely to have the greatest impacts on reptiles and amphibians because of their sensitivity to ground movement; however, vibration is not anticipated to result in substantial or long-lasting impacts. The impact would be most pronounced in at-grade portions of the alignment.	Impacts under Alternative 2 would be greater than those under Alternatives 1 and 3 because more of the alignment would be at grade.	Impacts under Alternative 3 would be similar to but greater than those under Alternative 1 because, while Alternative 3 would be on aerial structure in many of the same areas as Alternative 1, it would also cross more land conserved to protect movement corridors, including the Santa Cruz Mountains to Diablo Range wildlife linkage.	Impacts under Alternative 4 would be similar to those under Alternative 2 because of their similar use of at-grade and embankment profiles.

Resource Category	Operations Impacts under the Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Impact BIO#46: Intermittent Visual Disturbance of Wildlife Using Corridors during Operations	Moving trains could alter movement patterns of mammalian species due to visual stimuli associated with passing trains or maintenance activities. Moving trains may also cause visual cues, which cause animals to temporarily or permanently avoid an area. Moving trains could also increase stress and provoke flight in birds using nearby habitat, resulting in altered behavior and physiological consequences, as well as possible nest abandonment. The GEA and the Soap Lake 10-year floodplain are the two areas most susceptible to these impacts.	Impacts under Alternative 2 would be the same as those under Alternative 1.	Impacts under Alternative 3 would be greater than those under the other three alternatives because it would traverse more of the Soap Lake 10-year floodplain.	Impacts under Alternative 4 would be the same as those under Alternatives 1 and 2.
Impact BIO#47: Intermittent and Permanent Lighting Disturbance of Wildlife and Wildlife Using Corridors during Operations	Nighttime lighting, including light from passing trains, could disturb wildlife attempting to move through or across the alignment. The impact would be most marked in areas with low existing light levels, especially where the alignment would be at grade.	Impacts under Alternative 2 would be similar to those under Alternative 1. Although more of Alternative 2 would be at grade, these portions would be in existing transportation corridors where light levels are already high.	Impacts under Alternative 3 would be greater than under the other three alternatives because it would cross agricultural areas east of Gilroy at grade, would cross more of the Santa Cruz Mountains to Diablo Range wildlife linkage, and would include the East Gilroy MOWF and Station in areas that currently experience low light levels.	Impacts under Alternative 4 would be the same as those under Alternative 2.
Impact BIO#48: Mortality Resulting from Train Strike during Operations	Train strike is likeliest to cause mortality of terrestrial wildlife species along at-grade portions of the alignment. Alternative 1 would pose the lowest risk of train strike to terrestrial movement guilds because of the amount that would be on aerial structure. All profiles present risk of train strike to the aerial movement guild, although some focal groups are more susceptible to at-grade profiles, while others are more susceptible to elevated portions of the alignment.	Impacts under Alternative 2 would be greater than those under Alternative 1 because of the amount of the alignment at grade and on embankment.	Alternative 3 would present the greatest risk of train strike because, while much of it, like Alternative 1, would be on aerial structure, it would also cross through agricultural lands east of Gilroy at grade and would travel more closely to Coyote Creek than the other alternatives.	Impacts under Alternative 4 would be the same as those under Alternative 2.
Impact BIO#49: Injury and Mortality Resulting from Power Line Strike during Operations	Risk of power line strike would be ubiquitous along the alignment because of the consistent presence of electrical infrastructure. Alternative 1 could pose a greater risk to burrowing owls at San Jose International Airport, and would follow Coyote Creek for a greater distance than Alternatives 2 and 4.	Impacts under Alternative 2 would be similar to those under Alternative 1, except that there would be lesser risk to burrowing owls near the San Jose International Airport.	Impacts under Alternative 3 would be similar, although the distribution of the most severe risks would differ: Alternative 3 would cross less of the UPR IBA, although more of that distance would be in the Soap Lake 10-year floodplain, the area of most intensive bird use.	Impacts under Alternative 4 would be the same as those under Alternative 2.
Impact BIO#50: Mortality resulting from Entrapment in OCS Poles during Operations	The project is expected to avoid direct impacts from entrapment in OCS poles by design features that will preclude access to the poles.			
Conservation Areas				
Impact BIO#52: Introduction of Invasive Species or Contaminants into Conservation Areas during Operations	The project could have indirect impacts on conservation areas in all subsections. Routine inspections and maintenance of the HSR right-of-way could introduce contaminants from spills and invasive nonnative species to adjacent lands, degrading habitat for special-status species, special-status plant communities, aquatic resources, and wildlife corridors. All project alternatives would be similar in their potential to cause these impacts; however, Alternative 3 would result in the most permanent impacts and, by extrapolation, the most indirect impacts during the operations period.			
Hydrology and Water Resources				
Surface Water Hydrology				
Impact HYD#3: Impacts on Drainage Patterns and Stormwater Runoff from Intermittent Maintenance Activities during Operations	Operations and maintenance activities would result in minimal intermittent changes to drainage patterns and stormwater runoff. Approximately 172 waterbodies would be affected by bridge and culvert maintenance, vegetation management, and other operations conducted near waterbodies during intermittent maintenance activities. The application of BMPs, a SWPPP under the IGP, and an operations and maintenance plan under the Phase II MS4 permit would minimize potential impacts.	Impacts under Alternative 2 would be similar to Alternative 1; however, operations and maintenance would affect two more waterbodies (174).	Impacts under Alternative 3 would be similar to Alternative 1; however, operations and maintenance would affect three fewer waterbodies (169).	Impacts under Alternative 4 would be similar to Alternative 1; however, operations and maintenance would affect seven fewer waterbodies (165).

Resource Category	Operations Impacts under the Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Surface Water Quality				
Impact HYD#6: Impacts on Surface Water Quality from Intermittent Maintenance Activities during Operations	Station and maintenance facility activities, including train and materials storage, would result in minimal changes to surface water quality. Bridge and culvert maintenance and vegetation management would result in minimal impacts on surface water quality during intermittent maintenance activities. These activities would occur in or near 172 waterbodies. The design of stations and maintenance facilities, a SWPPP under the IGP, and an operations and maintenance plan under the Phase II MS4 permit would minimize potential impacts under Alternative 1.	Impacts under Alternative 2 would be similar to Alternative 1; however, operations and maintenance activities would occur in two more waterbodies (174).	Impacts under Alternative 3 would be similar to Alternative 1; however, operations and maintenance activities would occur in three fewer waterbodies (169).	Impacts under Alternative 4 would be similar to Alternative 1; however, operations and maintenance activities would occur in seven fewer waterbodies (165).
Impact HYD#7: Impacts on Surface Water Quality during Continuous Operations	Brake dust, PAHs, and other contaminants released by trains during ongoing operation of the rail would be deposited in 161 waterbodies. However, the electrical train technology with regenerative braking proposed for the HSR system and a stormwater management and treatment plan would minimize potential water quality impacts from brake dust and other contaminants to the maximum extent practicable using the best available technology.	Impacts under Alternative 2 would be similar to Alternative 1; however, brake dust and other contaminants would be deposited in three more waterbodies (164).	Impacts under Alternative 3 would be similar to Alternative 1; however, brake dust and other contaminants would be deposited in three fewer waterbodies (158).	Impacts under Alternative 4 would be similar to Alternative 1; however, brake dust and other contaminants would be deposited in nine fewer waterbodies (152).
Groundwater				
Impact HYD#12: Impacts on Groundwater Quality and Volume from Intermittent Maintenance Activities during Operations	There are new impervious surfaces, such as the Downtown Gilroy Station, that would be within groundwater recharge zones; however, operations and maintenance activities would minimally affect groundwater quality during intermittent maintenance activities. These activities would also not require dewatering, pumping, or other activities that would affect groundwater volume. The design of stations, maintenance facilities, a SWPPP under the IGP, and project features regarding the management, transport, and disposal of waste and materials will minimize impacts on groundwater quality.	Impacts under Alternative 2 would be the same as Alternative 1, because these alternatives would use the same stations, South Gilroy MOWF, and MOWS.	Impacts under Alternative 3 would be similar to Alternative 1 because the East Gilroy MOWF is in the same groundwater subbasin (Llagas Area) as the South Gilroy MOWF.	Impacts under Alternative 4 would be similar to Alternative 1 because the South Gilroy MOWF under Alternative 4 is in a different location in the Llagas Area subbasin than the MOWF in Alternative 1.
Impact HYD#13: Impacts on Groundwater Quality and Volume during Continuous Operations	Brake dust, PAHs, and other contaminants emitted by trains would minimally affect groundwater quality during operations and continuous dewatering of tunnels is not anticipated. The electrical train technology with regenerative braking proposed for the HSR system would not generate many pollutants and a stormwater management and treatment plan would reduce the potential for brake dust to percolate into groundwater aquifers using the best available technology.	Impacts under Alternative 2 would be similar to Alternative 1; brake dust would be deposited in different locations because of different track alignments between San Jose and Gilroy.	Impacts under Alternative 3 would be similar to Alternative 1; brake dust would be deposited in different locations because of different track alignments between San Jose and Gilroy.	Impacts under Alternative 4 would be similar to Alternative 1; brake dust would be deposited in different locations because of different track alignments between San Jose and Gilroy.
Floodplains				
Impact HYD#16: Impacts on Floodplain Hydraulics from Intermittent Maintenance Activities during Operations	Operations and maintenance activities would require intermittent activities in floodplains delineated by FEMA, including maintaining the flood control basin at the South Gilroy MOWF. Potential impacts would be minimized by monitoring weather forecasts for intense storms and flood conditions.	Impacts under Alternative 2 would be similar to Alternative 1; however, different floodplains would be affected by a larger footprint and by different alignments in the Morgan Hill and Gilroy Subsection.	Impacts under Alternative 3 would be similar to Alternative 1; however, different floodplains would be affected by different alignments in the Morgan Hill and Gilroy Subsection, including a flood control system for Dexter, San Ysidro, and Jones (Furlong) Creeks at the East Gilroy MOWF.	Impacts under Alternative 4 would be similar to Alternative 1; however, different floodplains would be affected by different alignments in the Morgan Hill and Gilroy Subsection and a smaller footprint.
Geology, Soils, Seismicity, and Paleontological Resources				
Impact GEO#11: Regional Ground Subsidence during Operations	Project features will minimize direct and indirect risks to life and property from differential ground movement resulting from ground subsidence by monitoring and maintaining the integrity of the track during operations.	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1

Resource Category	Operations Impacts under the Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Impact GEO#12: Primary Seismic Hazards during Operations	Project features will minimize direct and indirect risks to life and property from surface fault rupture and ground shaking during operations. These project features include using seismic design standards in the structural design, use of early warning systems that would be triggered by strong ground motion, and shutting down train operations during or after an earthquake.	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1
Impact GEO#13: Secondary Seismic Hazards during Operations	Project features will minimize direct and indirect risks to life and property resulting from ground deformation from secondary seismic hazards during operations. These project features include conforming to design guidelines specified by relevant transportation and building agencies such as AREMA, FHWA, and Caltrans, as well as long-term monitoring and maintenance.	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1
Paleontological Resources				
Impact GEO#15: Destruction of Paleontological Resources during Operations	Operation of the project would not affect geologic units identified as having high or undetermined paleontological potential.	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1
Hazardous Materials and Waste				
Impact HMW#11: Temporary and Intermittent Impacts from 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 maintenance facilities, which would have relevant BMPs in place to contain all hazardous materials and wastes within the maintenance facility.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Hazardous Material and Waste Impacts on Sensitive Receptors				
HMW#13: Intermittent Direct Impacts from Hazardous Materials and Wastes Activities in Proximity to Schools during Operation	Project operations would occur within 0.25 mile of 43 schools. As the HSR is planned as a passenger train, it is anticipated that only small quantities of hazardous materials would be transported during operations and that highest use of such materials would take place at maintenance facilities. Implementation of the materials storage procedures as outlined in the HMBP will limit the extent of any spilled material within a storage area to that storage facility.	Similar to Alternative 1, but operations would occur within 0.25 mile of 47 schools.	Similar to Alternative 1, but operations would occur within 0.25 mile of 41 schools.	Similar to Alternative 1, but operations would occur within 0.25 mile of 40 schools.
Safety and Security				
Emergency Response and Services				
Impact S&S#3: Permanent Impacts on Emergency Access and Response Times from Permanent Roadway and Highway Closures, Relocations, and Modifications	Travel time on Monterey Road would increase between Capitol Expressway and Bernal Road by 0 to 12 minutes in AM peak hours and 6 to 8 minutes in PM peak hours depending on the direction of travel, resulting in delays in emergency vehicle access and response time.	Travel time on Monterey Road would increase between Capitol Expressway and Bernal Road by 6 to 8 minutes in AM peak hours and by 2 to 12 minutes in PM peak hours depending on the direction of travel, resulting in delays in emergency vehicle access and response time.	Same as Alternative 1	Travel time on Monterey Road would not increase because of roadway modifications. However, because of additional gate down time, travel times between Bernal and Capitol Expressway would increase by less than 1 minute in AM peak hours, and 4 to 8 minutes in PM peak hours depending on the direction of travel, resulting in delays in emergency vehicle access and response time.

Resource Category	Operations Impacts under the Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Impact S&S#4: Continuous Permanent Impacts on Emergency Access and Response Times	Traffic generated by HSR riders at the San Jose Diridon Station and the Downtown Gilroy Station would result in an increase in emergency vehicle response times by 30 seconds or more. Travel time on Monterey Road would increase between Capitol Expressway and Bernal Road by 6 to 8 minutes in AM peak hours and 11 to 20 minutes in PM peak hours depending on the direction of travel, resulting in delays in emergency vehicle access and response time. These increases would be as a result of roadway modifications on Monterey Road. No delay because of additional gate down time.	Station traffic effects would be the same as Alternative 1. Travel time on Monterey Road would increase between Capitol Expressway and Bernal Road by 16 to 26 minutes in AM peak hours and by 5 to 17 minutes in PM peak hours depending on the direction of travel, resulting in delays in emergency vehicle access and response time. These increases would be as a result of roadway modifications on Monterey Road Same as Alternative 1.	Same as Alternative 1 except this alternative would not have station traffic effects on emergency vehicle response times relative to the East Gilroy Station.	Traffic generated by HSR riders at the San Jose Diridon Station and the Downtown Gilroy Station would result in an increase in emergency vehicle response times by 30 seconds or more. Additional gate down time would increase emergency vehicle response by 30 seconds or more in the Monterey Corridor and Morgan Hill and Gilroy Subsections. Travel time on Monterey Road would not increase because of roadway modifications. However, because of additional gate down time, travel times between Bernal and Capitol Expressway would increase by less than 1 minute in AM peak hours, and 4 to 8 minutes in PM peak hours depending on the direction of travel, resulting in delays in emergency vehicle access and response time.
Community Safety and Security				
Impact S&S#8: Permanent Exposure to Traffic Hazards	The project would result in 17 permanent local road closures and 27 permanent local road realignments. The project would construct overpasses and underpasses to route traffic over or under the HSR tracks, widen local roads, add new traffic signals, implement new traffic restrictions, improve intersections, and build new roads to address traffic hazards.	The project would result in 29 permanent local road closures and 59 permanent local road realignments. Project improvements would be the same as Alternative 1.	The project would result in 17 permanent local road closures and 32 permanent local road realignments. Project improvements would be the same as Alternative 1.	Alternative 4 would include construction of 29 at-grade quad gates at road-rail crossings in the San Jose Diridon Station Approach, Monterey Corridor, and Morgan Hill and Gilroy Subsections. Closure of at-grade crossing gates would result in traffic delays at at-grade intersections.
Impact S&S#9: Permanent Interference with Airport Safety	Project structures including proposed radio towers would exceed FAR Part 77 height notification limits and therefore notification to FAA would be required for these structures. Eight radio towers would require FAA notification for Alternative 1. The Authority expects that the aeronautical studies that FAA would conduct under the FAR Part 77 notification process would not result in identification of safety hazards that would result in FAA recommending the relocation of a proposed communications tower or other proposed structure.	Same as Alternative 1, except six radio towers would require FAA notification for Alternative 2.	Same as Alternative 1, except six radio towers would require FAA notification for Alternative 3.	Same as Alternative 1, except three radio towers would require FAA notification for Alternative 4.
Impact S&S#12: Permanent Exposure to Rail-Related Hazards	The project would permanently affect 120 acres of UPRR right-of-way and another 87 acres for temporary construction easements. From Tamien Station to Bloomfield Avenue in Gilroy, the UPRR and HSR run parallel for 24.4 miles. Alternative 1 would include 2.6 miles of blended track, 86.3 miles of dedicated track and would include no at-grade crossings. The project design includes grade separations, physical separations including separation distances and vertical separations, a physical protection barrier, PTC features, and derailment containment to maximize operational safety.	The project construction would permanently affect 127 acres of UPRR right-of-way and another 227 acres for temporary construction easements. From Tamien Station to Bloomfield Avenue in Gilroy, the UPRR and HSR run parallel for 31.4 miles. Alternative 2 would include 88.6 miles of dedicated track and no blended track and would include no at-grade crossings. The project design features would be the same as Alternative 1.	The project would permanently affect 81 acres of UPRR right-of-way and another 75 acres for temporary construction easements. From Tamien Station to Bloomfield Avenue in Gilroy, the UPRR and HSR run parallel for 16.4 miles. Alternative 3 would include 88.6 miles of dedicated track and no blended track and would include no at-grade crossings The project design features would be the same as Alternative 1.	The project would permanently affect 450 acres of UPRR right-of-way and another 4 acres for temporary construction easements. For Alternative 4, the HSR would run on blended track for 35.3 miles between San Jose and Gilroy. Alternative 4 would include 53.4 miles of dedicated track and 35.3 miles of blended track. Alternative 4 would include installation of 7 new quad gates and improvements to 74 existing gates at at-grade crossings in the San Jose Diridon Station Approach, Monterey Corridor, and Morgan Hill and Gilroy Subsections. The project design features would be the same as Alternative 1. At-grade crossings would be equipped with quad gates and barrier systems to prevent intrusion into the right-of-way.

Resource Category	Operations Impacts under the Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Impact S&S#13: Continuous Permanent Exposure to High-Risk Facilities and Tall Structures	Following construction, 41 high-risk utility facilities would remain within the RSA. A total of 16 bridges and no other tall structures would remain within the RSA after completion of construction. There are 96 high-risk facilities including cement plants, electric power plants, wastewater treatment plants, dams and reservoirs, and landfills within 2 miles of the project footprint. The project would conduct a PHA and include the SSMP to minimize the potential for high-risk facilities, including oil and natural gas pipelines, bulk fuel storage facilities, and tall structures (including bridges).	Following construction, 37 high-risk utility facilities would remain within the RSA. A total of 17 bridges and one other tall structure would remain within the RSA after completion of construction. There are 95 high-risk facilities including cement plants, electric power plants, wastewater treatment plants, dams and reservoirs, and landfills within 2 miles of the project footprint. The project features would be the same as Alternative 1.	Following construction, 41 high-risk utility facilities would remain within the RSA. A total of 17 bridges and one other tall structure would remain within the RSA after completion of construction. There are 96 high-risk facilities including cement plants, electric power plants, wastewater treatment plants, dams and reservoirs, and landfills within 2 miles of the project footprint. The project features would be the same as Alternative 1.	Following construction, 81 high-risk utility facilities would remain within the RSA. A total of 27 bridges and six other tall structures would remain within the RSA after completion of construction. There are 93 high-risk facilities including cement plants, electric power plants, wastewater treatment plants, dams and reservoirs, and landfills within 2 miles of the project footprint. The project features would be the same as Alternative 1.
Impact S&S#14: Continuous Permanent Exposure to Criminal and Terrorist Activity	Operations would not lead to increased exposure to criminal or terrorist activity. The project includes 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.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Impact S&S#15: Continuous Permanent Safety Hazard to Schools	The ATC system, intrusion detection system, and inspection and maintenance programs would minimize the risk of accidents, and derailment containment systems including check rails, parapets, undercar guards, and alternate barrier systems would keep the train within the right-of-way and railcars upright in the event of a derailment, minimizing the safety risk at the 43 schools in the RSA.	Same as Alternative 1 for the 47 schools in the RSA.	Same as Alternative 1 for the 41 schools in the RSA.	Same as Alternative 1 for the 40 schools in the RSA.
Impact S&S#16: Wildfire Hazards	1,932 acres are within moderate to very high fire hazard severity zones, 1,518 acres of which are permanent area acreage. The risks of fires during operations would be minimized with the low use of flammable materials, and risks from wildfires that could result in safety hazards would be effectively minimized through fire and life safety programs during project design, construction, and operations.	1,940 acres are within moderate to very high fire hazard severity zones, 1,523 acres of which are permanent area acreage. The project design features would be the same as Alternative 1.	1,930 acres are within moderate to very high fire hazard severity zones, 1,510 acres of which are permanent area acreage. The project design features would be the same as Alternative 1.	1,929 acres are within moderate to very high fire hazard severity zones, 1,520 acres of which are permanent area acreage. The project design features would be the same as Alternative 1.

Socioeconomics and Communities

Communities and Neighborhoods

Impact SOCIO #3: Disruption or Division of Established Communities from HSR Operations	The overall HSR system in the long term would improve regional access, reduce travel times, and could reduce interregional traffic on regional roadways.	Same as Alternative 1.	Similar to Alternative 1, except VMT would be increased for the East Gilroy Station compared to the other project alternatives and could result in greater community disruption in the east Gilroy area.	Similar to Alternative 1, except there would be no grade separations between San Jose and downtown Gilroy, leading to greater delays to cross the rail line compared to other alternatives.
Impact SOCIO #3: Disruption or Division of Established Communities from Changes to Air Quality from HSR Operations	With a reduction of regional automobile travel and associated emissions, the project would improve regional air quality.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Impact SOCIO #3: Disruption or Division of Established Communities from Changes to Noise and Vibration from HSR Operations	Operations would result in severe noise impacts on 337 sensitive receptors (347 with the DDV).	Operations would result in severe noise impacts on 755 sensitive receptors (766 with the TDV).	Operations would result in severe noise impacts on 222 sensitive receptors (233 with the TDV).	Similar to Alternative 2, except operations would result in severe noise impacts on 1,212 sensitive receptors (1,224 with the TDV). There would be potential indirect noise effects on confined animals within approximately 285 feet of the edge of the HSR right-of-way, depending on train speed.
Impact SOCIO #3: Disruption or Division of Established Communities from Changes to Aesthetics and Visual Quality from HSR Operations	Train vehicle headlights and maintenance facility nighttime operations would introduce a new source of substantial light and glare and would diminish views of the nighttime sky in the rural areas of the project.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1

Resource Category	Operations Impacts under the Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Impact SOCIO #3: Disruption or Division of Established Communities from Changes to Community Safety and Security from HSR Operations	Roads crossing the project alignment would be fully grade-separated from the right-of-way, minimizing risks to the community that could lead to disruption.	Same as Alternative 1.	Same as Alternative 1.	Similar to Alternative 1 except that existing at-grade crossings would be used and improved with four-quadrant gates.
Children's Health and Safety				
Impact SOCIO #5: Operations Impacts on Children's Health and Safety	Project operations would not result in continuous impacts on children's health and safety.	Same as Alternative 1	Similar to Alternative 1, except that emissions would be greater for Alternative 3 because of the greater VMT associated with the East Gilroy Station.	Same as Alternative 1 except operational noise impacts would be the greatest because of HSR and freight train horn soundings between San Jose and downtown Gilroy, where the alignment would use existing at-grade rail crossings and no new grade separations would be constructed.
Economic Impacts				
Impact SOCIO #17: Operations Impacts on Employment	Project operations would provide approximately 1,110 direct and indirect jobs annually.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Operations Impacts on Population Growth (See Section 3.18, Regional Growth).	Operation of the project is expected to induce population growth in the three-county region.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Impact SOCIO #13: Operations Impacts on the Agriculture Economy	There would be no direct impacts on the agricultural economy from project operations. With respect to indirect impacts, animals housed within 100 feet of the track centerline or proposed maintenance facility footprint could be affected by operational noise.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Impact SOCIO #18: Operations Impacts on Property Taxes	Project operations could result in property value reductions in some locations because of increased noise, light and glare. There would likely be an increase in property values in the vicinity of the HSR stations.	Same as Alternative 1.	Similar to Alternative 1, except there would be slightly less beneficial impact on property values in the station areas because no transit-oriented development is planned for the East Gilroy Station area.	Same as Alternative 1.
Impact SOCIO #18: Operations Impacts on Sales Tax Revenues	Sales taxes would likely increase in the three-county region from materials being purchased by HSR riders and employees.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Impact SOCIO #19: Permanent Impact on Private Recreational Waterfowl Hunting	Project operation would not affect the overall economic viability of waterfowl hunting activities in the GEA.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Station Planning, Land Use, and Development				
Alteration of Land Use Patterns				
Impact LU#5: Permanent Indirect Impacts on Land Use Patterns from Increased Noise, Light, and Glare	The project would avoid or minimize noise and lights from operations. Although some residents may choose to relocate away from the alignment, such relocations would not result in a substantial change in land use patterns.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
Inducement of Population Growth beyond Planned Levels				
Impact LU#7: Permanent Induced Population Growth	Population growth that might be induced by increased employment opportunities for HSR operations would not be considered substantial or exceed planned levels locally or regionally. The increase in employment would be beneficial to the local economy. Because adopted and planned station area and specific plans encourage TOD, Alternative 1 would not induce population growth beyond planned levels.	Same as Alternative 1.	Operation of the East Gilroy HSR station and the East Gilroy MOWF would not stimulate population growth in the vicinity beyond planned levels.	Same as Alternative 1.

Resource Category	Operations Impacts under the Project Alternatives			
	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Parks, Recreation, and Open Space				
Parks, Recreation, and Open Space Resources				
Impact PK#7: Permanent Changes from Noise and Vibration on Parks, Recreation, and Open Space Resource Character and Use	Operations would result in permanent effects from noise on Los Banos Wildlife Area and in the parking area for the Volta Wildlife Area. No vibration impacts would occur.	Operations would result in permanent effects from noise on Morgan Hill Community and Cultural Center and Los Banos Wildlife Area and in the parking area for the Volta Wildlife Area. No vibration impacts would occur.	Same as Alternative 1.	Operations would result in permanent effects from noise on Highway 87 Bikeway North, Edenvale Gardens Regional Park, Morgan Hill Community and Cultural Center, Los Banos Wildlife Area and in the parking area for the Volta Wildlife Area. Permanent vibration effects would occur at Highway 87 Bikeway.
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 constructed to accommodate demand.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.
School District Play Areas				
Impact PK#15: Permanent Changes from Noise and Vibration on School District Play Area Character and Use	No moderate or severe operational noise or vibration impacts would occur.	Same as Alternative 1.	Same as Alternative 1.	Operations would result in permanent effects from noise on Gilroy Prep School. No vibration impacts would occur.
Cultural Resources				
Impact CUL#6: Intermittent Noise and Vibration Impacts on Built Resources Caused by Operations	0 built resources adversely affected.	Same as Alternative 1.	Same as Alternative 1.	Same as Alternative 1.

¹ Impacts associated with the design variants are shown in parentheses. The DDV affects Alternative 4 within the San Jose Diridon Station Approach Subsection; the TDV affects all alternatives within the Morgan Hill and Gilroy, Pacheco Pass, and San Joaquin Valley Subsections.

AREMA = American Railway Engineering and Maintenance-of-Way Association
 ATC = automatic train control
 BMP = best management practice
 Caltrans = California Department of Transportation
 CEQA = California Environmental Quality Act
 CP = control point
 dBA = A-weighted decibel
 DDV = Diridon design variant
 EMF = electromagnetic frequency
 EMI = electromagnetic interference
 FAA = Federal Aviation Administration
 FAR = Federal Aviation Regulation
 FCC = Federal Communications Commission
 FEMA = Federal Emergency Management Agency
 FHWA = Federal Highway Administration

GEA = Grasslands Ecological Area
 HMBP = hazardous materials business plan
 HSR = high-speed rail
 I = Interstate
 IBA = Important Bird Area
 IGP = Individual General Permit
 L_{dn} = day-night sound level, dBA
 LOS = level of service
 mG = milligauss
 MMBtu = million British thermal units
 MOWS = maintenance of way siding
 MOWF = maintenance of way facility
 MPE = maximum permissible exposure
 mph = miles per hour
 MS4 = municipal separate storm sewer system

OCS = overhead contact system
 PHA = preliminary hazard analysis
 PTC = positive train control
 RSA = resource study area
 SSMP = safety and security management plan
 SWPPP = stormwater pollution prevention plan
 TDV = tunnel design variant
 TOD = transit-oriented development
 UPR = Upper Pajaro River
 UPRR = Union Pacific Railroad
 US = U.S. Highway
 VMT = vehicle miles traveled
 WEAP = Worker Environmental Awareness Program

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S.8.4 Comparison of HSR Stations

As described in Section S.5.3, Station Area Development, two stations would be constructed for the project: one in San Jose and one in Gilroy. The San Jose Diridon HSR Station would be constructed at the existing Caltrain station. The station configuration would be aerial under Alternatives 1, 2, and 3, and it would be identical under all three alternatives. Under Alternative 4 it would be built as an at-grade station. As described in Section S.8.3.5, the DDV that is available for Alternative 4 would allow for higher speeds in the approaches and through Diridon Station. The Gilroy station would be constructed in either downtown Gilroy (Alternatives 1, 2, or 4) or east Gilroy (Alternative 3). The Downtown Gilroy Station would be located on the east side of the UPRR tracks under Alternatives 1 and 2, but on the west side under Alternative 4. A comparative discussion of the station-related impacts is included in Section S.8.3.

S.8.5 Comparison of Maintenance Facilities

MOWFs provide for dispatch, maintenance, and repair of rail-mounted equipment and include support quarters for maintenance personnel. As described in Section S.5.4, Maintenance Facilities, there are three potential locations for the MOWF. The South Gilroy MOWF between Carnadero Avenue and Bloomfield Avenue on the east side of the HSR alignment would be constructed under Alternatives 1 and 2. The South Gilroy MOWF south of Bloomfield Avenue on the west side of the HSR alignment would be constructed under Alternative 4. Lastly, the East Gilroy MOWF would be constructed under Alternative 3. A comparative discussion of impacts associated with these three sites is included in Section S.8.3.

S.8.6 CEQA Summary of Impacts and Mitigation

Table S-5 provides a summary of the CEQA determination of significant impacts for the project alternatives. Where feasible, mitigation measures would be applied to avoid or reduce impacts from construction and operations of the project alternatives. A determination of the level of significance after mitigation measures is also required under CEQA. In most cases these mitigation measures will reduce the impacts to a less-than-significant level. Only EMF/EMI resources and Socioeconomics and Communities would not have significant impacts under CEQA for the project alternatives and would not require mitigation; although SO-MM#1 will be implemented to reduce impacts associated with residential displacement in certain areas.

Table S-5 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			
Transit			
Construction	All Alternatives: Impact TR #10: Temporary Impacts on Bus Transit	TR-MM#2: Install Transit Signal Priority	Significant and Unavoidable (Alternatives 1, 2, and 3) Less than Significant (Alternative 4)
Construction	All Alternatives: Impact TR #11: Temporary Impacts on Passenger Rail Operations	TR-MM#3: Railway Disruption Control Plan	Less than Significant
Construction	All Alternatives: Impact TR #12: Permanent Impacts on Bus Transit	TR-MM#2: Install Transit Signal Priority	Less than Significant
Operations	All Alternatives: Impact TR #13: Continuous Permanent Impacts on Bus Services	TR-MM#2: Install Transit Signal Priority	Less than Significant
Freight Rail Service			
Construction	All Alternatives: Impact TR #20: Temporary Impacts on Freight Rail Operations	TR-MM#3: Railway Disruption Control Plan	Less than Significant
Air Quality and Greenhouse Gases³			
Construction	All Alternatives: Impact AQ#1: Temporary Direct and Indirect Impacts on Air Quality within the SFBAAB	AQ-MM#1: Implement Additional On-Site Emissions Controls to Reduce Fugitive Dust AQ-MM#2: Construction Emissions Reductions – Requirements for use of Zero Emission (ZE) and/or Near Zero Emission (NZE) Vehicles and off-road equipment AQ-MM#3: Offset Project Construction Emissions in the SFBAAB	Less than Significant
Construction	All Alternatives: Impact AQ#3: Temporary Direct and Indirect Impacts on Air Quality within the SJVAB	AQ-MM#1: Implement Additional On-Site Emissions Controls to Reduce Fugitive Dust AQ-MM#2: Construction Emissions Reductions – Requirements for use of Zero Emission (ZE) and/or Near Zero Emission (NZE) Vehicles and off-road equipment AQ-MM#4: Offset Project Construction Emissions in the SJVAB	Less than Significant (NO _x and PM ₁₀) Significant and Unavoidable (CO)

Resource Category	Significant (CEQA) Impacts before Mitigation ¹	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation ²
Construction	All Alternatives: Impact AQ#4: Temporary Direct Impacts on Implementation of an Applicable Air Quality Plan	AQ-MM#1: Implement Additional On-Site Emissions Controls to Reduce Fugitive Dust AQ-MM#2: Construction Emissions Reductions – Requirements for use of Zero Emission (ZE) and/or Near Zero Emission (NZE) Vehicles and off-road equipment AQ-MM#3: Offset Project Construction Emissions in the SFBAAB AQ-MM#4: Offset Project Construction Emissions in the SJVAB	Less than Significant
Construction	All Alternatives: Impact AQ#5: Temporary Direct Impacts on Localized Air Quality—Criteria Pollutants	AQ-MM#1: Implement Additional On-Site Emissions Controls to Reduce Fugitive Dust AQ-MM#2: Construction Emissions Reductions – Requirements for use of Zero Emission (ZE) and/or Near Zero Emission (NZE) Vehicles and off-road equipment	Significant and Unavoidable ⁴

Noise and Vibration

Noise

Construction	All Alternatives: Impact NV#1: Temporary Exposure of Sensitive Receptors to Construction Noise	NV-MM#1: Construction Noise Mitigation Measures	Significant and Unavoidable for all project alternatives
Operations	All Alternatives: Impact NV#2: Intermittent Permanent Exposure of Sensitive Receptors to Noise from Train 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 BIO-MM#80: Minimize Permanent Intermittent Noise, Visual, and Train Strike Impacts on Wildlife Movement	Significant and Unavoidable for all project alternatives
Operations	All Alternatives: 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 all project alternatives

Resource Category	Significant (CEQA) Impacts before Mitigation ¹	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation ²
Operations	All Alternatives: Impact NV#8: Permanent Exposure of Sensitive Receptors to 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 with Mitigation
Vibration			
Construction	All Alternatives: Impact NV#9: Temporary Exposure of Sensitive Receptors and Buildings to Construction Vibration	NV-MM#2: Construction Vibration Mitigation Measures	Less than Significant for all project alternatives
Operations	All Alternatives: Impact NV#10: Intermittent Permanent Exposure of Sensitive Receptors to Vibration from Operations	NV-MM#8: Project Vibration Mitigation Measures	Significant and Unavoidable for all project alternatives (although preliminary review indicates that most, if not all, significant impacts for Alternatives 1, 2, and 3 may be avoided with mitigation and for Alternative 4 all but 15 significant impacts may be avoided with mitigation)
Public Utilities and Energy			
Construction	Alternatives 1 and 2: Impact PUE#4: Permanent Conflicts with Existing Major Utilities Requiring Relocation	PUE-MM#1: Replace Percolation Ponds at SCRWA WWTP	Less than Significant

Resource Category	Significant (CEQA) Impacts before Mitigation ¹	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation ²
Biological and Aquatic Resources			
Construction	All Alternatives: 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: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#7: Conduct Botanical Surveys for Special-Status Plant Species and Special-Status Plant Communities BIO-MM#8: Prepare and Implement Plan for Salvage, Relocation, and/or Propagation of Special-Status Plant Species BIO-MM#9: Prepare and Implement a Groundwater Management Adaptive Management and Monitoring Plan BIO-MM#10: Prepare and Implement a Habitat Mitigation Plan for Species and Species Habitat BIO-MM#11: Implement Measures to Minimize Impacts During Off-Site Habitat Restoration, or Enhancement, or Creation on Mitigation Sites BIO-MM#12: Provide Compensatory Mitigation for Impacts on Listed Plant Species	Less than Significant
Construction	All Alternatives: Impact BIO#2a: Permanent Conversion or Degradation of Habitat for and Mortality of Bay Checkerspot Butterfly	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: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#10: Prepare and Implement a Habitat Mitigation Plan for Species and Species Habitat BIO-MM#13: Implement Work Stoppage BIO-MM#14: Avoid Direct Impacts on Bay Checkerspot and Monarch Butterfly Host Plants BIO-MM#15: Prepare and Implement Bay Checkerspot Butterfly Protection Plan BIO-MM#16: Provide Compensatory Mitigation for Impacts on Bay Checkerspot Butterfly Habitat	Less than Significant

Resource Category	Significant (CEQA) Impacts before Mitigation ¹	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation ²
Construction	All alternatives: 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#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: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#9: Prepare and Implement a Groundwater Adaptive Management and Monitoring Plan BIO-MM#10: Prepare and Implement a Habitat Mitigation Plan for Species and Species Habitat BIO-MM#13: Implement Work Stoppage BIO-MM#14: Avoid Direct Impacts on Bay Checkerspot and Monarch Butterfly Host Plants BIO-MM#86: Provide Compensatory Mitigation for Impacts on Monarch Butterfly Habitat	Less than Significant
Construction	All Alternatives: Impact BIO#3: Permanent Conversion or Degradation of Habitat for and Mortality of Vernal Pool Crustaceans	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: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#10: Prepare and Implement a Habitat Mitigation Plan for Species and Species Habitat BIO-MM#13: Implement Work Stoppage BIO-MM#17: Conduct Pre-Construction Surveys for Vernal Pool Wildlife Species BIO-MM#18: Implement Seasonal Vernal Pool Work Restriction BIO-MM#19: Implement and Monitor Vernal Pool Avoidance Minimization Measures within Temporary Impact Areas BIO-MM#20: Provide Compensatory Mitigation for Impacts on Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp Habitat	Less than Significant

Resource Category	Significant (CEQA) Impacts before Mitigation ¹	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation ²
Construction	All Alternatives: Impact BIO#4: Removal or Pruning of Elderberry Plants Potentially Supporting Valley Elderberry Longhorn Beetle	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: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#10: Prepare and Implement a Habitat Mitigation Plan for Species and Species Habitat BIO-MM#11: Implement Measures to Minimize Impacts During Off-Site Habitat Restoration, or Enhancement, or Creation on Mitigation Sites BIO-MM#13: Implement Work Stoppage BIO-MM#21: Implement Avoidance Measures for Elderberry Shrubs outside Permanent Impact Areas BIO-MM#22: Provide Compensatory Mitigation for Impacts on Valley Elderberry Longhorn Beetle Habitat	Less than Significant
Construction	All Alternatives: Impact BIO#5: Permanent Conversion or Degradation of Habitat for and Mortality of Crotch's Bumble Bee	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: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#12: Provide Compensatory Mitigation for Impacts on Listed Plant Species BIO-MM#23: Conduct Surveys and Implement Avoidance Measures for Crotch's Bumble Bee BIO-MM#24: Provide Compensatory Mitigation for Impacts on Crotch's Bumble Bee	Less than Significant

Resource Category	Significant (CEQA) Impacts before Mitigation ¹	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation ²
Construction	All Alternatives: Impact BIO#6: Permanent Conversion of Habitat for and Direct Mortality of Steelhead and Pacific Lamprey, and All Alternatives: Permanent Conversion of Essential Fish Habitat for Chinook Salmon	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#6: Establish and Implement a Compliance Reporting Program BIO-MM#9: Prepare and Implement a Groundwater Management Adaptive Management and Monitoring Plan BIO-MM#10: Prepare and Implement a Habitat Mitigation Plan for Species and Species Habitat BIO-MM#13: Implement Work Stoppage BIO-MM#25: Prepare Plan for Dewatering and Water Diversions BIO-MM#26: Prepare and Implement a Fish Rescue Plan BIO-MM#27a: Implement General Protection Measures for Fish BIO-MM#27b: Work Windows for Fish BIO-MM#27c: Prepare and Implement an Underwater Sound Control Plan BIO-MM#28: Provide Compensatory Mitigation for Permanent Impacts on Steelhead Habitat and Essential Fish Habitat for Pacific Coast Salmon	Less than Significant
Construction	All Alternatives: Impact BIO#7: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Tiger Salamander	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: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#9: Prepare and Implement a Groundwater Management Adaptive Management and Monitoring Plan BIO-MM#10: Prepare and Implement a Habitat Mitigation Plan for Species and Species Habitat BIO-MM#13: Implement Work Stoppage BIO-MM#29: Conduct Pre-Construction Surveys for California Tiger Salamander BIO-MM#30: Implement Avoidance and Minimization Measures for California Tiger Salamander BIO-MM#31: Provide Compensatory Mitigation for Impacts on California Tiger Salamander Habitat	Less than Significant

Resource Category	Significant (CEQA) Impacts before Mitigation ¹	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation ²
Construction	All Alternatives: Impact BIO#8: Permanent Conversion or Degradation of Habitat for and Direct Mortality of California Red-Legged Frog	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: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#9: Prepare and Implement a Groundwater Management Adaptive Management and Monitoring Plan BIO-MM#10: Prepare and Implement a Habitat Mitigation Plan for Species and Species Habitat BIO-MM#13: Implement Work Stoppage BIO-MM#32: Conduct Pre-Construction Surveys and Implement Avoidance and Minimization Measures for California Red-Legged Frog BIO-MM#33: Provide Compensatory Mitigation for Impacts on California Red-Legged Frog Habitat	Less than Significant
Construction	All Alternatives: Impact BIO#9: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Foothill Yellow-Legged Frog	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: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#9: Prepare and Implement a Groundwater Management Adaptive Management and Monitoring Plan BIO-MM#10: Prepare and Implement a Habitat Mitigation Plan for Species and Species Habitat BIO-MM#13: Implement Work Stoppage BIO-MM#34: Conduct Pre-construction Surveys and Implement Avoidance and Minimization Measures for Foothill Yellow-Legged Frog BIO-MM#35: Provide Compensatory Mitigation for Impacts on Foothill Yellow-Legged Frog Habitat	Less than Significant

Resource Category	Significant (CEQA) Impacts before Mitigation ¹	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation ²
Construction	All Alternatives: Impact BIO#10: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Western Spadefoot	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: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#9: Prepare and Implement a Groundwater Management Adaptive Management and Monitoring Plan BIO-MM#13: Implement Work Stoppage BIO-MM#36: Conduct Pre-Construction Surveys for Special-Status Reptiles and Amphibians BIO-MM#37: Implement Avoidance and Minimization Measures for Special-Status Reptiles and Amphibians	Less than Significant
Construction	All Alternatives: Impact BIO#11: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Western Pond Turtle	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: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#9: Prepare and Implement a Groundwater Management Adaptive Management and Monitoring Plan BIO-MM#13: Implement Work Stoppage BIO-MM#36: Conduct Pre-Construction Surveys for Special-Status Reptiles and Amphibians BIO-MM#37: Implement Avoidance and Minimization Measures for Special-Status Reptiles and Amphibians	Less than Significant

Resource Category	Significant (CEQA) Impacts before Mitigation ¹	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation ²
Construction	All Alternatives: Impact BIO#12: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Blunt-Nosed Leopard Lizard	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: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#10: Prepare and Implement a Habitat Mitigation Plan for Species and Species Habitat BIO-MM#13: Implement Work Stoppage BIO-MM#38: Conduct Surveys for Blunt-Nosed Leopard Lizard BIO-MM#39: Implement Avoidance Measures for Blunt-Nosed Leopard Lizard BIO-MM#40: Provide Compensatory Mitigation for Impacts on Blunt-Nosed Leopard Lizard Habitat	Less than Significant
Construction	All Alternatives: Impact BIO#13: Permanent Conversion or Degradation of Habitat for and Direct Mortality of San Joaquin Coachwhip, Northern California Legless Lizard, and Coast Horned Lizard	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: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#13: Implement Work Stoppage BIO-MM#36: Conduct Pre-Construction Surveys for Special-Status Reptiles and Amphibians BIO-MM#37: Implement Avoidance and Minimization Measures for Special-Status Reptiles and Amphibians	Less than Significant

Resource Category	Significant (CEQA) Impacts before Mitigation ¹	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation ²
Construction	All Alternatives: Impact BIO#14: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Giant Garter Snake	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: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#10: Prepare and Implement a Habitat Mitigation Plan for Species and Species Habitat BIO-MM#13: Implement Work Stoppage BIO-MM#41: Conduct Pre-Construction Surveys and Implement Avoidance and Minimization Measures for Giant Garter Snake BIO-MM#42: Provide Compensatory Mitigation for Impacts on Giant Garter Snake Habitat	Less than Significant
Construction	All Alternatives: Impact BIO#15: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Short-Eared Owl and Grasshopper Sparrow	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: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#13: Implement Work Stoppage BIO-MM#43: Conduct Pre-Construction Surveys and Delineate Active Nest Buffers for Breeding Birds	Less than Significant

Resource Category	Significant (CEQA) Impacts before Mitigation ¹	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation ²
Construction	All Alternatives: Impact BIO#16: Permanent Conversion or Degradation of Habitat for Mountain Plover and Disturbance of Western Snowy Plover (Interior Population)	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: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#13: Implement Work Stoppage BIO-MM#43: Conduct Pre-Construction Surveys and Delineate Active Nest Buffers for Breeding Birds BIO-MM#44: Implement Avoidance and Minimization Measures for Mountain Plover and Sandhill Crane	Less than Significant
Construction	All Alternatives: Impact BIO#17: 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: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#10: Prepare and Implement a Habitat Mitigation Plan for Species and Species Habitat BIO-MM#13: Implement Work Stoppage BIO-MM#45: Conduct Surveys for Burrowing Owl BIO-MM#46: Implement Avoidance and Minimization Measures for Burrowing Owl BIO-MM#47: Provide Compensatory Mitigation for Loss of Active Burrowing Owl Burrows and Habitat	Less than Significant
Construction	All Alternatives: Impact BIO#18: Permanent Conversion or Degradation of Habitat for and Disturbance of Golden Eagle and Bald Eagle	BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#13: Implement Work Stoppage BIO-MM#48: Conduct Pre-Construction Surveys for Eagles BIO-MM#49: Implement Avoidance Measures for Active Eagle Nests BIO-MM#50: Provide Compensatory Mitigation for Loss of Eagle Nests	Less than Significant

Resource Category	Significant (CEQA) Impacts before Mitigation ¹	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation ²
Construction	All Alternatives: Impact BIO#19: Injury or Disturbance of California Condor	BIO-MM#5: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#13: Implement Work Stoppage BIO-MM#51: Implement Avoidance Measures for California Condor	Less than Significant
Construction	All Alternatives: Impact BIO#20: Permanent Conversion or Degradation of Habitat for and Disturbance of Special-Status Raptors (American Peregrine Falcon, Northern Harrier, White-Tailed Kite) and Other Raptors	BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#13: Implement Work Stoppage BIO-MM#52: Conduct Pre-Construction Surveys and Monitoring for Raptors	Less than Significant
Construction	All Alternatives: Impact BIO#21: Permanent Conversion or Degradation of Habitat for and Disturbance of Swainson’s Hawks	BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#10: Prepare and Implement a Habitat Mitigation Plan for Species and Species Habitat BIO-MM#13: Implement Work Stoppage BIO-MM#53: Conduct Surveys for Swainson’s Hawks Nests BIO-MM#54: Implement Avoidance and Minimization Measures for Swainson’s Hawk Nests BIO-MM#55: Provide Compensatory Mitigation for Loss of Swainson’s Hawk Nesting Trees and Habitat	Less than Significant
Construction	All Alternatives: Impact BIO#22: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Purple Martin, Olive-Sided Flycatcher, and Loggerhead Shrike	BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#13: Implement Work Stoppage BIO-MM#43: Conduct Pre-Construction Surveys and Delineate Active Nest Buffers for Breeding Birds	Less than Significant

Resource Category	Significant (CEQA) Impacts before Mitigation ¹	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation ²
Construction	All Alternatives: Impact BIO#23: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Least Bell's Vireo, Yellow Warbler, and Yellow-Breasted Chat	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: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#9: Prepare and Implement a Groundwater Management Adaptive Management and Monitoring Plan BIO-MM#13: Implement Work Stoppage BIO-MM#43: Conduct Pre-Construction Surveys and Delineate Active Nest Buffers for Breeding Birds BIO-MM#72: Provide Compensatory Mitigation for Permanent Impacts on Riparian Habitat	Less than Significant
Construction	All Alternatives: Impact BIO#24: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Tricolored Blackbird and Yellow-Headed 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: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#9: Prepare and Implement a Groundwater Management Plan BIO-MM#10: Prepare and Implement a Habitat Mitigation Plan for Species and Species Habitat BIO-MM#13: Implement Work Stoppage BIO-MM#56: Conduct Surveys and Implement Avoidance Measures for Active Tricolored Blackbird Nest Colonies BIO-MM#57: Provide Compensatory Mitigation for Impacts on Tricolored Blackbird Habitat	Less than Significant

Resource Category	Significant (CEQA) Impacts before Mitigation ¹	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation ²
Construction	All Alternatives: Impact BIO#25: Permanent Conversion or Degradation of Habitat for and Disturbance of Sandhill Crane	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: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#10: Prepare and Implement a Habitat Mitigation Plan for Species and Species Habitat BIO-MM#13: Implement Work Stoppage BIO-MM#44: Avoid or Minimize Disturbance on Mountain Plover and Sandhill Crane BIO-MM#58: Provide Compensatory Mitigation for Impacts on Waterfowl, Shorebird, and Sandhill Crane Habitat	Less than Significant
Construction	All Alternatives: Impact BIO#26a: Loss of Breeding, Foraging, and Dispersal Habitat for and Direct Mortality or Disturbance of Mountain Lion	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: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#10: Prepare and Implement a Habitat Mitigation Plan for Species and Species Habitat BIO-MM#13: Implement Work Stoppage BIO-MM#87: Conduct Pre-Construction Surveys and Implement Avoidance and Minimization Measures for Mountain Lion Dens BIO-MM#88: Provide Compensatory Mitigation for Impacts on Mountain Lion Habitat	Less than Significant

Resource Category	Significant (CEQA) Impacts before Mitigation ¹	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation ²
Construction	All Alternatives: Impact BIO#26b: Loss of Denning and Dispersal Habitat for and Direct Mortality or Disturbance of San Joaquin Kit Fox	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: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#10: Prepare and Implement a Habitat Mitigation Plan for Species and Species Habitat BIO-MM#13: Implement Work Stoppage BIO-MM#59: Conduct Pre-Construction Surveys for San Joaquin Kit Fox BIO-MM#60: Implement San Joaquin Kit Fox Avoidance and Minimization Measures BIO-MM#61: Provide Compensatory Mitigation for Impacts on San Joaquin Kit Fox Habitat	Less than Significant
Construction	All Alternatives: Impact BIO#27: Permanent Conversion or Degradation of Habitat for and Direct Mortality of Fresno Kangaroo Rat	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: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#10: Prepare and Implement a Habitat Mitigation Plan for Species and Species Habitat BIO-MM#13: Implement Work Stoppage BIO-MM#62: Implement Avoidance and Minimization Measures for Fresno Kangaroo Rat BIO-MM#63: Provide Compensatory Mitigation for Impacts on Fresno Kangaroo Rat Habitat	Less than Significant

Resource Category	Significant (CEQA) Impacts before Mitigation ¹	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation ²
Construction	All Alternatives: Impact BIO#28: Permanent Conversion or Degradation of Habitat for and Direct Mortality of American Badger	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: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#13: Implement Work Stoppage BIO-MM#64: Conduct Pre-Construction Surveys for American Badger Den Sites and Implement Avoidance and Minimization Measures	Less than Significant
Construction	All Alternatives: Impact BIO#29: 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: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#13: Implement Work Stoppage BIO-MM#65: Conduct Pre-Construction Surveys for Ringtail and Ringtail Den Sites and Implement Avoidance Measures BIO-MM#66: Conduct Pre-Construction Surveys for Dusky-Footed Woodrat and Implement Avoidance Measures	Less than Significant
Construction	All Alternatives: Impact BIO#30: Loss of Roost Sites for and Direct Mortality or Disturbance of Special-Status Bats	BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#5: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#13: Implement Work Stoppage BIO-MM#67: Conduct Pre-Construction Surveys for Special-Status Bat Species BIO-MM#68: Implement Bat Avoidance and Relocation Measures BIO-MM#69: Implement Bat Exclusion and Deterrence Measures	Less than Significant

Resource Category	Significant (CEQA) Impacts before Mitigation ¹	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation ²
Operations	All Alternatives: Impact BIO#31: Intermittent Disturbance of Habitat for Special-Status Plants during Operations	BIO-MM#70: Prepare and Implement an Annual Vegetation Control Plan	Less than Significant
Operations	All Alternatives: Impact BIO#32: Intermittent Disturbance of Habitat for and Direct Mortality of Special-Status Wildlife during Operations	BIO-MM#70: Prepare and Implement an Annual Vegetation Control Plan	Less than Significant
Construction	All Alternatives: Impact BIO#34: Removal or Degradation of Habitat for and Disturbance of Waterfowl and Shorebirds	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: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#10: Prepare and Implement a Habitat Mitigation Plan for Species and Species Habitat BIO-MM#58: Provide Compensatory Mitigation for Impacts on Waterfowl, Shorebird, and Sandhill Crane Habitat	Less than Significant

Resource Category	Significant (CEQA) Impacts before Mitigation ¹	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation ²
Construction	All Alternatives: Impact BIO#35: 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: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#7: Conduct Botanical Surveys for Special-Status Plant Species and Special-Status Plant Communities BIO-MM#9: Prepare and Implement a Groundwater Management Adaptive Management and Monitoring Plan BIO-MM#71: Restore Temporary Riparian Impacts BIO-MM#72: Provide Compensatory Mitigation for Permanent Impacts on Riparian Habitat	Less than Significant
Operations	All Alternatives: Impact BIO#36: Intermittent Disturbance or Degradation of Special-Status Plant Communities during Operations	BIO-MM#70: Prepare and Implement an Annual Vegetation Control Plan	Less than Significant

Resource Category	Significant (CEQA) Impacts before Mitigation ¹	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation ²
Construction	All Alternatives: Impact BIO#37: Permanent Conversion or Degradation of Aquatic Resources Considered Jurisdictional under Section 404 of the Clean Water Act or Regulated by the State	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: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#9: Prepare and Implement a Groundwater Management Adaptive Management and Monitoring Plan BIO-MM#25: Prepare Plan for Dewatering and Water Diversions BIO-MM#71: Restore Temporary Riparian Impacts BIO-MM#72: Provide Compensatory Mitigation for Permanent Impacts on Riparian Habitat BIO-MM#73: Restore Aquatic Resources Subject to Temporary Impacts BIO-MM#74: Prepare and Implement a Compensatory Mitigation Plan for Impacts on Aquatic Resources	Less than Significant
Construction	All Alternatives: Impact BIO#38: Permanent Conversion or Degradation of Resources Regulated 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: Limit Vehicle Traffic and Construction Site Speeds BIO-MM#6: Establish and Implement a Compliance Reporting Program BIO-MM#9: Prepare and Implement a Groundwater Management Adaptive Management and Monitoring Plan BIO-MM#25: Prepare Plan for Dewatering and Water Diversions BIO-MM#71: Restore Temporary Riparian Impacts BIO-MM#72: Provide Compensatory Mitigation for Permanent Impacts on Riparian Habitat BIO-MM#73: Restore Aquatic Resources Subject to Temporary Impacts BIO-MM#74: Prepare and Implement a Compensatory Mitigation Plan for Impacts on Aquatic Resources	Less than Significant

Resource Category	Significant (CEQA) Impacts before Mitigation ¹	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation ²
Operations	All Alternatives: Impact BIO#39: Intermittent Disturbance or Degradation of Aquatic Resources during Operations	BIO-MM#70: Prepare and Implement an Annual Vegetation Control Plan	Less than Significant
Construction	All Alternatives: Impact BIO#40: Removal of Trees Protected under Municipal Tree Ordinances	BIO-MM#9: Prepare and Implement a Groundwater Management Adaptive Management and Monitoring Plan BIO-MM#75: Implement Transplantation and Compensatory Mitigation for Protected Trees	Less than Significant
Construction	All Alternatives: Impact BIO#42: Temporary Disruption of Wildlife and Wildlife Movement	BIO-MM#3: Establish Environmentally Sensitive Areas and Nondisturbance Zones BIO-MM#25: Prepare Plan for Dewatering and Watering Diversions BIO-MM#76a: Minimize Impacts on Wildlife Movement during Construction BIO-MM#76b: Minimize Impacts on Wildlife Movement in the Western Pacheco Pass Region BIO-MM#79a: Provide Wildlife Movement between the Santa Cruz Mountains and Diablo Range	Less than Significant
Operations	All Alternatives: Impact BIO#43: Permanent Impacts on Wildlife Movement	BIO-MM#77a: Design Wildlife Crossings to Facilitate Wildlife Movement BIO-MM#77b: Monitoring and Adaptive Management of Wildlife Crossings BIO-MM#78: Establish Wildlife Crossings at Embankment in West Slope of Pacheco Pass BIO-MM#79a: Provide Wildlife Movement between the Santa Cruz Mountains and Diablo Range BIO-MM#79b: Provide Wildlife Movement between the Diablo Range and Inner Coast Range (for cumulative impacts to wildlife movement)	Less than Significant
Operations	All Alternatives: Impact BIO#44: Intermittent Noise Disturbance of Wildlife Using Corridors during Operations	BIO-MM#10: Prepare and Implement a Habitat Mitigation Plan for Species and Species Habitat BIO-MM#58: Provide Compensatory Mitigation for Impacts on Waterfowl, Shorebird, and Sandhill Crane Habitat BIO-MM#80: Minimize Permanent Intermittent Noise, Visual, and Train Strike Impacts on Wildlife Movement	Less than Significant

Resource Category	Significant (CEQA) Impacts before Mitigation ¹	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation ²
Operations	All Alternatives: Impact BIO#46: Intermittent Visual Disturbance of Wildlife Using Corridors during Operations	BIO-MM#58: Provide Compensatory Mitigation for Impacts on Waterfowl, Shorebird, and Sandhill Crane Habitat BIO-MM#80: Minimize Permanent Intermittent Noise and Visual Impacts on Wildlife Movement	Less than Significant
Operations	All Alternatives: Impact BIO#47: Intermittent and Permanent Lighting Disturbance of Wildlife and Wildlife Using Corridors during Operations	BIO-MM#80: Minimize Permanent Intermittent Noise, Visual, and Train Strike Impacts on Wildlife Movement BIO-MM#89: Minimize the Impacts of Operational Lighting on Wildlife Species	Less than Significant
Operations	All Alternatives: Impact BIO#48: Mortality Resulting from Train Strike during Operations	BIO-MM#77a: Design Wildlife Crossings to Facilitate Wildlife Movement BIO-MM#80: Minimize Permanent Intermittent Noise, Visual, and Train Strike Impacts on Wildlife Movement BIO-MM#81: Minimize Permanent Intermittent Impacts on Terrestrial Species Wildlife Movement BIO-MM#82: Minimize Permanent Intermittent Impacts on Aerial Species Wildlife Movement BIO-MM#83: Implement Removal of Carrion that May Attract Condors and Eagles	Less than Significant
Operations	All Alternatives: Impact BIO#49: Injury and Mortality Resulting from Power Line Strike during Operations	BIO-MM#80: Minimize Permanent Intermittent Noise and Visual Impacts on Wildlife Movement BIO-MM#82: Minimize Permanent Intermittent Impacts on Aerial Species Movement	Less than Significant
Construction	All Alternatives: Impact BIO#51: Permanent Conversion or Degradation of Conservation Areas	BIO-MM#9: Prepare and Implement a Groundwater Management Adaptive Management and Monitoring Plan BIO-MM#10: Prepare and Implement a Habitat Mitigation Plan for Species and Species Habitat BIO-MM#79a: Provide Wildlife Movement between the Santa Cruz Mountains and Diablo Range BIO-MM#84a: Avoid and Minimize Impacts on Conservation Areas BIO-MM#84b: Provide Compensatory Mitigation for Impacts on Conservation Areas	Less than Significant

Resource Category	Significant (CEQA) Impacts before Mitigation ¹	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation ²
Operations	All Alternatives: Impact BIO#53: Conflict with Santa Clara Valley Habitat Plan	BIO-MM#10: Prepare and Implement a Habitat Mitigation Plan for Species and Species Habitat BIO-MM#79a: Provide Wildlife Movement between the Santa Cruz Mountains and Diablo Range BIO-MM#84a: Avoid and Minimize Impacts on Conservation Areas BIO-MM#84b: Provide Compensatory Mitigation for Impacts on Conservation Areas BIO-MM#85: Provide Compensatory Mitigation for Permanent Impacts on California Sycamore Woodland at the Pacheco Creek Open Space Regional Reserve	Less than Significant
Operations	All Alternatives: Impact BIO#55: Conflict with Coyote Valley Linkage	BIO-MM#77a: Design Wildlife Crossings to Facilitate Wildlife Movement BIO-MM#77b: Monitoring and Adaptive Management of Wildlife Crossings BIO-MM#79a: Provide Wildlife Movement between the Santa Cruz Mountains and Diablo Range	Less than Significant
Hydrology and Water Resources			
Surface Water Quality			
Construction	All Alternatives: 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 Non-Disturbance Zones BIO-MM#4: Conduct Monitoring of Construction Activities BIO-MM#25: Prepare Plan for Dewatering and Water Diversions BIO-MM#71: Restore Temporary Riparian Habitat Impacts BIO-MM#73: Restore Aquatic Resources Subject to Temporary Impacts BIO-MM#74: Prepare and Implement a Compensatory Mitigation Plan (CMP) for Impacts to Aquatic Resources	Less than Significant
Construction	All Alternatives: Impact HYD#5: Permanent Impacts on Surface Water Quality during Construction	BIO-MM#72: Provide Compensatory Mitigation for Permanent Impacts on Riparian Habitat BIO-MM#74: Prepare and Implement a Compensatory Mitigation Plan (CMP) for Impacts to Aquatic Resources	Less than Significant

Resource Category	Significant (CEQA) Impacts before Mitigation ¹	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation ²
Groundwater			
Construction	All Alternatives: Impact HYD#10: Temporary Impacts on Groundwater and Surface Water Hydrology during Tunnel Construction	HYD-MM#1: Prepare and Implement a Groundwater Adaptive Management and Monitoring Program	Less than Significant
Floodplains			
Construction	Alternative 3: Impact HYD#15: Permanent Impacts on Floodplain Hydraulics during Construction	HYD-MM#2: Maintain Existing 100-year Water Surface Elevations of the Llagas Creek Floodway near Holsclaw Road in East Gilroy	Less than Significant
Hazardous Materials and Waste			
Construction	All Alternatives: Impact HMW#12: Intermittent Impacts from Hazardous Materials and Wastes Activities near Schools during Construction	HMW-MM#1: Limit use of extremely hazardous materials near schools during construction.	Less than Significant
Safety and Security			
Construction	All Alternatives: Impact S&S#1: Temporary Impacts on Emergency Access and Response Times from Temporary Roadway and Highway Closures, Relocations, and Modifications	SS-MM#1: Construct Permanent Access Roads and Driveways for Alternative 2 Skyway Drive Variant B. SS-MM#2: Construct Temporary Access Roads and Driveways for Morgan Hill Charter School (Alternatives 1 and 2) SS-MM#3: Install Emergency Vehicle Detection	Less than Significant
Operations	Alternatives 1, 2, and 3: Impact S&S#3: Permanent Impacts on Emergency Access and Response Times from Permanent Roadway and Highway Closures, Relocations, and Modifications	SS-MM#3: Install Emergency Vehicle Detection	Less than Significant

Resource Category	Significant (CEQA) Impacts before Mitigation ¹	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation ²
Operations	All Alternatives: Impact S&S#4: Continuous Permanent Impacts on Emergency Access and Response Times	SS-MM#3: Install Emergency Vehicle Detection (Alternatives 1, 2, and 3) SS-MM#4: Install Emergency Vehicle Response Improvements (Alternatives 1, 2, and 3 in part; Alternative 4 in full) In addition, for Alternative 4: TR-MM#1e: Monterey Road/Chynoweth Avenue-Roeder Road—Widen and Reconfigure TR-MM#1t: Monterey Road/San Martin Avenue—Restripe Southbound Approach TR-MM#1u: Monterey Road/IOOF Avenue—Widen and Reconfigure Southbound Approach TR-MM#1w: Chestnut Street/Luchessa Street—Reconfigure Southbound Approach TR-MM#1x.6: East Main Avenue/Depot Street—Install Traffic Signal TR-MM#1x.8: Llagas Road/San Martin Avenue—Install Traffic Signal TR-MM#1x.9: School Access/IOOF Avenue—Install Traffic Signal TR-MM#1x.10: SR 25/Bloomfield—Install Traffic Signal	Less than Significant for Alternatives 1, 2 and 3 Significant and Unavoidable for Alternative 4 Travel times are impacted at the following locations: Monterey Corridor Fire Stations: <ul style="list-style-type: none"> ▪ 4430 Monterey Road Morgan Hill and Gilroy Fire Stations: <ul style="list-style-type: none"> ▪ 15670 Monterey Road ▪ 10810 No Name Uno ▪ 880 Sunrise Drive ▪ 8383 Wren Avenue ▪ 7070 Chestnut Street
Station Planning, Land Use, and Development			
Construction	Alternative 3: Impact LU#4: Permanent Alteration of Land Use Patterns from Land Use Conversion and Introduction of Incompatible Uses	No mitigation has been identified.	Significant and Unavoidable
Agricultural Farmlands			
Construction	All Alternatives: Impact AG#2: Permanent Conversion of Important Farmland to Nonagricultural Use	AG-MM#1: Conserve Important Farmland (Prime Farmland, Farmland of Statewide Importance, Farmland of Local Importance, and Unique Farmland) AG-MM#2: Minimize the Area of Important Farmland (Prime Farmland, Farmland of Statewide Importance, Farmland of Local Importance, and Unique Farmland) Required for HSR Guideway	Significant and Unavoidable

Resource Category	Significant (CEQA) Impacts before Mitigation ¹	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation ²
Construction	All Alternatives: Impact AG#3: Permanent Creation of Remnant Parcels of Important Farmland	AG-MM#1: Conserve Important Farmland (Prime Farmland, Farmland of Statewide Importance, Farmland of Local Importance, and Unique Farmland) AG-MM#2: Minimize the Area of Important Farmland (Prime Farmland, Farmland of Statewide Importance, Farmland of Local Importance, and Unique Farmland) Required for HSR Guideway AG-MM#3: Evaluate Modified Access to Remnant Parcels with Landowner Input	Significant and Unavoidable
Construction	All Alternatives: Impact AG#4: Temporary Disruption of Agricultural Infrastructure Serving Important Farmland	AG-MM#4: Relocate and Reconnect Drainage Facilities before Disconnecting Original Facilities	Less than Significant
Construction	All Alternatives: Impact AG#5: Permanent Disruption of Agricultural Infrastructure Serving Important Farmland	AG-MM#4: Relocate and Reconnect Drainage Facilities before Disconnecting Original Facilities AG-MM#5: Avoid Infrastructure Serving Important Farmland from Station 3148+60 to Station 3154 (near Casa de Fruta)	Less than Significant
Parks, Recreation, and Open Space			
Construction	Alternatives 2 and 4: Impact PK#1: Temporary Changes from Noise, Vibration, and Construction Emissions on Use and User Experience of Parks, Recreational Facilities, and Open Space Resources	NV-MM #1: Construction Noise Mitigation Measures NV-MM#2: Construction Vibration Mitigation Measures PR-MM#6: Minimize Construction Noise Impacts During Noise Sensitive Special Events	Less than Significant
Construction	All Alternatives: Impact PK#2: Temporary Changes to Access or Use of Parks	PR-MM#1: Provide Access to Trails during Construction PR-MM#2: Provide Temporary Park Access PR-MM#4: Implement Project Design Features PR-MM#7: Design Refinements to Avoid Aboveground Park Encroachment at Tamien Park (Alts. 1-3) PR-MM#8: Reconfigure Reed and Grant Streets Sports Park (Alts. 2, 3)	Less than Significant

Resource Category	Significant (CEQA) Impacts before Mitigation ¹	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation ²
Construction	All Alternatives: Impact PK#4: Permanent Changes Affecting Access to or Circulation in Parks, Recreational Facilities, and Open Space Resources	PR-MM#3: Provide Permanent Park Access	Less than Significant
Construction	All Alternatives: Impact PK#6: Permanent Acquisition of Parks, Recreation, and Open Space Resources	PR-MM#3: Provide Permanent Park Access PR-MM#5: Implement Measures to Reduce Impacts Associated with the Relocation of Important Facilities PR-MM#7: Design Refinements to Avoid Aboveground Park Encroachment at Tamien Park PR-MM#8: Reconfigure Reed and Grant Streets Sports Park (Alts. 2, 3)	Less than Significant
Operations	All Alternatives: Impact PK#7: Permanent Changes from Noise and Vibration on Parks, Recreation, and Open Space Resource Character and Use	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#8: Project Vibration Mitigation Measures BIO-MM#80: Minimize Permanent Intermittent Noise, Visual, and Train Strike Impacts on Wildlife Movement	Less than Significant
School District Play Areas			
Construction	Alternative 2: Impact PK#14: Permanent Acquisition of School District Play Areas	PR-MM#5: Implement Measures to Reduce Impacts Associated with the Relocation of Important Facilities	Significant and Unavoidable
Operations	Alternative 4: Impact PK#15: Permanent Changes from Noise and Vibration on School District Play Area Character and Use	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	Less than Significant

Resource Category	Significant (CEQA) Impacts before Mitigation ¹	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation ²
Aesthetics and Visual Quality			
Visual Quality, Including Scenic Vistas			
Construction	All Alternatives: Impact AVQ#1: Temporary Direct Impacts on Visual Quality and Scenic Vistas	AVQ-MM#1: Minimize Visual Disruption from Construction Activities AVQ-MM#2: Minimize Light Disturbance during Construction	Less than Significant
Construction	Alternatives 1, 2, and 3: Impact AVQ#5: Permanent Direct Impacts on Visual Quality—Communications Hill Landscape Unit	AVQ-MM#4: Provide Vegetation Screening along At-Grade and Elevated Guideways Adjacent to Residential Areas AVQ-MM#5: Replant Unused Portions of Lands Acquired for the HSR	Less than Significant
Construction	Alternatives 1 and 3: Impact AVQ#6: Permanent Direct Impacts on Visual Quality—Monterey Highway San Jose Landscape Unit	AVQ-MM#3: Incorporate Design Aesthetic Preferences into Final Design and Construction of Non-Station Structures AVQ-MM#4: Provide Vegetation Screening along At-Grade and Elevated Guideways Adjacent to Residential Areas	Significant and Unavoidable
Construction	Alternatives 1 and 3: Impact AVQ#7: Permanent Direct Impacts on Visual Quality—Coyote Valley Landscape Unit	No mitigation is available.	Significant and Unavoidable
Construction	Alternative 3: Impact AVQ#11: Permanent Direct Impacts on Visual Quality—Pajaro–San Felipe Landscape Unit	AVQ-MM#3: Incorporate Design Aesthetic Preferences into Final Design and Construction of Non-Station Structures AVQ-MM#4: Provide Vegetation Screening along At-Grade and Elevated Guideways Adjacent to Residential Areas AVQ-MM#5: Replant Unused Portions of Lands Acquired for the HSR	Significant and Unavoidable
Construction	Alternative 3: Impact AVQ#16: Indirect Impacts on Visual Quality from HSR Stations	No mitigation is available.	Significant and Unavoidable

Resource Category	Significant (CEQA) Impacts before Mitigation ¹	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation ²
Light and Glare			
Construction	All Alternatives: Impact AVQ#18: Temporary Direct Impacts on Nighttime Light Levels	AVQ-MM#1: Minimize Visual Disruption from Construction Activities AVQ-MM#2: Minimize Light Disturbance during Construction	Less than Significant
Construction	Alternatives 1, 2, and 4: Impact AVQ#19: Permanent Direct Impacts on Nighttime Light Levels at Fixed Locations	AVQ-MM#6: Screen Traction Power Distribution Stations and Radio Communication Towers AVQ-MM#4: Provide Vegetation Screening along At-Grade and Elevated Guideways Adjacent to Residential Areas	Significant and Unavoidable
Construction	Alternatives 1, 2, and 3: Impact AVQ#20: Permanent Direct Impacts on Nighttime Light Levels from Trains	AVQ-MM#4: Provide Vegetation Screening along At-Grade and Elevated Guideways Adjacent to Residential Areas NV-MM#3: Implement Proposed California High-Speed Rail Project Noise Mitigation Guidelines	Significant and Unavoidable
Cultural Resources			
Construction	All Alternatives: Impact CUL#1: Permanent Disturbance of Unknown Archaeological Sites	CUL-MM#1: Mitigate Adverse Effects to Archaeological and Built Environment Resources Identified during Phased Identification and Comply with the Stipulations Regarding the Treatment of Archaeological and 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 Pre-Contact Archaeological Sites	Less than Significant
Construction	All Alternatives: Impact CUL#2: Permanent Disturbance of a Known Archaeological Site	CUL-MM#1: Mitigate Adverse Effects on Archaeological and Built Environment Resources Identified during Phased Identification and Comply with the Stipulations Regarding the Treatment of Archaeological and 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 Pre-Contact Archaeological Sites	Less than Significant

Resource Category	Significant (CEQA) Impacts before Mitigation ¹	Summary of Mitigation Measures	CEQA Level of Significance after Mitigation ²
Construction	All Alternatives: Impact CUL#4: Permanent Demolition, Destruction, Relocation, or Alteration of Built Resources or Setting	CUL-MM#1: Mitigate Adverse Effects on Archaeological and Built Environment Resources Identified during Phased Identification and Comply with the Stipulations Regarding the Treatment of Archaeological and Built Resources in the PA and MOA CUL-MM#4: Relocate Historic Buildings and Structures 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 Automatic Train Control Site to Avoid Demolition of 415 Illinois Avenue (Alternatives 1, 2, and 3)	Significant and Unavoidable

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 the California Environmental Quality Act.

³ The analysis of construction emissions for the project alternatives is based upon a fleet average mix of engine tier standards (i.e. Tiers 1–4). Subsequent to the preparation of the analysis, the Authority implemented a new mandate for all construction contractors to use construction equipment that meets the more stringent Tier 4 standards. As such, the analysis as prepared represents a conservative estimate of emissions using the EMFAC 2017 model.

⁴ While AQ-MM#3 and AQ-MM#4 will offset VOC, NO_x, and PM emissions, as required, these offsets could occur regionally throughout the SFBAAB and SJVAPCD. Accordingly, the emission reductions achieved by these offsets may not contribute to enough localized reductions to avoid a project-level violation of the ambient air quality standards or significant impact levels.

ATP = archaeological treatment plan

CEQA = California Environmental Quality Act

CO = carbon monoxide

HSR = high-speed rail

MOA = Memorandum of Agreement

NCCAB = North Central Coast Air Basin

NO_x = nitrogen oxide

PA = Programmatic Agreement

PM₁₀ = particulate matter with diameter of 10 microns or less

SCRWA = South County Regional Water Agency

SFBAAB = San Francisco Bay Area Air Basin

SJVAB = San Joaquin Valley Air Basin

WWTP = wastewater treatment plant

Table S-6 Significant and Unavoidable Impacts by Alternative

Alternative	Number of Significant and Unavoidable Impacts
Alternative 1	14
Alternative 2	13
Alternative 3	16
Alternative 4	10

S.8.7 Capital and Operations Cost

The costs reflect the total labor and materials for each of the project alternatives in 2018 dollars. The estimates are for common HSR elements and construction methods. The capital cost estimates include the total labor effort and materials to construct the project, including utility relocations and modifications to roadways required to accommodate the HSR alternatives. For consistency with the environmental impact analysis, the estimated operations and maintenance costs are based upon the Authority's 2016 Business Plan.⁶ For additional information, see Chapter 6 in the Final EIR/EIS. The total estimated capital costs for each alternative are presented in Table S-7. The 2018 Business Plan updated the O&M cost model with the latest available information on socioeconomic forecasts, transit network plans, auto travel time, auto operating costs, parking costs, and operations planning (reflecting updated trip times, station assumptions and frequency and patterns of service). In 2029, revenue would exceed annual O&M costs by \$584 million, while by 2040 revenues would exceed annual O&M costs by \$1,427 million (2017\$) (Authority 2018).

Table S-7 Capital Cost by Alternative (2021\$ millions)

Alternative ¹	Cost
Alternative 1	\$28,334
Alternative 2 ²	\$25,079
Alternative 3	\$28,698
Alternative 4	\$18,993

Note: Costs are rounded to the nearest million dollars

¹ The capital costs for all four alternatives include the costs associated with the tunnel design variant. The capital costs for Alternative 4 also include the costs associated with the Diridon design variant.

² Skyway Variant A and B under Alternative 2 would have the same cost.

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 avoidance alternatives and the project includes all possible planning to minimize harm to such properties. Properties protected under Section 4(f) are publicly owned lands of a park, recreation area, or wildlife and waterfowl refuge or land of a historical site (publicly or privately owned) of

⁶ The Authority's 2018 Business Plan, adopted in June 2018, includes updated O&M costs. As stated in that plan "Operations and maintenance costs in all scenarios are minimally impacted by the changes made since the 2016 Business Plan" (2018 Business Plan, Chapter 7, p. 96.).

national, state, or local significance as determined by the federal, state, regional, or local officials having jurisdiction over the resource.

There are 84 Section 4(f) properties in the RSAs for recreational and cultural resources: 49 parks and recreation lands and wildlife and waterfowl refuges, and 35 historical properties.

Overall, Alternative 4 would affect the fewest Section 4(f) resources (8), compared to Alternative 1 (11), Alternative 3 (12), and Alternative 2 (16). Alternative 4 would affect the fewest park, recreation, and open-space resources (three), compared to eight resources under Alternative 2, seven resources under Alternative 3, and five resources under Alternative 1. All impacts to parks, recreation, and open-space resources would be *de minimis* with the exception of temporary occupancy and permanent use of a portion of the Coyote Creek Parkway County Park (Alternative 4 would have the lowest effects to this park) and a temporary occupancy at the Field Sports County Park (all alternatives would have the same temporary effect). No feasible and prudent alternatives are available to avoid these uses and measures to minimize harm are included in the project to address project alternatives' effects on these two parks. The severity of the other impacts on park, recreation, and open-space resources would be similar under all project alternatives. Mitigation measures that are applicable to Section 4(f) resources include: AVQ-MM#3, AVQ-MM#4, AVQ-MM#6, NV-MM#3, NV-MM#4, NV-MM#5, NV-MM#6, NV-MM#7, PR-MM#1, PR-MM#2, PR-MM#4, PR-MM#7, BIO-MM#9, BIO-MM#77a, and HYD-MM#1.

What are Section 4(f) properties?

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

Regarding historic properties, all four project alternatives would result in the direct use and demolition of resources or contributing features to resources: Southern Pacific Depot (Diridon Station/Hiram Cahill Depot) and Cozzi Family Property. Impacts on these two properties are the same under all project alternatives, and thus are not differentiating factors among the project alternatives. In total, Alternative 1 would result in uses of six cultural resources (five permanent uses and one *de minimis*), Alternative 2 would result in uses of eight cultural resources (eight permanent uses and none *de minimis*), Alternative 3 would result in uses of five cultural resources (four permanent uses and one *de minimis*), and Alternative 4 would result in uses of five cultural resources (four permanent uses and one *de minimis*).

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

S.9.2 Section 6(f)

Section 6(f) properties are recreation resources funded by the federal Land and Water Conservation Fund Act (LWCF) Act. These properties also cannot be used for transportation projects unless there is no prudent or feasible alternative, and their use must be fully mitigated to the satisfaction of the National Park Service and the local jurisdiction administering the recreation resource.

There are four Section 6(f) properties within the RSA: Guadalupe River Park, Guadalupe Gardens (part of Guadalupe River Park), San Luis Dinosaur Development (part of San Luis Reservoir State Recreation Area), and the Cottonwood Creek Wildlife Area (NPS 2016). 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. While construction of the tunnel underneath Cottonwood Creek Wildlife Area may result in the lowering of groundwater due to tunnel inflows, mitigation measures BIO-MM#9 and HYD-MM#1 will avoid affecting wildlife function. Therefore, no impacts on Section 6(f) resources would occur.

S.10 Environmental Justice

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

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

The project alternatives would result in local and regional benefits to the low-income populations and minority populations that constitute a large percentage of the reference community. These benefits would include improvements in mobility within the region, air quality improvements, and new employment opportunities during construction and operations, among other benefits.

The design of the project alternatives would minimize or avoid impacts related to health risks associated with EMF and EMI; geology, soils, seismicity and paleontological resources; biological and aquatic resources; water quality; floodplains; station planning, land use, and development; agricultural farmland; and cultural resources. Impacts under these resource topics do not have the potential to adversely affect environmental justice communities (see discussion of these resource topics in Chapter 5, Environmental Justice, in the Final EIR/EIS for more information).

Project effects associated with construction noise and vibration, temporary construction-related effects on aesthetics and visual quality, emergency response delay during construction, residential displacements (except for Alternative 2), park acquisitions (except for Alternative 2), and vibration were determined to have adverse effects on environmental justice communities that would be addressed through mitigation. For these resource topics, the proposed mitigation would be applied equally to minority populations, low-income populations, and the general population and was responsive to the concerns raised during the environmental justice engagement process, and, after mitigation, these resource topics do not have the potential to have a disproportionately high and adverse effect on environmental justice communities.

Project effects associated with construction traffic, construction delay of bus transit, operational traffic, and business displacements were determined to have adverse effects on environmental

Laws and Regulations that Govern Environmental Justice:

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

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

justice communities that would be addressed through mitigation and offset through the positive transportation and economic benefits of the project that would be experienced by the populations affected by the adverse effects for these resource topics. For these resource topics, the proposed mitigation would be applied equally and the project benefits would be available equally to minority populations, low-income populations, and the general population and was responsive to the concerns raised during the environmental justice engagement process, and, after mitigation and consideration of project benefits, these resource topics do not have the potential to have a disproportionately high and adverse effect on environmental justice communities.

Before consideration of offsetting mitigation measures, the project alternatives would result in disproportionately high and adverse effects on low-income populations and minority populations residing along the project corridor from operational aesthetics and visual quality changes (Alternatives 1, 2, and 3), residential displacement (Alternative 2), emergency vehicle response delay (Alternative 4), loss of school district play areas (Alternative 2), and operational noise (all alternatives). A series of offsetting mitigation measures (consisting of certain community improvements) was developed through an interactive planning and engagement process involving local environmental justice communities to help offset these residual effects. With implementation of direct mitigation, consideration of project benefits, and the proposed offsetting mitigation measures for each project alternative, some, but not all, of the residual effects would be offset, and the concerns raised during the environmental justice process would be addressed. Alternatives 1 and 3 would have residual disproportionately high and adverse effects on environmental justice communities related to aesthetics and visual quality due to the extensive areas of an elevated viaduct within those communities. Alternative 2 would have residual disproportionately high and adverse effects on environmental justice communities related to aesthetics and visual quality due to extensive areas of elevated embankment (including large grade separations) within those communities and related to the acquisition of a portion of the South Valley Middle School track and field in Gilroy. With implementation of direct mitigation, consideration of project benefits, and the proposed offsetting mitigation measures Alternative 4 would not have any residual disproportionately high and adverse effects on environmental justice communities.

S.11 Areas of Controversy

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

- Consultation and outreach
- Business Plan (funding, ridership, and schedule)
- Right-of-way acquisition and planning
- Project operations (hours of operation, frequency, and speed)
- Alternatives feasibility
- Traffic impacts
- Impacts on wildlife
- Impacts on agricultural lands
- Noise and vibration 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 document also is available at the Authority offices, public libraries in the vicinity of the San Jose to Merced Project Section, and on the Authority's website. The following discussion outlines the next steps in the environmental process.

S.12.1 Identification of Preferred Alternative

The Authority identified Alternative 4, including the DDV and TDV, as the Preferred Alternative for the San Jose to Central Valley Wye Project Extent. The Authority identified this alternative 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 CWA Section 404(b)(1) requirements; local and regional land use plans; community preferences; and costs.

The identification of the Preferred Alternative is also based upon evaluation of Section 4(f) of the Department of Transportation Act (49 U.S.C. § 303) (Section 4(f)), which provides special protection to publicly owned public parks; recreational areas of national, state, or local significance; wildlife or waterfowl refuges; and lands of a historic site of national, state, or local significance. Section 4(f) properties can only be used by federally funded transportation projects if there is no feasible and prudent avoidance alternative and all possible planning has been taken to minimize harm to any 4(f) property used by the project.

The Preferred Alternative is estimated to cost approximately \$19 billion (in 2021 dollars). It has the lowest capital cost of the four project alternatives.

This section describes how the Authority identified the Preferred Alternative that the agency believes would fulfill its statutory missions and responsibilities by giving consideration to economic, environmental, technical, and other evaluation factors. The Authority identified the Preferred Alternative by balancing the adverse and beneficial impacts of the project on the human and natural environment. Taking this holistic approach means that no single issue was dispositive 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 project alignment, the views of federal and state resource agencies, project costs, and constructability—to identify what the Authority believes is the best alternative to achieve the project's Purpose and Need.

Table S-8 shows the potential impacts of the project alternatives on community factors (displacements, agricultural farmlands, aesthetics and visual quality, land use and development, noise, traffic,⁷ emergency vehicle access/response time, environmental justice) and environmental factors (biological resources, Section 4(f)/6(f) resources, built environment historic resources, and natural resources). The impacts shown in Table S-8 include relevant and applicable mitigation. The best performing alternative is indicated with bold text and an asterisk (*).

Preferred Alternative

The *Preferred Alternative* is the alternative identified as preferred by the lead agency.

For the San Jose to Central Valley Wye Project, Alternative 4 is the Preferred Alternative, including the DDV and the TDV.

⁷ In accordance with Senate Bill 743 (2013) and the CEQA Guideline Updates (December 2018), the Authority does not consider traffic vehicle delay, measured through level of service (LOS) or other metrics, to be a CEQA significant impact. The Authority's approach to CEQA is the same approach currently used by the City of San Jose, the City of San Francisco, and other jurisdictions. This approach is allowed by the current CEQA Guidelines and became mandatory for all CEQA lead agencies in California as of July 1, 2020.

Table S-8 Comparison of Key Resource Factors by Project Alternative

Impact	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Community Factors¹				
Displacements				
Residential displacements (number of units)	147	603	157	68*
Commercial displacements (number of businesses)	217	348	157	66* (68)
Agricultural displacements (number of structural improvements)	49	53	49	40*
Community or public facilities displacement (number of units)	7	8	5	1*
Commercial displacements (square feet)	411,000*	1,800,000	994,000	448,000 (463,120)
Agricultural structure displacements (square feet)	407,000*	1,206,000	1,489,000	542,000
Agricultural Farmland				
Permanent conversion of Important Farmland ² (acres)	1,036	1,181	1,193	1,033
Aesthetics and Visual Quality				
Visual quality impacts	Viaduct Elevated Stations	Embankment and Viaduct Elevated Stations Roadway Grade Separations	Viaduct Elevated Stations Alignment in Rural Area (East Gilroy)	At-grade alignment Existing Right-of- Way*
Land Use and Development				
Consistency with City of Gilroy General Plan policy encouraging Transit-Oriented Development in downtown station area	Yes*	Yes*	No	Yes*
Noise				
Severe noise impacts with noise barrier mitigation (number of sensitive receptors)	232 (242)	195 (206)	174* (185)	291 (303)
Severe noise impacts with noise barrier mitigation and if local municipalities implement quiet zones ³ (number of sensitive receptors)	224 (234)	195 (206)	174* (185)	192 (205)

Impact	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Vibration				
Vibration impacts	81* permanent vibration impacts (before mitigation); potential to reduce all or most of these impacts to below the threshold with mitigation.	143 permanent vibration impacts (before mitigation); potential to reduce all or most of these impacts to below the threshold with mitigation.	140 permanent vibration impacts (before mitigation); potential to reduce all or most of these impacts to below the threshold with mitigation.	1,203 permanent vibration impacts (before mitigation); potential to reduce all but 15 of these impacts to below the threshold with mitigation.
Traffic				
Permanent road closures – San Jose to Gilroy	10	21	9	7*
Permanent road closures – Gilroy to Carlucci Road	8*			
Intersections with adverse NEPA effects after mitigation	23	24	23	22*
Emergency Vehicle Access/Response Time				
Areas of potential delay to emergency vehicle response times	Monterey Corridor due to Monterey Road narrowing*			Monterey Corridor, Morgan Hill, Gilroy due to gate-down time
Types of mitigation needed to minimize emergency vehicle delays	Vehicle detection equipment*			Vehicle detection equipment, additional emergency equipment for existing fire stations, new fire stations, and potentially additional ambulance services
Comparative level of increase on fire department response times (lower number is less delay)	1*	3	1*	4
Environmental Justice (EJ) ⁴				
Disproportionately high and adverse effects due to disruption of traffic or transit during construction on minority populations or low-income populations	No	No	No	No*

Impact	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Disproportionately high and adverse effects on operational traffic on minority populations or low-income populations	No	No	No	No*
Disproportionately high and adverse effects on local views associated with the viaduct or elevated embankment on minority populations or low-income populations	Yes	Yes	Yes	No*
Disproportionately high and adverse residential displacements to minority populations or low-income populations	No	No	No	No*
Disproportionately high and adverse business displacements to minority populations or low-income populations	No	No	No*	No
Disproportionately high and adverse effects due to emergency vehicle response time delays on minority populations or low-income populations	No	No	No*	No
Disproportionately high and adverse effect on parks on minority populations or low-income populations	No	Yes	No*	No
Disproportionately high and adverse severe noise impacts on minority populations or low-income populations ⁵	No*	No	No	No
Environmental Factors¹				
Biological Resources				
Permanent impacts on jurisdictional waters and wetlands (acres)	101	108	111	97*
Permanent impacts on habitat for special-status plant species (non-overlapping acres)	1,179	1,186	1,191	1,154*
Permanent impacts on habitat for listed wildlife species with the most impacts overall (California tiger salamander, acres)	2,249	2,305	2,448	2,126*

Impact	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Wildlife corridor impacts	Avoids east Gilroy; fewer Soap Lake floodplain impacts*	Avoids east Gilroy; fewer Soap Lake floodplain impacts*	Impacts in east Gilroy; more impacts in Soap Lake floodplain	Avoids east Gilroy; fewer Soap Lake floodplain impacts*
Permanent impacts on conservation areas (acres)	427*	432	481	427*

Section 4(f)/6(f) Resources

Permanent use of 4(f)/6(f) park resources (number of resources [acres], includes resources with <i>de minimis</i> impact)	4 (4.8)	7 (8.3)	6 (5.8)	2 (0.3)*
Temporary use of 4(f)/6(f) park resources (number of resources [acres])	1 (2.04)	1 (2.04)	1 (2.04)	1 (2.04)
Permanent use of 4(f) historic property resources (number of resources, includes resources with <i>de minimis</i> impact) ⁶	6	8	5	5

Built Environment Historic Resources

Number of permanent adverse impacts on NRHP-listed/eligible resources (number of resources)	7	11	7	5*
Number of permanent significant impacts on CEQA-only historic resources (number of resources)	2	4	1*	1*

Note: The best performing alternatives are indicated with bold text and an asterisk (*).

¹ Community and environmental factors affected by the DDV (which applies to Alternative 4 only) and the TDV (which applies to all alternatives) are shown in parentheses.

² Important Farmland includes Prime Farmland, Farmland of Statewide Importance, Unique Farmland, and Farmland of Local Importance.

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 highway-rail grade crossings. A quiet zone is a section of rail line at least one-half 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 Criteria used for evaluation are those subjects where the EIR/EIS analysis indicates disproportionately high and adverse effects on low-income populations and minority populations after direct mitigation. Conclusions take into account the effect of direct mitigation, the offsetting value of project benefits, and offsetting mitigation measures proposed for each project alternative.

⁵ Noise impacts after noise barrier mitigation.

⁶ Determinations regarding use of historic properties under Section 4(f) are not synonymous with findings of adverse effect to historic properties per Section 106. See analysis in Chapter 4.

AM = morning

NB = Northbound

NRHP = National Register of Historic Places

PM = evening

SB = southbound

SF = square feet

The Authority staff identified Alternative 4 as the Preferred Alternative in June 2019, based upon the analysis contained in the Draft EIR/EIS, the evaluation in this chapter, and the input received from the public; local, state, and federal agencies; businesses; tribes; and community organizations. Alternative 4 includes the San Jose Diridon Station, a station in downtown Gilroy, along with the South Gilroy MOWF. Subsequent public outreach meetings were held in July and August 2019 to solicit input on the Preferred Alternative. HSR staff presented a report to the Authority Board of Directors at its 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 4 as the Preferred Alternative for the San Jose to Central Valley Wye Project Extent. As part of ongoing design optimization, Authority staff identified design variants for Diridon (applicable to Alternative 4 only) and the tunnels (applicable to all alternatives) to optimize speeds.

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 this Final EIR/EIS for compliance with CEQA. If the Authority certifies this Final EIR/EIS, it can consider approving one of the four alternatives and making related CEQA decisions (i.e., 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 it 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 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. 327 and an MOU dated July 23, 2019, FRA assigned its federal environmental review responsibilities to the Authority. The Authority is now 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 Endangered Species Act, Section 106, Section 4(f), and environmental justice; present FRA's determination of air quality conformity; 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.). A permit under Section 10 of the Rivers and Harbors Act (33 U.S.C. § 403) would not be required because no navigable waters as defined under 33 CFR 329.4, would be crossed by the project. Permission under Section 14 of the Rivers and Harbors Act (33 U.S.C. § 408) would be required for effects on flood control facilities and floodplains. 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 and Section 408 permission (as applicable). This single document can be used for alteration/modification of completed federal flood risk management facilities and any associated operation and maintenance, and real estate permissions or instruments (as applicable).

S.13.4 Surface Transportation Board

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

S.13.5 Project Implementation

The anticipated dates for completion of key milestones as part of the environmental process are shown in Table S-9. After the issuance of the ROD and NOD, the Authority would complete final design, obtain construction permits, and acquire property before construction.

Table S-9 San Jose to Merced Project Section Milestone Schedule

Date	Key Milestones
April 2020	Public release of Draft EIR/EIS
February 2022	Final EIR/EIS published
April 2022	Notice of Determination and Record of Decision