

3.19 Cumulative Impacts

Since publication of the Draft Environmental Impact Report/Environmental Impact Statement (EIR/EIS), the following substantive changes have been made to this section:

- The cumulative operational parks, recreation, and open space analysis was revised to clarify the cumulative effect on the Pacific Crest National Scenic Trail in response to comments made on the Draft EIR/EIS.
- The analysis of impacts of the project combined with other cumulative projects was revised to clarify the cumulative effects to mineral resources in response to comments made on the Draft EIR/EIS.
- The analysis of wildlife movement corridor impacts of the project combined with other cumulative projects was revised in response to comments made on the Draft EIR/EIS and Revised Draft EIR/Supplemental Draft EIS.
- The population and community impacts of the project combined with other cumulative projects was revised to reflect the deficit of available industrial parcels available to accommodate the business relocations in the Lancaster and Palmdale area.
- New information on the Southern California/Central Coast evolutionary significant unit mountain lion's candidacy status under the California Endangered Species Act (CESA) and the candidate status of monarch butterfly for listing under the Federal Endangered Species Act (FESA) was considered relative to the discussion of cumulative effects.
- The analysis of cumulative impacts was revised based on the engineering and design refinements described in the Preface and Chapter 2, including related refinements to the area of potential affect (APE) for cultural and archaeological resources.

This section provides an analysis of the cumulative impacts of implementing the high-speed rail (HSR) project within the Bakersfield to Palmdale Project Section in combination with other past, present, and reasonably foreseeable probable future actions or projects (cumulative projects) that contribute to those impacts. This cumulative analysis of the Bakersfield to Palmdale Project Section evaluates effects of the Bakersfield to Palmdale (B-P) Build Alternatives (Alternatives 1, 2, 3, and 5), the Bakersfield and Palmdale stations, the portion of the Fresno to Bakersfield Locally Generated Alternative (F-B LGA) alignment from the intersection of 34th Street and L Street to Oswell Street, the César E. Chávez National Monument Design Option (CCNM Design Option), the Refined CCNM Design Option, and the maintenance facilities, including the light maintenance facility (LMF), maintenance of way facility (MOWF), and maintenance of infrastructure siding facilities (MOIS). For purposes of this analysis, "reasonably foreseeable future actions or projects" are defined as those likely to occur in the 2040 planning horizon. This cumulative impacts analysis focuses on the Bakersfield to Palmdale Project Section of the California HSR System and the regional context appropriate for each resource area, including adjacent sections of the California HSR System. For a discussion of the impacts of implementing the California HSR System in its entirety, refer to the 2005 *Final Program Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for the Proposed California High-Speed Train System (Statewide Program EIR/EIS)* (California High-Speed Rail Authority [Authority] and Federal Railroad Administration [FRA] 2005).

Cumulative Impacts

Cumulative impacts from varying sources accumulate over time and can result in degradation of important resources. By looking at cumulative impacts, decision-makers can consider how outside sources, in addition to the proposed project, may affect the natural and built environment over time.

Summary of Results

The proposed improvements within the Bakersfield to Palmdale Project Section, which include the B-P Build Alternatives, the CCNM Design Option, the Refined CCNM Design Option, the stations, the F-B LGA alignment from the intersection of 34th Street and L Street to Oswell street, and the maintenance facilities, in combination with cumulative projects, would result in the

following cumulative, construction-period impacts that would be significant and cumulatively considerable under the California Environmental Quality Act (CEQA):

- **Air Quality**—Construction of the proposed improvements within the Bakersfield to Palmdale Project Section in combination with cumulative projects would increase emissions of criteria pollutants for which the resource study area (RSA) is in nonattainment under an applicable federal or state ambient air quality standard. Air pollutant emissions from construction of the proposed improvements within the Bakersfield to Palmdale Project Section would be reduced with the purchase of emissions offsets, but emissions of carbon monoxide (CO) would not be reduced to a less than significant level. Therefore, under CEQA, the project's incremental contribution to this impact would be cumulatively considerable. No additional mitigation is available to reduce the cumulative impact.
- **Socioeconomics and Communities**— Construction of the proposed improvements within the Bakersfield to Palmdale Project Section, in combination with cumulative projects, would result in the permanent disruption or division of communities and permanent displacement and relocation of residents, businesses, and community facilities in the RSA, a cumulative impact that would be significant under CEQA. The proposed improvements within the Bakersfield to Palmdale Project Section would permanently disrupt established patterns of interaction among community residents and directly displace residents, businesses, and community facilities. Alternative 5 would have the largest incremental impact on displacement of residents, businesses, and community facilities by displacing 338 residential units, 285 businesses, and 4 community facilities. Alternative 3 would result in fewer displacements than under Alternative 5, with 244 residential units, 231 businesses, and 4 community facilities displaced. Alternatives 1 and 2 would result in the fewest displacements, with 243 residential units, 231 businesses, and 4 community facilities.¹ Implementation of the CCNM Design Option or the Refined CCNM Design Option would not change the number of displacements. Cumulative Mitigation Measure CUM-SO-MM#1, Coordination with Cumulative Construction Project Sponsors, requires HSR project sponsors to coordinate construction schedules and potential closures, detours, and other elements of construction with other entities, including regional or local governments, to minimize cumulative effects to the extent feasible. Despite this measure, however, construction of the B-P Build Alternatives and cumulative projects would permanently disrupt established patterns of interaction among community residents and directly displace residents, businesses, and community facilities. Under CEQA, the project's incremental contribution to this impact would be cumulatively considerable.
- **Agricultural Farmland**— Construction of the B-P Build Alternatives, in combination with cumulative projects, would result in the permanent conversion of Important Farmland, Williamson Act Contract Land, and Important Farmland zoned for agricultural use to nonagricultural use, a cumulative impact that would be significant under CEQA. The B-P Build Alternatives include a project-level mitigation measure to address the loss of Important Farmland, including that governed by a Williamson Act contract and/or zoned for agricultural use. However, mitigation would not create new farmland (i.e., convert natural land to agriculture) and therefore would not address the permanent net loss of Important Farmland, including Important Farmland that is under a Williamson Act Contract Land, and/or zoned for agricultural use. Alternative 3 would result in the largest incremental impact with the conversion of 611 acres of Important Farmland, 559 acres of which are zoned for agricultural use and 71 acres of which are under Williamson Act contract. Alternatives 1 and 5 would result in the next level of incremental impact, with each converting 604 acres of Important Farmland, 552 acres of which are zoned for agriculture use and 71 acres of which are under Williamson Act contract. Alternative 2 would have the smallest incremental impact, as it

¹ The number of displacements listed for Alternatives 3 and 5 includes the portion of the F-B LGA alignment from the intersection of 34th Street and L Street to Oswell Street. This portion of the alignment would result in the displacement of 36 residential units, 192 businesses, and 4 community facilities.

- would convert 565 acres of Important Farmland, 621 acres of which are zoned for agriculture use and 86 acres of which are under Williamson Act contract. Implementation of the CCNM Design Option or the Refined CCNM Design Option would not change the number of acres of Important Farmland, the number of acres of Important Farmland under a Williamson Act contract, or the number of acres of Important Farmland zoned for agriculture use that would be permanently converted under any of the B-P Build Alternatives. Under CEQA, the project's incremental contribution to this impact would be cumulatively considerable. No additional mitigation is available to reduce the cumulative impact.
- Cultural Resources**— Construction of the proposed improvements within the Bakersfield to Palmdale Project Section, in combination with other cumulative projects, would result in potential exposure of and permanent disruption to cultural resources, including archaeological resources, and removal or damage to historic architectural (built) properties. Project-level mitigation measures have been prescribed to address the potential disturbance of archaeological and cultural resources to the extent feasible. However, they would not fully mitigate these cumulative effects, and no additional mitigation is available. Under all B-P Build Alternatives, the cumulative effect to archaeological resources would result in a cumulative impact that is significant under CEQA, and the project's incremental contribution to this impact would be cumulatively considerable. Construction of any of the B-P Build Alternatives would result in direct effects to the Big Creek Hydroelectric System Historic District and construction of any of the B-P Build Alternatives and the CCNM Design Option would result in adverse visual effects to the Nuestra Señora Reina de La Paz/César E. Chávez National Historic Landmark (La Paz), thereby contributing to the cumulative impacts on these resources. Further, refinements to the APE caused by various engineering refinements added three historic properties that are listed or eligible for listing in the National Register of Historic Places and California Register of Historical Resources to the B-P APE. These historic properties consist of Cedar Avenue Historic District / Cedar Avenue Complex in Lancaster, and two residential properties in Lancaster. As discussed in the Section 106 Addendum Finding of Effect (Authority 2021), Alternatives 1, 2, 3, and 5 would have no adverse effect on the Cedar Avenue Historic District / Cedar Avenue Complex and the property on Trevor Avenue. Alternatives 1, 2, and 3 would have no adverse effect on the property on Lancaster Boulevard. All potential impacts would be mitigated, as discussed in Section 3.17.8, Mitigation Measures, of Section 3.17, Cultural Resources, such that these impacts would not result in a significant cumulative impact on historic architectural properties. Under the Refined CCNM Design Option, impacts to La Paz would be reduced and avoided as the visual alteration resulting from this design option would be minimal, distant, and low within the view-sheds from La Paz and would not reduce the isolation of the setting; therefore, impacts would be reduced to a less than significant level under CEQA. Further, construction of Alternative 5, in combination with cumulative projects, would result in a permanent cumulative impact on built resources that is significant under CEQA due to demolition of a historic architectural property: the historic Denny's Restaurant #30. This impact would not occur under Alternatives 1, 2, and 3 (or under the CCNM Design Option or Refined CCNM Design Option which are not located in Lancaster) because they would not affect this property. Project-level mitigation measures have been prescribed to address the impact of Alternative 5 on historic architectural properties to the extent feasible, but they would not sufficiently mitigate the cumulative effect since this alternative would require demolition of the historic structure. No additional mitigation is available to address the cumulative impact for Alternative 5, and its incremental contribution to this impact would be cumulatively considerable under CEQA.

The proposed improvements within the Bakersfield to Palmdale Project Section in combination with cumulative projects, would not result in cumulative construction-period impacts that would be significant and cumulatively considerable under CEQA for the following resources: transportation; noise and vibration; electromagnetic fields (EMF) and electromagnetic interference (EMI); public utilities and energy; biological and aquatic resources; hydrology and water quality; geology, soils, seismicity, and paleontological resources; hazardous materials and wastes; safety and security;

station planning, land use, and development; parks, recreation, and open space; and aesthetics and visual quality.

Operation of the HSR project within the Bakersfield to Palmdale Project Section, in combination with cumulative projects, would result in the following cumulative, operation-period impact that would be a significant and cumulatively considerable impact under CEQA:

- **Noise**—Increased traffic volumes from cumulative projects, in combination with traffic related to operation the B-P Build Alternatives, would permanently increase noise levels and result in a cumulative impact that would be significant under CEQA. Although project-level mitigation measures would reduce the noise effects of the B-P Build Alternatives by requiring that sound walls be installed and through the use of other techniques, the B-P Build Alternatives, in combination with cumulative projects, would still have the potential to exceed thresholds for noise at sensitive receivers. With mitigation, Alternative 5 would have the largest incremental noise impact because it would severely affect 578 sensitive receptors. Alternative 3 would follow, severely affecting 516 sensitive receptors. Alternatives 1 and 2 would result in the smallest incremental noise impacts, as they would each severely affect 502 sensitive receptors. Implementation of the CCNM Design Option or Refined CCNM Design Option would reduce the number of sensitive receptors that would be severely affected under any of the B-P Build Alternatives by one receptor (La Paz). Nonetheless, no mitigation is available to address this cumulative impact. Under CEQA, the project's incremental contribution to this impact would be cumulatively considerable.

The proposed improvements within the Bakersfield to Palmdale Project Section, in combination with cumulative projects, would not result in cumulative operation-period impacts that would be significant and cumulatively considerable under CEQA for the following resources: transportation; air quality and global climate change; EMI and EMF; public utilities and energy; biological and aquatic resources; hydrology and water quality; geology, soils, seismicity, and paleontological resources; hazardous materials and wastes; safety and security; socioeconomics and communities; station planning, land use, and development; agricultural farmland and forest land; parks, recreation, and open space; aesthetics and visual quality; and cultural resources.

3.19.1 Introduction

This cumulative impact analysis complies with the National Environmental Policy Act (NEPA) (40 Code of Federal Regulations Parts 1508.7 and 1508.25²) and the CEQA Guidelines (California Code of Regulations, Title 14, § 15130), as further described in Section 3.1, Introduction. The analysis was prepared following guidelines from the California Department of Transportation (Caltrans) *Guidance for Preparers of Cumulative Impact Analysis* (Caltrans 2005), the Council on Environmental Quality's (CEQ) *Considering Cumulative Effects Under the National Environmental Policy Act* (CEQ Handbook) (CEQ 1997), and the CEQA Guidelines.

3.19.2 Laws, Regulations, and Orders

This section summarizes federal and state laws relevant to the Bakersfield to Palmdale Project Section cumulative impact analysis. General NEPA and CEQA requirements for assessment and disclosure of environmental impacts are described in Section 3.1, Introduction, and are not restated here. However, NEPA and CEQA requirements specific to the evaluation of cumulative impacts are described in this section.

² The CEQ issued new regulations on July 14, 2020, effective September 14, 2020, updating the NEPA implementing procedures at 40 Code of Federal Regulations 1500. 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 CEQ regulations in this environmental document refer to the 1978 regulations, pursuant to 40 Code of Federal Regulations 1506.13 (2020) and the preamble at 85 Fed. Reg. 43340.

3.19.2.1 Federal

National Environmental Policy Act (42 U.S. Code § 4321 et seq.; 40 Code of Federal Regulations Part 1500–1508)

Pursuant to NEPA and CEQ regulations, a lead agency must consider cumulative impacts in addition to direct and indirect project impacts. The CEQ regulations define cumulative effects as the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over time (40 Code of Federal Regulations § 1508.7).

The CEQ guidance document *Considering Cumulative Effects under the National Environmental Policy Act* (CEQ 1997) recommends that cumulative impact analysis include the following steps in scoping those impacts worthy of analysis in an EIS:

- **Step 1:** Identify the cumulative effects issues associated with the proposed action and define the assessment goals.
- **Step 2:** Establish the geographic scope for the analysis.
- **Step 3:** Establish the timeframe for the analysis.
- **Step 4:** Identify other actions affecting the resources, ecosystems, and human communities of concern.

The guidance notes that “scoping is the key to analyzing cumulative impacts; it provides the best opportunity for identifying important cumulative impacts issues, setting appropriate boundaries for analysis, and identifying relevant past, present, and future actions. Scoping allows the NEPA practitioner to ‘count what counts.’” This analysis follows that instruction.

National Historic Preservation Act (36 Code of Federal Regulations Part 800)

The regulations implementing Section 106 of the National Historic Preservation Act acknowledge that a project’s impacts include any reasonably foreseeable impacts, even if they may occur later in time, are farther removed in distance, or are cumulative.

Federal Endangered Species Act (15 U.S. Code § 1531 et seq.)

The Federal Endangered Species Act, Section 7, defines cumulative impacts as those effects of future state or private activities (not involving federal activities) reasonably certain to occur in the action area subject to consultation with the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, or both.

3.19.2.2 State

California Environmental Quality Act (Cal. Code Regs., Title 14, § 15000 et seq.)

CEQA defines cumulative impacts as two or more individual impacts that, when evaluated together, are considerable or compound or increase other environmental impacts (CEQA Guidelines § 15355). Under CEQA, when a project would contribute to a cumulatively significant impact, an EIR must discuss whether the project’s incremental effect is “cumulatively considerable,” where cumulatively considerable means that the project’s incremental effect is significant when viewed in the context of past, present, and reasonably probable future projects.

Similar to the approach under NEPA, the CEQA Guidelines provide that cumulative impact analyses should focus on significant cumulative impacts to which a project would contribute and the magnitude of the project’s contribution.

When the combined cumulative impact associated with the project’s incremental effect and the effects of other projects is not significant, the EIR will briefly indicate why the cumulative impact is not significant and is not discussed in further detail in the EIR. A lead agency shall identify facts

and analysis supporting its conclusion that the cumulative impact is less than significant (CEQA Guidelines § 15130(a)(2)).

3.19.3 Methods for Evaluating Impacts

The methodology used for this analysis follows the guidelines provided in the Caltrans *Guidance for Preparers of Cumulative Impact Analysis* (Caltrans 2005), the CEQ Handbook from 1997, and the CEQA Guidelines. Consistent with these guidelines, the analysis of cumulative impacts for each resource generally involves the following steps, described further in the subsequent subsections:

- Review the direct and indirect impacts of the project for each resource. Where the project would have a beneficial impact, consider this along with any other impacts on the resource and proposed mitigation. If the proposed improvements within the Bakersfield to Palmdale Project Section would not cause direct or indirect impacts on a resource, they would not contribute to a cumulative impact on that resource.
- Define the geographic boundary or RSA for the cumulative effects of each resource.
- Describe the affected environment for each resource.
- Compile a list and description, as well as environmental impact information for past, present, and reasonably foreseeable projects (i.e., cumulative projects) causing related or cumulative impacts (Appendix 3.19-A). For the purpose of this analysis, reasonably foreseeable future projects are defined as those likely to occur in the 2040 planning horizon for the HSR project and that would contribute to the cumulative impact on a particular resource. Where relevant to the analysis for a particular resource, consider the cumulative impacts of construction and operation of adjacent HSR project sections.
- Gather applicable projected growth trends (projections) contained in adopted statewide, regional, or local plans used in part to describe and evaluate conditions contributing to potential cumulative impacts.
- Identify the resources where the project and other cumulative projects could, together, cause a cumulative impact.
- Determine whether the proposed improvements within the Bakersfield to Palmdale Project Section's incremental contribution to significant cumulative impacts would be cumulatively considerable under CEQA (assuming implementation of mitigation measures previously identified for the respective resource), using the two-step CEQA cumulative analysis process.
- Provide a comprehensive discussion of the project's potential impacts in terms of context and intensity (defined for each resource topic in its respective section of this EIR/EIS) under NEPA.
- Identify reasonable, feasible options for avoiding or mitigating the proposed improvements within the Bakersfield to Palmdale Project Section's contribution to significant cumulative impacts.

The cumulative impact analysis for the majority of the resources is based on the cumulative project list (Appendix 3.19-A). For some resources, the analysis is based on both the cumulative project list and growth projections, discussed under the respective resource below. As previously noted, where relevant to a particular resource, the analysis also considers the cumulative impacts of construction and operation of adjacent HSR project sections.

The No Project Alternative represents the state's transportation system and planned major land use changes anticipated by 2040. This alternative is analyzed for each resource under its respective project analysis (sections 3.2 through 3.18). It is not evaluated in this section because there would be no contribution to any cumulative impact from the proposed improvements within the Bakersfield to Palmdale Project Section under the No Project scenario.

3.19.3.1 Identify Resources for Cumulative Impact Analysis

The specific resource evaluations in Chapter 3, Affected Environment, Environmental Consequences, and Mitigation Measures, form the basis for analyzing the cumulative impacts of each resource. The cumulative analysis includes all resources considered in Chapter 3 (i.e., Sections 3.2 through 3.17)³ that would result in direct or indirect effects. Where applicable, the environmental consequences sections note impacts to which the proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to and explains the rationale.

3.19.3.2 Definition of Resource Study Area

The RSA is the geographic area in which all environmental investigations specific to each affected resource are conducted to determine the resource characteristics and potential impacts of the project. For cumulative impacts, the RSA also includes the geographic extent of each affected resource in which project impacts accumulate or interact with the impacts of other actions, including adjacent HSR project sections. The RSA for cumulative impacts therefore has the potential to be larger than the RSA for the specific resources when considering the Bakersfield to Palmdale Project Section alone. These larger RSAs include adjacent HSR project sections to ensure a broad consideration of impacts on a statewide and regional basis.

Throughout the remainder of this section, the term “RSA” refers to the cumulative RSA for each resource being discussed. Table 3.19-1 identifies the RSA used for each resource evaluated in this cumulative impact analysis and the rationale for selecting that RSA boundary.

Table 3.19-1 Resource Study Areas for Cumulative Impact Analysis

Resource	Resource Study Area	Reason for Selecting the Resource Study Area
Transportation		
Transportation	Kern and Los Angeles Counties.	The RSA includes all of Kern and Los Angeles Counties to allow for a broad, regional consideration of cumulative transportation effects.
Air Quality and Global Climate Change		
Air Quality	San Joaquin Valley and Mojave Desert Air Basins.	Air quality impacts are regional and local in nature, and are regulated by California’s 15 regional air districts. The Bakersfield to Palmdale Project Section is located in these two air basins. Meteorological and topographical factors generally limit criteria pollutant mixing across air basin boundaries.
GHG Emissions	State of California.	Impacts from GHGs are not specific to the area in which they are produced. The RSA for GHG emissions encompasses the State of California because plans, emissions targets, and CEQA thresholds are established based on statewide goals. The HSR system’s GHG impacts (benefits) would also occur at the state level because many of the reductions in mobile-source emissions would be achieved by long-distance travel on the HSR system.

³ Section 3.18, Regional Growth, describes induced growth and indirect effects from growth; that section also identifies cumulative impacts associated with regional growth and future projects, and the analysis is not repeated in this section.

Resource	Resource Study Area	Reason for Selecting the Resource Study Area
Noise and Vibration		
Noise	2,500 feet on either side of the HSR centerline.	The maximum FRA screening distance of 1,300 feet for noise was replaced with a screening distance of 2,500 feet due to the number of trains projected per day. The screening distances for maintenance facilities and stations is 1,000 feet and is therefore included in the RSA. The Authority has determined that noise and vibration impacts associated with the project would not likely be experienced by receivers beyond the screening distances.
Vibration	Project footprint plus 275 feet.	
EMI and EMF		
EMI and EMF	500 feet on either side of the HSR centerline, electrical transmission lines, and traction power facilities.	This RSA was determined based on typical screening distances defined in the <i>Electromagnetic Field Footprint Report</i> (Authority 2012: Table 3.5-4) and project-specific factors of the HSR project. Screening distances indicate whether any EMI/EMF-sensitive receivers are near enough to the proposed alignment for an EMI/EMF impact to be possible under typical conditions. If receivers are located farther than these screening distances, the <i>Electromagnetic Field Footprint Report</i> has determined that impacts would be unlikely.
Public Utilities and Energy		
Public Utilities	Service areas of utility providers in Kern and Los Angeles Counties where utility infrastructure would be used by HSR stations and maintenance facilities.	This area encompasses utility infrastructure throughout Kern and Los Angeles Counties that would be impacted as a result of the HSR system.
Energy	The State of California and western states that produce energy exported to California.	The HSR system would obtain electricity from the statewide grid, which uses energy generated all over California and in neighboring western states (e.g., Nevada).
Biological and Aquatic Resources		
Wildlife Habitat and Movement Corridors	Central Valley, Tehachapi Mountains and foothills, and Antelope Valley.	This area encompasses all species-specific habitat and wildlife movement corridors vulnerable to cumulative impacts.

Resource	Resource Study Area	Reason for Selecting the Resource Study Area
Aquatic and Wetland Resources	Contributing subwatersheds upslope of and within the project footprint and those receiving waters downslope of the project footprint, in the southern San Joaquin Valley, Tehachapi Mountains and foothills, and the Antelope Valley. Specifically, these subwatersheds are portions of the following Hydrologic Unit Code-10 watersheds, as follows: <ul style="list-style-type: none"> ▪ Pleitito Creek-Kern Lake Bed ▪ Lake Paulina-Comanche Creek ▪ Caliente Creek ▪ Tehachapi Creek ▪ Upper Cache Creek ▪ Tropico Hill-Oak Creek ▪ Bissell Hills ▪ Rosamond Lake ▪ Cottonwood Creek-Tylerhorse Canyon ▪ Sacatara Creek-Kings Canyon ▪ Amargosa Creek ▪ Lake Palmdale-Piute Ponds Caliente Creek, Tehachapi Creek, Proctor Lake, and dry Lake Rosamond are the major receiving waters from the project.	This area encompasses the contributing watershed upslope of and within the project footprint that contributes water to surface aquatic features and wetlands in the project-level RSA for aquatic resources. It also considers the downstream receiving waters downslope of aquatic features in the project-level RSA. This area includes aquatic and wetland features of the southern San Joaquin Valley, Tehachapi Mountains and foothills, and Antelope Valley. This area encompasses all aquatic resources vulnerable to cumulative impacts.
Special-Status Plant and Wildlife Species	Central Valley, Tehachapi Mountains and foothills, and Antelope Valley.	This area encompasses all habitats used by special-status plant and wildlife species vulnerable to cumulative impacts.
Hydrology and Water Resources		
Floodplains	Federal Emergency Management Agency-designated 100-year floodplains crossed by the project footprint and the land adjacent to these floodplains.	Floodplain impacts (increases in water surface elevation) are localized in the area of structures proposed in a specific floodplain.
Surface Waters	Watersheds crossed by the project footprint: South Valley Floor Watershed, Grapevine Watershed, Fremont Valley Watershed, and Antelope Valley Watershed.	Hydrologic and water quality impacts on surface water are regional in nature and can affect downstream receiving waters in the watershed.

Resource	Resource Study Area	Reason for Selecting the Resource Study Area
Groundwater	Groundwater basins crossed by the project footprint: Kern County Subbasin of the San Joaquin Valley Groundwater Basin (portion of the San Joaquin Valley Groundwater Basin located in Kern County), Tehachapi Valley West Groundwater Basin, Tehachapi Valley East Groundwater Basin, Fremont Valley Groundwater Basin, and Antelope Valley Groundwater Basin.	Hydrologic and water quality impacts on groundwater are regional and can affect the groundwater basin.
Geology, Soils, Seismicity, and Paleontological Resources		
Geology, Soils, and Seismicity	San Joaquin Valley, Tehachapi Mountains, and Antelope Valley.	Geologic and seismic hazards, such as soil failures, settlement, corrosivity, shrink-swell, erosion, seismicity, and earthquake-induced liquefaction risks are limited to the project site level and do not accumulate across projects. Therefore, these issues are not addressed in the cumulative impacts analysis. Other issues, such as impacts on mineral resources, have the potential to accumulate and are assessed at a broader regional level that defines the RSA.
Paleontological Resources	All geologic units partially overlain by the HSR project footprint in the San Joaquin Valley, Tehachapi Mountains, and Antelope Valley.	Paleontological resources occur as part of the broader geologic record and are irregularly distributed across both a geographic region and throughout the vertical extent of the geologic units present in any given region. The fossil record comprises all fossils occurring in the geologic record. Impacts on any one paleontological resource occur in the context of the entire fossil record of a region. Therefore, cumulative impacts are evaluated at a broader regional level.
Hazardous Materials and Waste		
Hazardous Materials and Wastes	Project footprint plus a 0.25-mile radius.	This area accounts for potential releases of hazardous materials within 0.25 mile of schools. Other impacts related to hazardous materials are localized in the project footprint and would not contribute to cumulative effects. There are no landfills in the RSA.
Safety and Security		
Safety and Security	Kern and Los Angeles Counties.	This area captures potential cumulative impacts on emergency response and evacuation routes relative to impacts on roadway connectivity to emergency service providers.

Resource	Resource Study Area	Reason for Selecting the Resource Study Area
Socioeconomics and Communities		
Population and Community Impacts	The southern portion of Kern County and northern portion of Los Angeles County, including the Cities of Bakersfield, Tehachapi, Lancaster, and Palmdale; the unincorporated communities of Edison, Keene, Golden Hills, and Rosamond; and the unincorporated areas within 1 mile of the B-P Build Alternatives or design options.	This RSA includes all of the communities either directly affected within the Bakersfield to Palmdale Project Section or located within 1 mile of the B-P Build Alternatives or design options. This area captures potential cumulative impacts on communities.
Economic Impacts	Kern and Los Angeles Counties.	Economic impacts generally occur countywide. Given the substantial costs associated with construction and operation of the project and the regional nature of employment in Southern California, the project is anticipated to generate direct and indirect economic impacts on a scale that would be felt throughout the regional economy.
Station Planning, Land Use, and Development		
Station Planning, Land Use, and Development	Kern and Los Angeles Counties.	Land use impacts are regional in nature and are regulated by incorporated cities or other planning agencies and bodies.
Agricultural Farmland		
Agricultural Farmland	Kern and Los Angeles Counties.	Farmland data is collected and presented primarily at the county level. Regulatory land use decisions that result in the conversion of agricultural land to nonagricultural use are also typically made at the county level.
Parks, Recreation, and Open Space		
Parks, Recreation, and Open Space	The Cities of Bakersfield, Tehachapi, Lancaster, and Palmdale and within 1 mile from the project footprint, where the alignment crosses unincorporated areas in Kern and Los Angeles Counties.	Impacts on these resources are regulated by the local jurisdiction in which the facility is located. In unincorporated county areas, cumulative impacts on park, recreation, and/or open space resources are localized to where demand for these resources occurs rather than in the county as a whole. The RSA for the analysis of potential cumulative impacts on these types of resources was defined as 1 mile from the project footprint, which reflects the distance residents would likely travel to access local parks and recreation facilities in unincorporated county areas.
Aesthetics and Visual Quality		
Aesthetics and Visual Quality	The project's viewshed, defined as within 0.25 mile of the centerline in urban areas (Bakersfield, Lancaster, and Palmdale), within 0.5 mile of the centerline in rural areas, and within 3 miles (the limit of human sight) in open landscape and mountainous areas.	The HSR project viewshed (i.e., the area that could have views of project features) is the distance from the alignments where cumulative projects could have visual impacts that would overlap with those of the HSR project. The project's viewshed accounts for existing terrain, predominant land uses, and proposed elevated components of the HSR project.

Resource	Resource Study Area	Reason for Selecting the Resource Study Area
Cultural Resources		
Archaeological Properties	A 4-mile-wide corridor, with a 2-mile buffer on each side of the project footprint.	The RSA corresponds with that of the Archaeological Survey Report (Authority and FRA 2017) to guide record searches at relevant California Historical Resources Information Centers, and represents the geographic range of known archaeological properties potentially affected by the project.
Built Resources	A 4-mile-wide corridor, with a 2-mile buffer on each side of the project footprint, including parcels adjacent to those intersected by the B-P Build Alternatives or design options if the built resources on those parcels may be indirectly affected.	The RSA encompasses areas that contain built resources that may be subject to cumulative impacts and encompasses the geographic area needed to provide historic context for the built environment. Therefore, the RSA is assumed to include built resources eligible or that could become eligible for listing on national, state, and local registers of historic resources in the reasonably foreseeable future.

Authority = California High-Speed Rail Authority
 B-P = Bakersfield to Palmdale Project Section
 CEQA = California Environmental Quality Act
 EMF = electromagnetic fields
 EMI = electromagnetic interference

FRA = Federal Railroad Administration
 GHG = greenhouse gas
 HSR = high-speed rail
 RSA = resource study area

3.19.3.3 Identify Cumulative Projects and Regional Projections

This section describes the methods and data sources used to develop the cumulative project list and growth projections considered in the cumulative impact analysis.

Cumulative Projects

For the purpose of this analysis, reasonably foreseeable, probable future projects are defined as those likely to occur in the 2040 planning horizon for the HSR project and that would contribute to the cumulative impact on a particular resource. Reasonably foreseeable projects are future projects (including those currently proposed) that are likely or probable rather than those that are merely possible. This analysis assumes these proposed projects would be constructed during the same timeframe as the HSR project, to provide a conservative analysis of cumulative impacts.

Generally, projects are reasonably foreseeable if they meet any one or more of the following conditions:

- The project is a foreseeable future phase of an existing project.
- Applications for project entitlements or construction are pending with a government agency (these projects may have been identified during interviews with state, regional, and local planning agencies or may have been analyzed in a recent environmental document).
- The project is included in state or regional transportation plans; regional transportation improvement programs; local long-range transportation plans; local land use, general, and specific plans; or an agency’s budget or capital improvement program.

Appendix 3.19-A provides detailed information about cumulative projects and plans, including transportation projects, in the study area. The tables in Appendix 3.19-A form the cumulative project list used for this analysis and include development projects intended to help accommodate the projected 2040 study area population in the two counties through which the Bakersfield to Palmdale Project Section would extend. The development projects identified in the cumulative project list represent only a portion of those likely to be constructed in the study area through 2040 because the list is mostly based on planned development activity over the next 3 or 4 years. The general plans of the cities and counties in the study area include provisions for future growth beyond existing development levels under their land use elements. Although there would be additional future development projects not included on this list because they are not

programmed or entitled at this time (not reasonably foreseeable), these development projects are expected to proceed in the future on the basis of the general plan land use designations identified in this analysis.

Appendix 3.19-A includes a series of tables that list major capital or new development projects by jurisdiction for the study area. The tables include developments planned for the near term (10 years or less) generated by contacting city and county planning departments to determine which projects had been entitled. Additionally, long-term (35-year) development and urbanization were determined by reviewing proposed land uses identified in the general plans reviewed, including the conversion of agricultural land anticipated to occur with the corresponding growth in population. Appendix 3.19-A also includes transportation improvements with the potential to result in environmental effects, such as interchange and capacity expansions. This list is based on applicable plans programmed for the study area, such as regional transportation plans and capital improvement programs.

Regional Growth Projections

Cumulative development is also affected by population growth in the various jurisdictions, as residential and community development would be needed to support growing populations. The regional transportation plans for Kern and Los Angeles Counties include projections of the anticipated population in these counties, including the cities in these counties. Specifically, Kern County is covered by the Kern Council of Governments Regional Transportation Plan, and Los Angeles County is covered by the regional transportation plan for the entire Southern California Association of Governments region. General plans and other planning documents for counties and cities in the region estimate the locations and types of growth likely to occur under build-out of these plans. These projections represent the future condition under the No Project Alternative, discussed in Section 2.4.1 of this EIR/EIS.

3.19.4 Affected Environment

This section describes the general affected environment for the project vicinity and then more specifically for each resource, including how conditions have changed over time and the current condition of the resource.

3.19.4.1 Overview of Project Vicinity

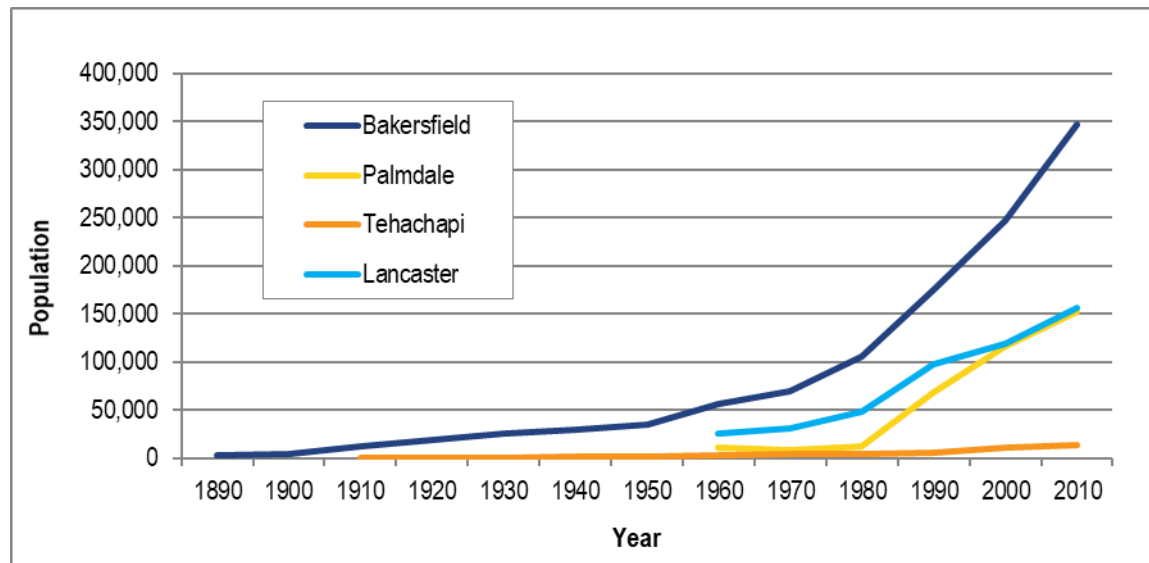
The Bakersfield to Palmdale Project Section of the California HSR System traverses the southern portion of the San Joaquin Valley and the Tehachapi Mountains in Kern County and the Antelope Valley in Los Angeles County. With the construction of the Southern Pacific Railroad by the Central Pacific Railroad (now the Union Pacific Railroad [UPRR]) through the San Joaquin Valley, Tehachapi Mountains, and Antelope Valley in the late 1800s, and completion of the California Aqueduct in 1913, considerable growth occurred in the population and economy of the region. The railroad connected the region to Sacramento and San Francisco, providing an opportunity for ranchers and farmers to sell their goods to distant markets. The establishment of stations along the railway was a major reason for early settlement and development of the cities in the region.

Increased automobile use required the establishment of a state highway system in the early 1900s. The first paved road segments were widened in the 1920s and 1930s. They correspond to the current State Route (SR) 99, SR 58, SR 184, SR 223, SR 14, and SR 138. These improvements in surface transportation encouraged the growth of existing and new residential, commercial, and industrial developments (i.e., neighborhoods, shopping centers, and light industry) along these routes in the Cities of Bakersfield, Palmdale, Tehachapi, and Lancaster, particularly during the latter half of the 20th century.

Completion of these roads and the California Aqueduct caused the local agricultural industry to flourish and was the first major step towards defining the cities that exist in the study area today. Agriculture continued to be the foremost industry in the Antelope Valley until World War II, when the U.S. government established Muroc Air Base, now known as Edwards Air Force Base, and the aerospace industry took over as the primary source of employment. With this, the Antelope Valley began a period of steady growth until the 1980s and 1990s when affordable housing in the

area caused a dramatic spike in population. In 2000, there were 3,502,473 housing units in the two-county area. This number increased to 3,729,443 housing units in 2010 (U.S. Census Bureau 2000, 2010).

Figure 3.19-1 shows the growth in population for the Cities of Bakersfield, Tehachapi, Lancaster, and Palmdale between 1890 and 2010 (U.S. Census Bureau 1993, 2000, 2010). The chart represents all years for which data is available. The data show cities in the RSA experienced steady growth through most of the 1900s, and then substantial growth in the period between 1980 and 2010, with the combined total population of these cities nearly tripling over this period.



Source: U.S. Census Bureau, 1993, 2000, 2010

Figure 3.19-1 Historic Population Data for Bakersfield, Tehachapi, Lancaster, and Palmdale

3.19.4.2 Transportation

A network of regional and local roadways provides mobility in and between local areas of Kern and Los Angeles Counties, as described in Section 3.2, Transportation. Most travel occurs through a network of interdependent roadways, with each segment moving traffic through the system toward various destinations. Streets and highways provide opportunities for most modes of transportation, including walking, biking, personal vehicles, public transit buses, and heavy freight trucks. Transportation in the RSA is also facilitated by air and rail.

Population in the RSA has increased substantially over the past 100 years, and this growth has resulted generally in a steady increase in vehicle miles traveled (VMT) on roadways, a trend that is likely to continue in line with projected growth. As of 2018, there were about 4.15 billion annual VMT in Kern County and 73.40 billion annual VMT in Los Angeles County.

3.19.4.3 Air Quality and Global Climate Change

Air Quality

Although air quality in the air basins has been improving, mobile and stationary emissions stemming from past and present development provide substantial sources of regional pollution, resulting in nonattainment of certain federal and state air quality standards.

The Eastern Kern Air Pollution Control District (EKAPCD) is located in the Mojave Desert Air Basin and is an attainment/unclassified area for particulate matter less than 2.5 microns in diameter (PM_{2.5}), carbon monoxide (CO), and lead National Ambient Air Quality Standards. The EKAPCD is unclassified for federal and in attainment for state nitrogen dioxide (NO₂) and sulfur

dioxide (SO₂) standards. Table 3.19-2 shows EKAPCD currently in nonattainment for federal and state 8-hour O₃. The western portion of the district is in nonattainment for the federal particulate matter less than 10 microns in diameter (PM₁₀) standard. On January 9, 2003, the EKAPCD adopted the Ozone Attainment Demonstration, Maintenance Plan, and Redesignation Request for the East Kern County nonattainment area (EKAPCD 2003). The plan demonstrates that the air quality improvement was achieved by successful implementation of O₃ control strategies contained in the region’s State Implementation Plan. It also demonstrates that significant O₃ precursor emission reductions implemented in the region are permanent and enforceable. A maintenance plan is included to ensure that the region will not exceed the standards defined by the region’s State Implementation Plan. The plan requests a re-designation in accordance with the federal Clean Air Act.

Table 3.19-2 Eastern Kern Air Pollution Control District Air Quality Attainment Status

Pollutant	Federal Status	State Status
O ₃ : 1-hour	N/A	Nonattainment
O ₃ : 8-hour	Nonattainment	Nonattainment
PM ₁₀	Attainment	Nonattainment
PM _{2.5}	Attainment	Attainment/Unclassified
CO	Attainment/Unclassified	Attainment/Unclassified
SO ₂	Unclassified	Attainment
Lead	Attainment/Unclassified	Attainment
NO ₂	Unclassified	Attainment

Source: California Air Resources Board, 2018

CO = carbon monoxide
 N/A = not available
 NO₂ = nitrogen dioxide
 O₃ = ozone
 PM_{2.5} = particulate matter less than 2.5 microns in diameter
 PM₁₀ = particulate matter less than 10 microns in diameter
 SO₂ = sulfur dioxide

As shown in Table 3.19-3, the San Joaquin Valley Air Basin (SJVAB) is in federal nonattainment for ozone (O₃) and PM_{2.5}, and state nonattainment for O₃, PM₁₀, and PM_{2.5}. According to the San Joaquin Valley Air Pollution Control District (SJVAPCD), over 85 percent of the district’s O₃ and PM_{2.5} emissions come from mobile sources, which are under federal and state regulation. The mountains surrounding the valley and atmospheric conditions combine to create optimal circumstances for air pollution formation and retention, contributing to the federal and/or state nonattainment status for some of these pollutants (SJVAPCD 2016). On May 5, 2010, the U.S. Environmental Protection Agency reclassified the 8-hour O₃ nonattainment of the San Joaquin Valley from serious to extreme. The reclassification requires the State of California to incorporate stricter requirements on the district, such as lowering permit thresholds and implementing reasonably available control technologies at more sources of O₃ than are currently in place. To address nonattainment designations, the SJVAB utilizes the 2007 8-hour Ozone Air Quality Plan, which contains a comprehensive list of regulatory and incentive-based measures to reduce emissions of O₃ and particulate matter precursors throughout the San Joaquin Valley. Additionally, the plan for the 1997 PM_{2.5} standard, approved by the SJVAPCD Governing Board on April 16, 2015, will bring the valley into attainment with the U.S. Environmental Protection Agency’s 1997 PM_{2.5} standard as quickly as possible, but no later than December 31, 2020 (SJVAPCD 2015).

Table 3.19-3 San Joaquin Valley Air Basin Air Quality Attainment Status

Pollutant	Federal Status	State Status
O ₃ : 1-hour	N/A	Nonattainment
O ₃ : 8-hour	Nonattainment	Nonattainment
PM ₁₀	Attainment	Nonattainment
PM _{2.5}	Nonattainment	Nonattainment
Carbon Monoxide (CO)	Attainment/Unclassified	Attainment/Unclassified
Sulfur Dioxide (SO ₂)	Attainment/Unclassified	Attainment
Lead	N/A	Attainment

Source: California Air Resources Board, 2018

CO = carbon monoxide
 N/A = not available
 NO₂ = nitrogen dioxide
 O₃ = ozone
 PM_{2.5} = particulate matter less than 2.5 microns in diameter
 PM₁₀ = particulate matter less than 10 microns in diameter
 SO₂ = sulfur dioxide

Table 3.19-4 shows the attainment status of the Antelope Valley Air Quality Management District (AVAQMD) in the Mojave Desert Air Basin. Under the federal criteria, the AVAQMD is designated as nonattainment for 8-hour O₃. The AVAQMD is an attainment/unclassified area under the National Ambient Air Quality Standards for CO, nitrogen dioxide (NO₂), SO₂, and lead. The AVAQMD is unclassified for the PM₁₀ and PM_{2.5} National Ambient Air Quality Standards, but is designated nonattainment for state PM₁₀ and attainment for PM_{2.5}. The 2004 AVAQMD Ozone Attainment Plan indicates AVAQMD is also showing significant progress toward attainment of the state O₃ standard. The document includes the latest planning assumptions concerning population, vehicle, and industrial activities, and addresses all existing and forecast O₃ precursor-producing activities in the Antelope Valley through the year 2007. The plan includes necessary information to allow general and transportation conformity findings to be made for the Antelope Valley (AVAQMD 2004).

Table 3.19-4 Antelope Valley Air Quality Management District Air Quality Attainment Status

Pollutant	Federal Status	State Status
O ₃ : 1-hour	N/A	Nonattainment
O ₃ : 8-hour	Nonattainment	Nonattainment
PM ₁₀	Attainment	Nonattainment
PM _{2.5}	Attainment	Attainment
CO	Attainment/Unclassified	Attainment/Unclassified
SO ₂	Attainment/Unclassified	Attainment
Lead	Attainment/Unclassified	Attainment

Source: California Air Resources Board, 2018

CO = carbon monoxide
 N/A = not available
 NO₂ = nitrogen dioxide
 O₃ = ozone
 PM_{2.5} = particulate matter less than 2.5 microns in diameter
 PM₁₀ = particulate matter less than 10 microns in diameter
 SO₂ = sulfur dioxide

Greenhouse Gases

Global greenhouse gas (GHG) emissions from the combustion of fossil fuels have increased substantially since 1900. Since 1970, global carbon dioxide emissions have increased by about 90 percent. The main causes of the increase in global GHG emissions since 1970 are fossil fuel combustion, industrial processes, agriculture, deforestation, and other land use changes (Intergovernmental Panel on Global Climate Change 2014).

The California Air Resources Board estimated the total GHG emissions in California for 2014 at 441.5 million metric tons of carbon dioxide equivalent (California Air Resources Board 2018). The transportation sector has historically been, and is currently, the largest source of GHG emissions in California, accounting for 37 percent of the 2014 inventory. Industrial sources of GHG emissions were the second largest for the state, contributing 24 percent in 2014. While the RSA for GHG emissions is limited to the state of California, GHG emissions are cumulative on a global scale.

3.19.4.4 Noise and Vibration

Noise levels in the RSA have been influenced by increasing urban density and intensity of use over the past 100 years. Traffic on the freeways and roads, trains, equipment operation, urban uses, and other noise sources typical in developed areas generate noise in the RSA. As described in Section 3.4, Noise and Vibration, concentrated residential uses and other potential noise- and vibration-sensitive receptors exist in the Cities of Bakersfield, Tehachapi, Lancaster, and Palmdale, as well as in the unincorporated communities of Edison, Keene, and Rosamond. Outside of these urban and suburban areas, land is mostly agricultural with scattered sensitive receptors. Existing noise levels vary throughout the RSA. Where there is little to no development, receivers would perceive noise levels as low as 41 A-weighted decibels (dBA) day-night sound level (L_{dn}). In areas near major arterial roadways, highways, and industrial uses, receivers may only perceive noise levels that reach 81.1 dBA L_{dn} (Authority and FRA 2016). While noise levels have increased with urbanization, numerous land use controls have been adopted or are required by local jurisdictions to ensure that noise-generating land uses are situated in appropriate and compatible locations or employ noise-reduction equipment capable of meeting noise standards established in the general plans and municipal codes for the affected counties and cities.

3.19.4.5 Electromagnetic Interference and Electromagnetic Fields

EMI/EMF is tied closely to the degree to which development and associated infrastructure are present. The long-range historical context in the RSA is described by a gradual introduction and use of electric power with its associated infrastructure, throughout the area, supplemented by regional broadcast radio and television services. Services such as fire and police protection, aviation, and military training activities have increasingly adopted communications and tracking technologies that have further contributed to the EMI/EMF environment. Such changes closely correlate to both spatial and temporal changes in population over the last 100 years.

Recent trends include a rapid increase in the deployment of cellular telecommunications and other wireless communications systems. These uses tend to be more concentrated in fully developed areas, although not exclusively. Government decisions have played roles, both indirectly (e.g., zoning and regional planning) and directly (e.g., regulatory restrictions on the siting of cell towers and transmission lines), in shaping the EMI/EMF environment.

3.19.4.6 Public Utilities and Energy

Public Utilities

Major public utilities in the RSA include facilities for electricity, natural gas, and petroleum distribution; telecommunications; potable and irrigable water delivery; and stormwater, wastewater, and solid waste disposal. Past and present development have resulted in an increased demand for public utilities in the RSA, much of which has been addressed by the developers paying applicable “fair-share” fees. Furthermore, and as discussed in Section 3.6, Public Utilities and Energy, periodic drought in California has required water use reduction and conservation measures to remain in effect to ensure ongoing adequate water supply. The existing and planned water supplies for the Cities of Bakersfield, Tehachapi, Lancaster, and Palmdale are adequate to meet projected demand during normal water years through 2040, according to the applicable urban water management plans for these areas (Section 3.6, Public Utilities and Energy).

Energy

Past and present development has resulted in an increase in electricity consumption in the RSA. The state's major fuel sources for electric power as of 2015 are natural gas, renewables (wind, solar, and geothermal), nuclear, hydroelectric, oil, and coal. As described in Section 3.6, Public Utilities and Energy, total statewide electricity consumption grew from 227,606 gigawatt-hours (GWh) in 1990 to 281,916 GWh in 2014. Electricity consumption growth rates fell from an estimated rate of 3.2 percent in the 1980s to a rate of 0.52 percent between 2000 and 2014 (California Energy Commission 2019). The transportation sector consumes 38.7 percent of California's energy, while the industrial sector consumes 24.4 percent, the residential sector 18.3 percent, and the commercial sector 18.6 percent (U.S. Energy Information Administration 2015). Since 2014, self-generation solar power systems have increased, while baseline per capita electricity consumption has decreased, slowly reducing traditional system power (California Energy Commission 2019).

3.19.4.7 *Biological and Aquatic Resources*

Wildlife Habitat and Movement Corridors

Past and present developments have altered long-term wildlife movement corridors and foraging ranges as well as genetic distribution of species in the RSA. This development has resulted in habitat fragmentation, habitat shifts, increased foraging competition, and limitations on genetic exchange. Linear projects such as roadways and railroads have generally altered the effectiveness of wildlife movement corridors and hindered movement through normal ranges or along migration routes. As they were built, residential and commercial developments could have also hindered wildlife movement, depending on their location and size. For a detailed discussion of habitat linkages that function as wildlife corridors for various species in the RSA, refer to Section 3.7, Biological and Aquatic Resources.

Currently, the RSA is composed primarily of open natural land subject to a moderate to low level of disturbance associated with activities such as cattle or sheep ranching, wind energy, and off-road vehicle use. However, in the more urbanized areas of Bakersfield, Tehachapi, Lancaster, and Palmdale, the habitat is highly disturbed and fragmented by urban, agricultural, highway, and local road land uses.

Aquatic Resources

The RSA includes natural surface waters and wetlands, including streams and desert washes, wetlands, riparian areas, and claypans. The RSA also includes constructed aquatic features such as irrigation and stock ponds, canals, irrigation and drainage ditches, and retention/detention basins, primarily in urbanized areas such as Bakersfield, Lancaster, and Palmdale.

Past and present development projects have changed the hydrology of aquatic features in the RSA through direct alteration of channel location, size, and flow direction; bank armoring; channel filling; and removal of wetland and riparian vegetation. Pollutants from stormwater runoff, wastewater discharges, and other sources that result from past and present development have also affected aquatic resources.

In the southern San Joaquin Valley portion of the RSA, agricultural, industrial, and urban projects have greatly altered the land surface; remaining aquatic resources are primarily constructed features, such as basins, ditches, and canals. The mouth of Caliente Creek has been channelized and terminates at the edge of farm fields near Malaga Road.

In the foothills and Tehachapi Mountains, linear transportation projects, including improvements to existing transportation corridors, have required the construction of culverts and bridge structures, channel armoring, and removal of riparian vegetation. However, ephemeral, intermittent, and occasional reaches of perennial streams are present. In many areas, the ephemeral streams lack riparian vegetation distinguished from surrounding uplands, but many of the intermittent and perennial streams have well-developed riparian woodlands and shrublands associated with their banks. Wind energy development has also resulted in alteration of surface hydrology, particularly where access roads required construction of culverts in small, tributary

headwaters. Flood control projects in the Tehachapi Valley have altered hydrology patterns for streams that now flow toward Proctor Lake.

In the Mojave Desert, aquatic features include desert streams and claypans. Linear transportation projects have altered surface hydrology in claypan areas, and urbanization has resulted in removal and redirection of desert stream features. Military uses have altered surface hydrology near Rosamond Lake. Past agricultural uses in the western Antelope Valley resulted in construction of ditches and basins to support irrigation, although many of these features are currently dry and not in use. In urbanized areas, including Lancaster and Palmdale, drainage ditches and retention basins are common. Hydrology of artificial features in the RSA is particularly variable based on precipitation events, irrigation inputs/removal, and other management activities.

Impacts on aquatic resources from past and present development include direct and indirect effects on chemical and biological characteristics of aquatic substrates and food webs, and their related potential to increase erosion and associated sediment transport into adjacent aquatic areas. Removal of vegetation and armoring of channel banks resulted in reductions in riparian cover and habitat functions.

Special-Status Plant and Wildlife Species

Past and present development projects and activities have affected special-status plant and wildlife species in the RSA through habitat loss or alteration and direct effects to individual specimens of a species. In the southern San Joaquin Valley portion of the RSA, agricultural, industrial, and urban projects have greatly altered habitat for special-status plant and wildlife species. In the Tehachapi Mountains and foothills, linear transportation projects, including improvements to existing transportation corridors, required culverts, bridge structures, and the removal of habitat potentially supporting special-status plant and wildlife species. Additionally, wind energy development has altered habitat by means of physical barriers (fences) and ongoing maintenance to access turbine facilities. In the Mojave Desert, linear transportation projects, urbanization, military facilities, and past agricultural practices have altered habitat potentially supporting special-status plant and wildlife species.

Direct and indirect effects on special-status plant and wildlife species and their habitats from past and present development include direct loss of individual specimens, displacement of species due to habitat loss, changes in species distribution, and fragmentation. Impacts on drainage patterns and water quality affected plant and animal species and fragmented habitats as described above.

3.19.4.8 Hydrology and Water Resources

Floodplains

The aquatic resources subsection in Section 3.19.4.7 discusses the changes past and present development have rendered to the hydrology and pattern of flooding in the RSA through direct alteration of channel location, size, and flow direction; bank armoring; channel filling; and removal of wetland and riparian vegetation. Many waterbodies have been channelized and drainage systems have been put in place to accommodate agricultural and urban development, but these structures divert flows, may increase flooding problems in the area, and are sometimes unable to contain flood flows due to insufficient drainage capacity. Furthermore, increases in impervious surface over time from urbanization have added to the rate and volume of stormwater runoff, thereby increasing the potential risk for flooding. Flooding problems have resulted in urban areas from high-intensity winter rainstorms, in mountainous areas from stream channel overflow or where streams flow through alluvial valleys, and in desert areas where drainage channels are poorly defined and intermittent, or where ephemeral streams flow across alluvial fans.

Surface Water

The watersheds in the RSA include the South Valley Floor Watershed, Grapevine Watershed, Fremont Valley Watershed, and Antelope Valley Watershed (Figure 3.8-1 in Section 3.8, Hydrology and Water Resources). Over the past 100 years, land use and urbanization have

influenced water quality by changing the stormwater runoff levels and composition. Construction of buildings, highways, driveways, and parking lots has increased runoff by reducing the amount of rain the ground can absorb. Based on the 2011 National Land Cover Database, 4.45 percent of the RSA is covered with impervious surfaces (Xian et al. 2011). Additionally, changes in land use have introduced new sources of pollution in stormwater runoff. Common pollutants contributed to receiving waters in the RSA include pesticides, sediment, heavy metals, nutrients, zinc, copper, arsenic. However, over the past 40 years federal, state, and local regulations enacted have produced positive changes to water quality. Ordinances have strengthened over time, beginning with the federal Water Pollution Control Act of 1972, and later in 1974 with the passage of the Safe Drinking Water Act. The resulting National Pollutant Discharge Elimination System (NPDES) permit program places limits on the amount of pollutants that may be discharged from point sources. This program includes issuance of construction and maintenance best management practices to prevent harmful pollutants from entering stormwater systems. Recent changes provide more stringent controls on construction-related discharges by requiring construction projects 1 acre in size or larger to secure a permit for stormwater discharges.

Groundwater

The groundwater basins in the RSA include the Kern County Subbasin, Tehachapi Valley West Groundwater Basin, Tehachapi Valley East Groundwater Basin, Fremont Valley Groundwater Basin, and Antelope Valley Groundwater Basin (Figure 3.8-5 in Section 3.8, Hydrology and Water Resources). The development of irrigated agriculture has altered the groundwater flow systems, as pumping of groundwater from wells for agricultural use has diminished groundwater supplies. Urban growth has resulted in increased impervious surface area that decreases the infiltration potential, thereby lessening the amount of water able to recharge the groundwater basin. Additionally, ongoing development has resulted in land use changes that introduce new pollutants that can infiltrate the soil, impacting the groundwater quality of the underlying aquifer or groundwater basin. The primary constituents of concern in the groundwater basins include high total dissolved solids, nitrate, arsenic, inorganics, organic compounds, chloride, sodium, boron, and fluoride. For a description of the existing groundwater quality for each of the five aquifers, refer to Section 3.8.5.8, Groundwater.

3.19.4.9 Geology, Soils, Seismicity, and Paleontological Resources

Geology, Soils, and Seismicity

As described in Section 3.9, Geology, Soils, Seismicity, and Paleontological Resources, the RSA for geology, soils, and seismicity is in a seismically active area, has a documented history of significant and recurrent seismic activity, and may be subject to moderate to severe ground shaking during a major earthquake.

Population growth and associated development in the region have increased the number of structures and people potentially exposed to geologic hazards associated with a seismically active region. However, exposure of development to geologic hazards is addressed by a strong regulatory environment in the State of California. Both past and current projects are subject to CEQA and other laws related to geologic hazards and must comply with the California Building Code, Alquist-Priolo Earthquake Fault Zoning Act, and Seismic Hazards Mapping Act, all of which act to reduce geologic hazards.

The mineral resources also experience impacts as a result of growth and development in the RSA. Conversion of open space to urban land uses and the prohibition of resource extraction have diminished the production of resources like aggregate, limestone, natural gas, and oil. Both past and current projects are subject to a regulatory environment focused on production as it affects public safety, and this has diminished production of these resources. The Surface Mining and Reclamation Act addresses the need for a continuing supply of mineral resources and is intended to prevent or minimize the adverse effects of surface mining on public health, property, and the environment. Additionally, the California Department of Conservation, Division of Oil, Gas, and Geothermal Resources, implements regulations that emphasize the responsible

development of oil, natural gas, and geothermal resources in the state through sound engineering practices that protect the environment, prevent pollution, and ensure public safety.

Paleontological Resources

Geologic units in the RSA range in age from the Precambrian (>541 million years ago) to recent times. These geologic units have varying potential for the presence of paleontological resources and fall into the following categories of sensitivity: low or no sensitivity, high sensitivity below 5 feet, and high sensitivity. No known paleontological resources are recorded, nor were they observed during the August 2015 field survey in the project footprint and the 150-foot buffer of any of the B-P Build Alternatives.⁴ However, as there are areas of high sensitivity and high sensitivity below a depth of 5 feet, transportation and development projects in the RSA have the potential to disturb or destroy these resources.

Past and present ground-disturbing activities in the RSA as a result of population growth and related land use conversions, including development of other transportation infrastructure improvements, may have affected paleontological resources, which are unique and nonrenewable. As development has spread beyond urban areas, disturbing previously undisturbed sediments through the conversion of farmland and other open areas to urban or suburban land uses, it is possible that damage to paleontological resources has occurred. However, as transportation and development projects are generally subject to environmental review under CEQA and/or NEPA, many of these projects incorporated appropriate project design features and mitigation measures to avoid or minimize impacts on paleontological resources.

3.19.4.10 Hazardous Materials and Waste

Past and present development has resulted in an increase in the amount of hazardous materials and waste used, stored, and transported in the RSA, as well as an increase in contamination. However, over the past 40 years, numerous laws have been enacted to reduce exposure of people and the environment to hazardous materials and wastes (Section 3.10, Hazardous Materials and Wastes). Both past and current projects are subject to numerous laws, such as the Resource Conservation and Recovery Act, Toxic Substances Control Act, Hazardous Materials Transportation Act, and Hazardous Materials Release Response Plans and Inventory Law, enacted to regulate the transport, use, storage, handling, and disposal of hazardous materials and wastes, and the cleanup of contaminated sites. These laws are designed to minimize the potential for new releases and the risk of exposure to existing contamination.

3.19.4.11 Safety and Security

Population growth and development over the past few decades in the RSA, especially in the Antelope and San Joaquin Valleys, have resulted in an increased demand for emergency services and facilities to adequately serve the population and respond to emergencies. However, much of the increased demand for emergency services in the RSA has been addressed by the payment of applicable “fair-share” development fees.

Wildfire potential has increased in California in the past decade due to recent statewide droughts, uncontrolled vegetation overgrowth, and expansion of urban areas into rural areas. In 2007 and 2008, the California Department of Forestry and Fire Protection prepared Local Responsibility Area (LRA) Maps and State Responsibility Area (SRA) Maps depicting Fire Hazard Severity Zones in each county of California. The B-P Build Alternatives are all located on SRA and LRA land with Moderate and High Fire Hazard Severity Zones. Only B-P Build Alternative 3 is in an SRA Very High Fire Hazard Severity Zone (approximately 6.5 acres). With the CCNM Design Option, the B-P Build Alternatives would be on approximately 694 additional acres of land designated as an SRA High Fire Hazard Severity Zone. With the Refined CCNM Design Option,

⁴ As discussed in Section 3.9, Geology, Soils, Seismicity and Paleontological Resources, not all areas of the alignment were surveyed due to access restrictions, but of the areas surveyed, no paleontological resources were observed.

the B-P Build Alternatives would be on approximately 5 additional acres of land designated as an LRA High Fire Hazard Severity Zone, approximately 300 additional acres of land designated as an SRA Medium Fire Hazard Severity Zone, and approximately 397 additional acres of land designated as an SRA High Fire Hazard Severity Zone. The LMF/MOIS/MOWF sites are not within Moderate, High, or Very High Fire Hazard Severity Zones.

3.19.4.12 Socioeconomics and Communities

Population and Communities

Many communities in the RSA have historically developed along either side of heavy rail or highway corridors that have been in place for a long time. Even though much of the length of the Bakersfield to Palmdale Project Section passes through rural, uninhabited, or sparsely inhabited land, population in the RSA has increased substantially over the past 100 years. The communities support facilities that serve the public, including schools, churches, transit stops, museums, libraries, city halls, fire and police stations, and various other community facilities.

Based on demographic data in the 2009–2013 American Community Survey 5-year estimates, each of the cities and unincorporated communities in the RSA for cumulative population and community impacts demonstrate at least two indicators of community cohesion when compared to the county in which they are located. Palmdale exhibits four out of the seven community cohesion indicators: a high percentage of racial minorities, a high number of Hispanics/Latinos, a high number of owner-occupied residences, and a larger average household size compared to Los Angeles County overall. Edison and Golden Hills each exhibit three of the seven community cohesion indicators. Based on these factors, the City of Palmdale appears to exhibit the highest degree of community cohesion in the RSA for cumulative population and community impacts, followed by Golden Hills and Edison.

Community Cohesion

Community cohesion is the degree to which residents have a sense of belonging to their neighborhood, a level of commitment to the community, or a strong attachment to neighbors, groups, and institutions, usually as a result of continued association over time. Community cohesion indicators include age, ethnicity, household size, owner occupancy, housing tenure, and transit-dependent population.

The RSA for cumulative population and community impacts contains a number of community amenities, particularly in Bakersfield, Lancaster, and Palmdale. These include a California State University campus, a convention center, symphony orchestra and performing arts centers, several museums, parks, and other facilities and public services. The southern San Joaquin Valley and the Antelope Valley also have abundant natural resources, including historic parks and national forests. Smaller communities like Edison and Keene have few local services and residents must travel to obtain access to them.

Several facilities intended for nonmotorized circulation and access—specifically, bicycle lanes—are located in the RSA for cumulative population and community impacts. Again, most are in the larger cities (Bakersfield, Lancaster, and Palmdale). Planning documents for the cities and counties in the RSA recognize the importance of the availability and accessibility of alternative modes of transportation and their impact upon a community's quality of life, and they all plan to add pedestrian and bicycle-friendly features in their communities.

Economy

The southern San Joaquin Valley is driven by the agricultural industry. As such, it is currently one of the most economically depressed areas in the nation due to the low-paying and seasonal nature of agricultural jobs. The region was also one of the hardest hit by the housing market crash in 2008. The unemployment rates remain far higher in the Kern County communities in the RSA than in the state overall.

The Antelope Valley depends heavily on the aeronautical industry, which can fluctuate greatly due to changing levels of government funding, resulting in a similarly fluctuating employment rate. However, the Antelope Valley is connected to downtown Los Angeles via the Metrolink commuter

rail, offering opportunities for Antelope Valley residents to reach places of employment in Los Angeles. Unemployment rates in Lancaster and Palmdale are the same as or slightly higher than those of the state.

Similarly, local government tax revenues declined at the time of the recession but have since rebounded. Funding for K-12 public schools comes from a combination of sources, including federal, state, and local, and depends on factors such as average daily attendance. Twenty-three school districts fall at least partially within the RSA for cumulative economic impacts.

3.19.4.13 Station Planning, Land Use, and Development

Land uses in the RSA are varied but include residential, commercial, and industrial areas interspersed with swaths of rural agricultural areas. The communities in the RSA for cumulative station planning, land use, and development impacts generally follow the existing highway and heavy rail line, where substantial growth has been experienced relatively recently. Development and associated land use changes are expected to continue throughout the RSA.

3.19.4.14 Agricultural Farmland and Forest Land

Urbanization has led to the significant conversion of farmland to nonfarmland use in the RSA over time. Although Kern and Los Angeles Counties have policies in place to protect agricultural land, conversions of Important Farmland continue to occur. As described in Section 3.14, Agricultural Farmland and Forest Land, between 2004 and 2016, both counties reported a reduction in Important Farmland acreage. During this time, approximately 87,049 acres of the Important Farmland in Kern County and 16,660 acres of the Important Farmland in Los Angeles County were converted to nonagricultural uses (Table 3.14-7 in Section 3.14, Agricultural Farmland and Forest Land). These trends are expected to continue in the future as factors such as urbanization and continued population growth and associated development expand, and as economic considerations and lack of available resources such as water lead to the ongoing conversion of agricultural land to nonagricultural use.

3.19.4.15 Parks, Recreation, and Open Space

The allocation of parkland, recreation facilities, and open space in the RSA is connected largely to growth in population and housing. Therefore, as the populations of the counties, cities, and communities in the RSA historically increased, demand for parks, recreation facilities, and open space also increased. A list of parks, recreation areas, and open spaces in the RSA, along with descriptions of those resources, is provided in Section 3.15, Parks, Recreation, and Open Space, particularly in Tables 3.15-4 and 3.15-5.

Table 3.19-5 summarizes the general plan parkland service ratios for the jurisdictions in the cumulative RSA for parks, recreation, and open space resources. Many of the jurisdictions in the RSA acknowledge park, recreation, and open space constraints, including, but not limited to, funding, topography, access, and biological resources. Table 3.19-5 shows that only two jurisdictions—the City of Tehachapi and the County of Los Angeles Antelope Valley Planning Area (Regional Parkland)—do not have parkland deficits currently.

Table 3.19-5 Parkland Standards by Jurisdiction

Jurisdiction	Parkland Service Ratio (Source)	Existing Park Facilities	Existing Park Conditions
Kern County (unincorporated areas)	5 acres per 1,000 residents and 2.5 usable acres per 1,000 residents (Kern County 2007)	Residents in areas in unincorporated Kern County not served by park districts are served by 293 acres of local parks.	The current level-of-service for these residents is 147 acres, or 1.66 acres of parkland per 1,000 residents.
City of Bakersfield	Neighborhood parks: 2.5 usable acres per 1,000 residents (Kern	Total parkland: 2,871.09 acres Local parks: Existing	There is a deficit for mini-parks, neighborhood parks, and community

Jurisdiction	Parkland Service Ratio (Source)	Existing Park Facilities	Existing Park Conditions
	County 2009) General recreation: 4 acres of park and recreation space per 1,000 residents for general recreation opportunities (includes mini-parks, neighborhood parks, community parks, and regional parks) (Kern County 2009)	service ratios: <ul style="list-style-type: none"> ▪ Mini-parks = 0.0663 acre per 1,000 residents ▪ Neighborhood parks = 1.88 acres per 1,000 residents ▪ Community parks = 4.94 acres per 1,000 residents Community park centers: Three recreational centers totaling 81.35 acres Regional parks: Two regional parks totaling 1,119 acres (4.7 acres per 1,000 residents)	parks based on national standards. The current park acreage for local parks (local parks include mini-parks, neighborhood parks, and community parks) is 1.88 acres per 1,000 residents.
City of Tehachapi	3 acres per 1,000 residents (City of Tehachapi 2012)	Approximately 14 acres of parkland and approximately 7,639 acres of natural open space are in the city, for a total of approximately 7,653 acres.	Tehachapi currently exceeds the 68-acre total park requirement, but the vast majority of open space in the city is in natural areas at the city's edges. That open space does not provide for active recreation uses, and most of it is not easily accessible by or within walking distance of most residents.
Los Angeles County (Antelope Valley Planning Area in unincorporated Los Angeles County)	Local park system: 4 acres per 1,000 residents Regional park system: 6 acres per 1,000 residents (Los Angeles County 2015)	Local parkland: 50 acres Regional parkland: 3,870 acres	Based on the defined service ratio, the Antelope Valley Planning Area in unincorporated Los Angeles County has a deficit of 244 acres of local parkland. Based on the defined service ratio, the Antelope Valley Planning Area in unincorporated Los Angeles County has a surplus of 1,573 acres of regional parkland.

Jurisdiction	Parkland Service Ratio (Source)	Existing Park Facilities	Existing Park Conditions
City of Lancaster	5 acres per 1,000 residents (City of Lancaster 2007)	<p>Existing city parks:</p> <ul style="list-style-type: none"> ▪ Total park facility acreage: 566.63 acres ▪ Developed acreage: 404.80 acres ▪ Future development: 161.56 acres <p>The current level-of-service for all parklands and open space is 3.39 acres per 1,000 residents based on 2005 population statistics.</p>	Based on the defined service ratio, the city has a parkland deficit of 1.61 acres per 1,000 residents. Currently, 73.2 percent of the land in Lancaster is undeveloped. Only 218.3 acres, or 0.4 percent, of vacant land in Lancaster is zoned for parks and open space.
City of Palmdale	<p>General parkland: 5 acres per 1,000 residents</p> <p>Active parkland: 3 acres per 1,000 residents</p> <p>Open space: 1 acre per 1,000 residents</p> <p>Other public recreational facilities, including parts of school sites that provide recreation facilities or play fields accessible to the public or other comparable facilities: 1 acre per 1,000 residents) (City of Palmdale 2003)</p>	There are 10 developed parks in the City of Palmdale, providing 193 acres of developed parkland.	Based on the defined service ratios, the city currently needs 381 acres of active parkland, of which 193 acres are available at this time. When the expansion of Marie Kerr Park and construction of the east side park are completed, the deficit will have been reduced by 71 acres.

Source: California High-Speed Rail Authority, 2020

The availability of parks, recreation facilities, and open space is a high community priority for the counties, cities, and communities in the RSA. Recently, efforts to provide for recreational needs in those areas have expanded to include active transportation networks, such as off-street bike paths, on-street bike lanes, and multi-use paths. Several facilities in the RSA are intended for nonmotorized circulation and access—specifically, bicycle lanes. Most of these facilities are in the larger cities (Bakersfield, Lancaster, and Palmdale). Planning documents for the cities and counties in the RSA recognize the importance of the availability and accessibility of alternative modes of transportation and their impact on quality of life. These active transportation networks provide linear recreation opportunities, offer safe alternatives to vehicular travel, and provide connections between various local parks and recreation resources in the RSA.

Funding for the acquisition of land, facility construction, and ongoing maintenance of parks, recreation facilities, and open space can present an economic hardship for a jurisdiction. Some local municipal codes include mechanisms for the payment of park fees and/or the dedication of land for parks, recreational facilities, and open space as part of land development projects. The 1975 Quimby Act (California Government Code Section 66477) allows counties and cities to establish ordinances requiring land developers to set aside land, donate conservation easements, and/or pay in-lieu fees for park improvements. While these fees can be used for the establishment or enhancement of parkland, they cannot be used for the operation and maintenance of park facilities. Therefore, it remains up to the planning jurisdiction to fund the ongoing maintenance of parks, recreation facilities, bikeways, and open space.

In addition to local parks, recreation facilities, and open space, the Pacific Crest National Scenic Trail (PCT) is located in the RSA. The PCT passes through lands owned and managed by federal, state, and county agencies, Native American sovereignties, and private parties along its approximately 2,650-mile-long alignment. The U.S. Forest Service (Pacific Southwest Region of the U.S. Department of Agriculture) has overall responsibility for managing the PCT. The trail is a designated National Scenic Trail. The PCT is a long-distance hiking and equestrian trail closely aligned with the highest parts of the Sierra Nevada and Cascade mountain ranges, and it extends from Mexico through California (including Los Angeles and Kern Counties), Oregon, and Washington, to Canada.

The segment of the PCT in the RSA is approximately 5 miles southeast of Tehachapi and approximately 6 miles northwest of Mojave. An approximately 1.8-mile segment of the PCT is in the RSA for all B-P Build Alternatives. The PCT extends along and crosses existing transportation facilities.

3.19.4.16 Aesthetics and Visual Quality

The RSA includes flat valley floors in the San Joaquin Valley and Antelope Valley, and the mountainous terrain of the Tehachapi Mountains. Visual resources in the RSA include historically significant sites such as La Paz; the historic town center in Lancaster; views of the Sierra Nevada, Greenhorn, and Tehachapi Mountains from the valley floors; and scenic views of the undeveloped, mountainous terrain of the Tehachapi Mountains.

Over the past century, valley floors in the RSA have transformed from open spaces with grasslands and desert vegetation to agricultural regions with open fields and orchards, along with urbanized areas. Visual quality in these valley floors ranges from low in industrial areas to moderately high in urban areas with panoramic desert and mountain views or historic architecture with improved streetscapes. In contrast with the primarily agricultural and urban flatlands, the natural environment predominates in the Tehachapi Mountains, except where development has occurred, such as in the SR 58 and UPRR corridors. Historic cultural resources, including the La Paz, also contribute to the visual character of the Tehachapi Mountains.

3.19.4.17 Cultural Resources

The southern San Joaquin Valley region (i.e., the Tulare Lake and Buena Vista Lake areas) and the Antelope Valley region have long histories of human occupation and therefore have the potential to contain prehistoric and historic archaeological resources as well as historic-era architectural resources (built resources).

Historic and archaeological resources are unique and nonrenewable. For this reason, all detrimental effects to these resources erode a dwindling resource base. Destruction of any single cultural site or resource affects all others in the RSA because as a group they make up the context of the cultural setting. Based on existing inventories and the cultural history of the area, numerous cultural resources, including both archaeological and built resources, are present in the RSA. It is assumed that previously unidentified archaeological resources are also present in the RSA. Past development in the RSA has impacted historic properties and cultural resources.

3.19.5 Environmental Consequences

This section addresses the potential cumulative impacts for each resource. The analysis for each resource considers the resource-specific RSA (Section 3.19.3.2, Definition of Resource Study Area), the affected environment (Section 3.19.4, Affected Environment), future conditions of the RSA (Section 3.19.5.1, Overview of Future Conditions), cumulative projects and their effects (projects listed in Appendix 3.19-A, adjacent HSR project sections, and/or growth projections, as applicable), cumulative effects with the project, and the contribution of the proposed improvements within the Bakersfield to Palmdale Project Section to those cumulative effects. This cumulative analysis includes and evaluates the effects of the B-P Build Alternatives, the portion of the F-B LGA alignment from the intersection of 34th Street and L Street to Oswell Street, the CCNM Design Option, the Refined CCNM Design Option, the Bakersfield and Palmdale stations, and the maintenance facilities, including the LMF, MOWF, and MOIS.

The analysis first considers the impacts of the proposed improvements within the Bakersfield to Palmdale Project Section in combination with the other cumulative projects (listed in Appendix 3.19-A, adjacent HSR project sections, and/or growth projections, as applicable) to determine if there would be a cumulatively significant impact on the resource. If a significant cumulative impact is identified, the second consideration is whether the incremental effect of the proposed improvements within the Bakersfield to Palmdale Project Section (after project-level mitigation) would be cumulatively considerable. Additional feasible mitigation measures are proposed, where appropriate, to mitigate the incremental but cumulatively considerable contribution to a cumulative impact.

For many of the resources, the contribution of the Bakersfield to Palmdale Project Section to cumulative impacts is similar under all of the B-P Build Alternatives or design options. Therefore, the following analysis applies to the B-P Build Alternatives and design options, with remark upon any notable differences between alternatives or design options. The discussion of potential cumulative impacts for each resource area is organized by the timeframe during which they would occur (i.e., construction or operation).

3.19.5.1 Overview of Future Conditions

Projected growth and conversion of land to urban and transportation uses associated with the cumulative condition, reflected in adopted county and city general plans, regional transportation plans/sustainable communities strategies, and the cumulative project list (Appendix 3.19-A), are anticipated to have an environmental effect in the area crossed by the B-P Build Alternatives or design options through 2040. The combined population of Kern and Los Angeles Counties is projected to grow at an average rate of 0.7 percent per year between 2010 and 2040, with an estimated population increase of 2,268,764 people, or approximately 21 percent (Table 3.19-6). Over the 30-year period between 2010 and 2040, projections show that the population of Kern County and Los Angeles County will increase by 68 percent and 17 percent, respectively. In that same timeframe, projections show that the population of Bakersfield, Tehachapi, Lancaster, and Palmdale will increase by 107 percent, 39 percent, 34 percent, and 32 percent, respectively (Kern Council of Governments 2015; California Employment Development Department 2016; Southern California Association of Governments 2016).

Table 3.19-6 Population Projections for Counties and Cities Traversed by the Bakersfield to Palmdale Project Section, 2010–2040

Area	Population in 2010 ¹	Population in 2040	Change from 2010 to 2040
Kern County	839,631	1,413,000²	68.3%
City of Bakersfield	347,483	719,500 ³	107.1%
City of Tehachapi	14,414	20,100 ³	39.4%
Los Angeles County	9,818,605	11,514,000⁴	17.3%
City of Lancaster	156,633	209,900 ⁴	34.0%
City of Palmdale	152,750	201,500 ⁴	31.9%
Two-County Region	10,658,236	12,927,000^{2,4}	21.3%

Sources: ¹ U.S. Census Bureau, 2010

² Kern Council of Governments, 2015

³ Kern Council of Governments, 2014

⁴ Southern California Association of Governments, 2016

The Kern Council of Governments does not provide population projections for the communities of Keene and Rosamond.

The number of housing units and employment in the two-county region are also projected to increase by 2040. Housing is projected to grow at an average rate of 0.7 percent per year between 2015 and 2040, from 3,780,208 to 4,458,000 housing units (a net increase of 677,792

units). Employment is projected to grow at an average rate of 0.5 percent per year between 2015 and 2040, from 5,028,400 to 5,692,000 (a net increase of 663,600). These growth projections are expected to occur regardless of the HSR project. For a detailed discussion of population, housing, and employment growth, refer to Section 3.18.4, Affected Environment, in Section 3.18, Regional Growth.

The adopted county and city general plans and regional transportation plans call for preservation of agricultural land, increased infrastructure to support higher-density urban development, and a focus on growing existing urban development over the spread of rural development. Nevertheless, urban development would continue to result in the conversion of agricultural land, especially for future housing and associated development consistent with the general plans of the area. Under the cumulative condition, VMT would increase; ambient noise levels would increase; demand for public utilities, energy, and water would increase; habitat for wildlife would become less available; the amount of impervious surface would increase and affect the quality and amount of stormwater runoff; demand for public facilities and parks would increase; the land available for agricultural production would decrease; and the visual character of many locations in the cumulative RSA would change from rural to urban.

3.19.5.2 Transportation

The cumulative impact analysis for transportation considers the B-P Build Alternatives, design options, the specific projects identified in Appendix 3.19-A, the adjacent HSR project sections (Fresno to Bakersfield and Palmdale to Burbank), and regional growth projections that, combined, constitute the cumulative condition relevant to transportation. Under the cumulative condition, population in the RSA would continue to increase as a result of cumulative development. Existing and planned improvements to the highway, aviation, conventional passenger rail, and freight rail systems would be constructed to accommodate planned growth in the RSA.

A cumulative transportation impact that would be significant under CEQA would occur if the effects of the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects were to combine to greatly reduce access or circulation in the cumulative RSA. The analysis of operations impacts presented in Section 3.2, Transportation, discusses the localized cumulative impacts of the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects on roadway segments and intersections, including evaluation of impacts on level-of-service; the analysis is not repeated in this section.

Construction

Construction of the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects could result in a cumulative transportation impact that is significant under CEQA if cumulative projects are located near the chosen HSR alignment and have construction schedules that overlap. Temporary impacts due to construction at the station areas and in the urban and rural areas of the alignments, such as road closures and increases in construction-related vehicles and workers, would result in temporary access and circulation disruptions. Such cumulative impacts would include the following:

- In the Bakersfield F Street Station, construction-period cumulative impacts could occur from the combination of the B-P Build Alternatives and roadway improvement projects in Bakersfield, including the 24th Street improvements (B-34),⁵ the Hageman Road extension and expansion (B-35), and the SR 99 auxiliary lane/Rosedale Highway off-ramp improvements (B-36).
- In the Palmdale Station area, cumulative impacts could occur from the B-P Build Alternatives, roadway improvement projects in Palmdale (P-7 through P-32 and LA-4), and development projects close to the station, including the solar facility on the Lockheed Martin campus (P-5) and a wireless telecommunication facility (P-6).

⁵ Numbering in parenthesis after a project corresponds to a specific project listed and mapped in Appendix 3.19-A.

- In the LMF, MOWF, and MOIS areas, cumulative impacts could occur from the B-P Build Alternatives, roadway improvement projects in Lancaster (L-30), and development projects close to the facilities, including the Department of Motor Vehicles facility (L-4), Whit Carter Park expansion (L-16), and residential subdivisions (L-9 through L-15).
- Circulation in rural and urban non-station areas would be affected by road closures as a result of the proposed improvements within the Bakersfield to Palmdale Project Section in combination with transportation projects in Kern County (K-8 and K-14), Los Angeles County (LA-5), and the City of Lancaster (L-17 through L-27), as well as development projects close to the proposed improvements within the Bakersfield to Palmdale Project Section in the rural areas and urban areas outside the station areas. These projects include the Redwood Cluster Solar project in Kern County (K-10); a 154-acre tentative tract map in Los Angeles County (LA-2); residential, commercial, and industrial facilities in Bakersfield (B-6, B-15, B-17, B-18, B-20, and B-21); residential/nursing, medical, hospitality, and gas station facilities in Tehachapi (T-2, T-4, T-5, T-7, and T-8); and residential, commercial, industrial, and recreational facilities in Lancaster (L-2, L-5, L-15, and L-16).

As discussed in Section 3.2, Transportation, the Authority would implement a Construction Transportation Plan as a standardized impact avoidance and mitigation feature (IAMF) before commencing construction activities. The plan would reduce impacts by requiring staggered construction periods for overlapping projects in coordination with county and city building permits. Staggering construction activities would reduce cumulative construction effects by spacing activities out over multiple years. TR-IAMF#3, Off-Street Parking for Construction-Related Vehicles, would avoid conflicts with passing traffic. TR-IAMF#4, Maintenance of Pedestrian Access, would allow pedestrians to pass during construction. TR-IAMF#5, Maintenance of Bicycle Access, would allow passage of bicyclists during construction. TR-IAMF#6, Restriction on Construction Hours, would minimize construction traffic on roads during peak travel hours. TR-IAMF#9, Protection of Freight and Passenger Rail during Construction, would avoid interruption of rail traffic. TR-IAMF#11, Maintenance of Transit Access, would minimize conflicts over bus access. In addition, Mitigation Measure TRAN-MM#2 includes the requirements for flaggers and temporary traffic control personnel at the specific locations described above. As discussed in Section 3.2, Transportation, with these IAMFs and mitigation measure, the proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to cumulative transportation impacts.

CEQA Conclusion

Construction of cumulative projects would result in a potentially significant cumulative impact on transportation because access and circulation disruptions could occur throughout the construction period at various intensities. However, the proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to this cumulative impact because the design characteristics of the alternatives and mitigation measure include effective measures to maintain circulation and adequate access during construction by providing detours that allow 24-hour access; therefore, the incremental effect of the proposed improvements within the Bakersfield to Palmdale Project Section would not be cumulatively considerable, and CEQA does not require cumulative mitigation.

Operation

Operation of any of the B-P Build Alternatives or design options, in combination with cumulative transportation projects, would improve long-term circulation in the RSA and accessibility of the RSA from other parts of the state. Cumulative projects that would contribute to improved circulation include the SR 58 widening, SR 184 widening, 24th Street improvements, and High Desert Corridor construction (K-13, B-34, and LA-4). Highway improvements planned in the RSA would not reduce daily VMT but would help to reduce future congestion in some areas.

The HSR system would provide a new regional surface transportation system that complements and connects with existing transportation modes. At a regional level, HSR service would reduce VMT by providing motorists an alternative to existing interregional and intercity freeways and

highways. Currently, there are about 77.55 billion annual VMT in the RSA (4.15 billion in Kern County and 73.40 in Los Angeles County). Without the HSR project, VMT in the RSA would reach approximately 91.85 billion annually by 2040, comprising 5.79 billion in Kern County and 86.06 billion in Los Angeles County. However, implementation of the HSR project under a medium ridership scenario would reduce VMT by approximately 0.841 billion annual VMT (14.5 percent) in Kern County and 0.931 billion annual VMT (1.1 percent) in Los Angeles County. Under a high ridership scenario, the HSR project would reduce annual VMT by approximately 1.15 billion (or 17.3 percent) in Kern County and 1.29 billion (or 1.5 percent) in Los Angeles County (Section 3.3, Air Quality and Global Climate Change). This reduction in total VMT would reduce traffic and congestion on existing roadways, and improve circulation. In addition, the B-P Build Alternatives and design options would be grade-separated from freeways, highways, and roads, allowing vehicular traffic to pass unimpeded under or over the rail corridor. Therefore, in most cases, the B-P Build Alternatives and design options would not interfere with traffic on existing roadways.

Operation of the proposed improvements within the Bakersfield to Palmdale Project Section in combination with cumulative projects would have the potential to affect the level-of-service at roadways and intersections. The project-level analysis of impacts on level-of-service at roadways and intersections contained in Section 3.2, Transportation, includes consideration of future conditions combined with the Bakersfield to Palmdale Project Section. These future conditions include consideration of cumulative projects and therefore represent the cumulative condition. As such, the project-level analysis evaluates the potential cumulative effects and includes mitigation measures to address these effects. Please refer to Impact TR-8 in Section 3.2, Transportation, for a discussion of these effects and the associated mitigation measures.

CEQA Conclusion

As explained in Section 3.2, traffic congestion (including changes in LOS) is not considered a significant environmental impact under CEQA. Operation of the proposed improvements within the Bakersfield to Palmdale Project Section, in combination with cumulative projects, would improve long-term circulation in the RSA and accessibility of the RSA from other parts of the state, which would be a cumulatively beneficial impact under CEQA. Therefore, no mitigation measures are required for cumulative impacts.

3.19.5.3 Air Quality and Global Climate Change

The cumulative impact analysis for air quality considers the proposed improvements within the Bakersfield to Palmdale Project Section the specific projects identified in Appendix 3.19-A, the adjacent HSR project sections (Fresno to Bakersfield and Palmdale to Burbank), and regional growth projections.

The SJVAB is currently in federal nonattainment for O_3 and $PM_{2.5}$, and state nonattainment for O_3 , PM_{10} , and $PM_{2.5}$. The Mojave Desert Air Basin is in federal nonattainment for O_3 and state nonattainment for O_3 and PM_{10} . General plans for the Cities of Bakersfield and Palmdale and for the County of Kern indicate continued land development and population growth in the region over the next 25 years, which would increase regional emissions. However, increasingly stringent federal and state emission-control requirements and replacement of older, higher-polluting vehicles with newer, less-polluting ones would reduce basin-wide emissions under the cumulative condition. In addition, air district rules and plans have been established to bring the affected air basins into compliance with the National Ambient Air Quality Standards and California Ambient Air Quality Standards that would reduce emissions, notwithstanding growth that would increase regional emissions.

A cumulative air quality impact that would be significant under CEQA would occur if the proposed improvements within the Bakersfield to Palmdale Project Section would result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in nonattainment under an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for O_3 precursors). A cumulative GHG emissions impact that would be significant under CEQA would occur if the proposed improvements within the Bakersfield to Palmdale Project Section would conflict with an applicable plan, policy, or

regulation adopted for the purpose of reducing the emissions of GHGs or would generate GHG emissions that may have a significant impact on the environment.

Construction

Air Pollutant Emissions

Construction of the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects would temporarily increase regional emissions of air pollutants and may cause or exacerbate an exceedance of air quality standards. In addition, cumulative projects would have volatile organic compound, nitrogen oxides (NO_x), PM₁₀, and PM_{2.5} emissions during construction. Because the SJVAB is currently designated as nonattainment for the federal O₃ and PM_{2.5} standards and the state O₃, PM_{2.5}, and PM₁₀ standards, and the Mojave Desert Air Basin is currently designated as federal nonattainment for O₃ and state nonattainment for O₃ and PM₁₀, cumulative projects constructed at the same time as the project would likely exceed an air quality standard or contribute to an existing or projected air quality exceedance for these criteria pollutants.

As discussed in Section 3.3, Air Quality and Global Climate Change, the predominant pollutants associated with construction of the proposed improvements within the Bakersfield to Palmdale Project Section would be fugitive dust (PM₁₀ and PM_{2.5}) from earthmoving and disturbed earth surfaces, and combustion pollutants (particularly O₃ precursors [NO_x and volatile organic compounds]) from heavy equipment and trucks. The proposed improvements within the Bakersfield to Palmdale Project Section would incorporate IAMFs to reduce emissions of air pollutants during construction. AQ-IAMF#1, Fugitive Dust Emissions, would include measures to avoid or minimize fugitive dust emissions, and AQ-IAMF#2, Selection of Coatings, would avoid the potential to create air pollutants from off-gassing of volatile organic chemicals. AQ-IAMF#3, Renewable Diesel, would reduce GHG emissions and particulate matter emissions. AQ-IAMF#4, Reduce Criteria Exhaust Emissions from Construction Equipment, would reduce criteria pollutant emissions by requiring Tier 4 engines for construction equipment. AQ-IAMF#5 would reduce emissions from haul trucks, while AQ-IAMF#6 would reduce air quality impacts from concrete batch plants. However, even accounting for these IAMFs, these pollutants could combine with emissions from other construction projects and create a cumulative impact on air quality that would be significant under CEQA.

For the proposed improvements within the Bakersfield to Palmdale Project Section, a mitigation measure would offset construction and other off-site emissions through a voluntary emissions reduction agreement and the purchase of emission offsets (see Section 3.3.8, Mitigation Measures, of Section 3.3, Air Quality and Global Climate Change, for information on the mitigation measure). The mitigation measure would reduce volatile organic compound and NO_x emissions to a less than significant level; however, the offset programs are not applicable to CO emissions and CO emission impacts would therefore not be reduced to a less than significant level. All B-P Build Alternatives, the F-B LGA from the intersection of 34th Street and L Street to Oswell Street, the CCNM Design Option, and the Refined CCNM Design Option would have significant and unavoidable criteria pollutant (CO) air quality impacts after mitigation during the construction period. No additional mitigation is available to reduce the cumulative impact, other than the mitigation measures for the project already identified in Section 3.3. Therefore, the incremental effect of the proposed improvements within the Bakersfield to Palmdale Project Section would be cumulatively considerable.

Greenhouse Gas Emissions

Construction of the proposed improvements within the Bakersfield to Palmdale Project Section would require the use of heavy equipment and trucks. The use of construction equipment and trucks would result in a one-time increase in GHG emissions that would affect global climate change through the release of emissions into the atmosphere as described in Impact AQ #3 in Section 3.3.6.3, High-Speed Rail Build Alternatives, in Section 3.3, Air Quality and Global Climate Change. These emissions would be offset within less than 2 days of commencing HSR operation because of reduced passenger vehicle travel on roadways and reduced passenger travel by

aircraft. Based on the short offset period, the net effect of the proposed improvements within the Bakersfield to Palmdale Project Section would be to reduce GHG impacts. This net reduction in GHG impacts would be consistent with California's statewide goals identified in Assembly Bill 32 and Senate Bill 32. Therefore, because the project meets these goals by reducing GHG emissions overall, construction of the proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to cumulative impacts on climate change.

CEQA Conclusion

Construction of the proposed improvements within the Bakersfield to Palmdale Project Section in combination with cumulative projects has the potential to increase emissions of criteria pollutants for which the RSA is in nonattainment under an applicable federal or state ambient air quality standard. Air pollutant emissions from construction of the Bakersfield to Palmdale Project Section would be reduced with the purchase of offsets, but offsets would not be available to reduce CO impacts to a less than significant level. Therefore, the proposed improvements within the Bakersfield to Palmdale Project Section in combination with cumulative projects would result in a significant cumulative impact under CEQA. No additional mitigation is available to reduce the cumulative impact. The proposed improvements within the Bakersfield to Palmdale Project Section would result in no net increase in GHG emissions overall. Therefore, the incremental effect of proposed improvements within the Bakersfield to Palmdale Project would not be cumulatively considerable, and CEQA does not require any cumulative mitigation for GHG emissions.

Operation

Air Pollutant Emissions

On a regional scale, past, present, and foreseeable projects would contribute to traffic congestion associated with long-term growth and worsen air quality. In addition, cumulative projects would generate air pollutant emissions during operation, primarily transportation and transit projects or development projects that would generate additional traffic trips. Although cumulative air emissions would be generated in the region, operation of the HSR project in the Bakersfield to Palmdale Project Section would help the region attain its air quality standards and plans by reducing the amount of regional traffic and providing an alternative mode of transportation.

As discussed in detail in Section 3.3, Air Quality and Global Climate Change, operation of the HSR project in the Bakersfield to Palmdale Project Section would benefit regional air quality by reducing automobile and airplane emissions, which would reduce criteria pollutants and mobile-source air toxics. Summaries of the regional criteria pollutant emissions associated with HSR operation are shown in Tables 3.3-32 through 3.3-41 in Section 3.3, Air Quality and Global Climate Change. The reduction in emissions would help the region attain air quality standards and plans, and the cumulative effect would be beneficial.

Greenhouse Gas Emissions

Cumulative development is projected to result in thousands of new homes and millions of square feet of new retail, commercial, and industrial uses that would generate GHG emissions from fossil fuel combustion and energy usage. There is a possibility that the demand for electricity from operation of the HSR system would result in indirect GHG emissions from power generation facilities. However, as discussed in Section 3.3, Air Quality and Global Climate Change, under Impact AQ #10 (Greenhouse Gas Analysis during Operation), operation of the HSR project in the Bakersfield to Palmdale Project Section is predicted to result in a net reduction in statewide GHG emissions under both future conditions (opening year and horizon year). The analysis estimated the potential GHG emission changes from reduced on-road VMT, reduced intrastate airplane travel, and increased demand for electricity. Compared with existing conditions, all B-P Build Alternatives or design options would reduce GHG emissions by amounts similar to those shown below because the B-P Build Alternatives (whether or not the CCNM Design Option or Refined CCNM Design Option are implemented) would reduce VMT and intrastate airplane travel in a similar manner and would require a similar amount of electricity for operation.

CEQA Conclusion

Under CEQA, operation of the HSR project within the Bakersfield to Palmdale Project Section in combination with cumulative projects would help the region attain air quality standards and plans, and the cumulative effect would be beneficial. Operational GHG impacts would be beneficial because the project would result in a statewide reduction of GHG emissions. Therefore, the cumulative impact would be less than significant. CEQA does not require any cumulative mitigation.

3.19.5.4 Noise and Vibration

The cumulative impact analysis for noise considers the proposed improvements within the Bakersfield to Palmdale Project Section, the specific projects identified in Appendix 3.19-A, and the adjacent HSR project sections (Fresno to Bakersfield and Palmdale to Burbank), which combined constitute the cumulative condition relevant to noise and vibration. Under the cumulative condition, increased population and associated increased VMT on local and regional roadways would lead to increased traffic-associated noise in the RSA that could incrementally increase ambient volumes.

A cumulative noise or vibration impact that would be significant under CEQA would occur if activities related to the proposed improvements within the Bakersfield to Palmdale Project Section, in combination with noise or vibration generated by cumulative projects, would expose people to harmful noise or vibration levels. A cumulative noise impact that would be significant under CEQA could occur from either a temporary and permanent increase in ambient noise levels in the RSA, and result from noise-generating activities combined during construction or operation of the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects. These impacts would be considered a cumulative impact that would be significant under CEQA if the noise levels from train operations, combined with noise emissions from other projects, exceed standards for severe impacts (as established by the FRA) for high-speed ground transportation or if traffic noise emissions exceed Federal Highway Administration standards, as established in the Caltrans Traffic Noise Analysis Protocol. Additionally, construction noise emissions from multiple projects could combine to form a cumulative impact that would be significant under CEQA if these combined emissions exceed FRA construction noise assessment criteria (Section 3.4, Noise and Vibration).

Construction

Noise

Construction of the proposed improvements within the Bakersfield to Palmdale Project Section in combination with cumulative projects, such as the BNSF Improvement Project (K-8), SR 184 widening (K-14), 24th Street improvements (B-34), Tehachapi Walmart project (T-11), High Desert Corridor (LA-4), Northwest 138 Corridor Improvement Plan (LA-5), and Lockheed Martin solar facility (P-5), would result in temporary and intermittent noise effects from the use of construction equipment. While construction activities would generate noise levels that could result in individual impacts requiring project-specific mitigation, it is not considered likely that these would combine with the noise-generating activities of other projects to result in cumulative noise impacts. For this to occur, construction of multiple projects generating high noise levels would have to occur simultaneously and very close to sensitive receptors such that they combined to create noise levels that exceeded federal (FRA and Federal Highway Administration) standards. This scenario is unlikely to occur because the construction of planned projects would be temporary, and the projects do not generally have overlapping or adjacent construction footprints. Therefore, there would not be a cumulative noise impact in the RSA.

As described in Section 3.4, Noise and Vibration, construction of the proposed improvements with the Bakersfield to Palmdale Project Section would involve activities such as demolishing existing structures; handling, storing, hauling, excavating, and placing fill; and building aerial structures, bridges, HSR electrical systems, and rail beds that include road modifications, and utility upgrades and relocations. All of these activities would introduce new temporary sources of noise from construction equipment, and their associated noise emissions are anticipated to affect

sensitive receptors under all B-P Build Alternatives. The B-P Build Alternatives include a measure, NV-IAMF#1, Noise and Vibration, requiring the construction contractor to comply with FRA guidelines for noise and vibration (FRA 2012). Implementation of FRA guidelines would partially minimize noise and vibration impacts on sensitive receptors; however, noise and vibration generated by construction activities could still exceed thresholds at nearby sensitive receptors during construction of the B-P Build Alternatives. Therefore, the B-P Build Alternatives would implement Mitigation Measure NV-MM#1, Construction Noise Mitigation, which requires the contractor to maintain noise levels below FRA construction noise criteria at sensitive receptors. As discussed in Section 3.4.8, Mitigation Measures, of Section 3.4, Noise and Vibration, with incorporation of this mitigation measure, the proposed improvements within Bakersfield to Palmdale Project Section would not cause or contribute to a cumulative noise impact during construction.

Vibration

Similar to noise, construction of the proposed improvements within the Bakersfield to Palmdale Project Section in combination with cumulative projects, such as the BNSF Improvement Project (K-8), SR 184 widening (K-14), 24th Street improvements (B-34), Tehachapi Walmart project (T-11), High Desert Corridor (LA-4), Northwest 138 Corridor Improvement Plan (LA-5), and Lockheed Martin solar facility (P-5), would result in temporary and intermittent ground-borne vibration from the use of construction equipment. If these vibration levels exceeded standards for nearby sensitive receptors, they could damage structures and would be considered a cumulative impact that would be significant under CEQA. The construction of planned transportation projects could cause cumulative vibration impacts on sensitive receptors if construction schedules for these projects overlap and if work that generates high vibration levels takes place simultaneously on multiple sites near sensitive receptors.

While there are few construction activities that generate high levels of vibration (see discussion in Section 3.4, Noise and Vibration), impact pile driving in particular can result in damaging and annoying ground-borne vibration. Ground-borne vibration generally travels only short distances from the vibration source and does not readily combine with other sources of vibration to increase in magnitude because of differing frequencies. Therefore, even if construction activities were taking place on adjacent projects, it is unlikely that there would be multiple vibration sources (such as impact pile drivers) close to one another, generating high levels of vibration at the same frequency and at the same time, during construction near sensitive receptors. Nevertheless, the B-P Build Alternatives include a project-level mitigation measure, N&V-MM#2, Construction Vibration Mitigation Measures, requiring the use of alternative methods to pile driving (such as cast-in-drilled-hole) that would reduce potential vibration impacts.

CEQA Conclusion

No cumulative noise impacts are anticipated during construction of cumulative projects. The proposed improvements within the Bakersfield to Palmdale Project Section would include an IAMF to minimize construction noise emissions and a mitigation measure that requires the contractor to comply with FRA construction noise criteria. Therefore, there would not be a significant cumulative construction noise impact under CEQA caused by or to which the proposed improvements within the Bakersfield to Palmdale Project Section would contribute. Because of the nature of vibration transmission, no cumulative impacts are anticipated during construction. Therefore, CEQA does not require any additional mitigation.

Operation

Noise

As discussed in Section 3.4, Noise and Vibration, increased vehicle and train traffic volumes from cumulative projects, such as the SR 184 widening (K-14), High Desert Corridor (LA-4), Northwest 138 Corridor Improvement Plan (LA-5), and BNSF Improvement Project (K-8), as well as the potential double-tracking of the UPRR, in combination with traffic-related to operation of any of the B-P Build Alternatives or design options would permanently increase noise levels in the RSA and result in a cumulative impact that would be significant under CEQA. The estimated

contribution from vehicle and train traffic to the cumulative noise exposure is anticipated to result in an increase of 3.5 dBA community noise equivalent level (CNEL) in ambient noise levels in areas near the B-P Build Alternatives in 2040. The B-P Build Alternatives include project-level mitigation aimed at reducing operational noise impacts, as discussed in Section 3.4.8, Mitigation Measures, of Section 3.4, Noise and Vibration. Although these measures would reduce noise impacts of the B-P Build Alternatives through the use of sound walls and other techniques, the B-P Build Alternatives in combination with cumulative projects would still have the potential to exceed significance thresholds for noise at sensitive receivers and result in a cumulative impact that would be significant under CEQA. The number of sensitive receptors for which significance thresholds for noise may be exceeded would vary depending on which of the B-P Build Alternatives is selected. After mitigation, Alternative 5 would have the largest incremental impact on noise because it would severely affect 578 sensitive receptors along the alignment. Alternative 3 would follow, severely affecting 516 sensitive receptors. Alternatives 1 and 2 would result in the smallest incremental noise impacts, as they would each severely affect 502 sensitive receptors. No mitigation is available to address this cumulative impact.

La Paz, located in Keene, California, is one of the sensitive receptors that would be subject to operational noise from the B-P Build Alternatives. As a National Historic Landmark, this property is particularly sensitive to noise impacts. The B-P Build Alternatives, without selection of the CCNM Design Option or Refined CCNM Design Option, would be located approximately 1,140 feet from the closest noise-sensitive location at La Paz. At this distance, with incorporation of project-level mitigation measures, the cumulative noise impact from the B-P Build Alternatives, in combination with noise from cumulative projects, would not exceed significance thresholds for noise at sensitive receivers and therefore would not result in a cumulative impact that would be significant under CEQA. With implementation of the CCNM Design Option, the alignment would be located farther away (approximately 1,640 feet from the nearest building of La Paz) and would include a sound wall which would reduce noise impacts on this facility compared to the B-P Build Alternatives without the CCNM Design Option. With implementation of the Refined CCNM Design Option, noise impacts would be further reduced compared to Alternatives 1, 2, 3, or 5 or the CCNM Design Option.

Vibration

Existing vibration sources consist primarily of train operations in the RSA. Anticipated additional freight train traffic on the UPRR would result in increased vibration levels. Operation of the B-P Build Alternatives or design options would also increase vibration levels along the alignment. This freight and HSR operations are separated for rail safety reasons and do not overlap in a way such that ground-borne vibration would readily combine. Therefore, there would not be a cumulative vibration impact.

CEQA Conclusion

Operation of the B-P Build Alternatives or design options and cumulative projects would generate noise levels that exceed standards at sensitive receptors, which would be a significant cumulative impact under CEQA. After mitigation, Alternative 5 would have the largest incremental impact on noise because it would severely affect 578 sensitive receptors along the alignment. Alternative 3 would follow, severely affecting 516 sensitive receptors. Alternatives 1 and 2 would result in the smallest incremental noise impacts, as they would each severely affect 502 sensitive receptors. Implementation of the CCNM Design Option and Refined CCNM Design Option would reduce the number of sensitive receptors that would be severely affected under any of the B-P Build Alternatives as no impacts to La Paz would occur. Nonetheless, the incremental contribution of operation of the HSR project in the Bakersfield to Palmdale Project Section would be cumulatively considerable. No additional mitigation is available to address cumulative impacts.

Because of the nature of vibration transmission, no cumulative impacts are anticipated during operations. Therefore, CEQA does not require any additional mitigation.

3.19.5.5 Electromagnetic Interference and Electromagnetic Fields

The cumulative impact analysis for EMI/EMF considers the B-P Build Alternatives, design options, the specific projects identified in Appendix 3.19-A, the adjacent HSR project sections (Fresno to Bakersfield and Palmdale to Burbank), and growth projections throughout the area that, combined, constitute the cumulative condition relevant to EMI/EMF.

Under the cumulative condition, ongoing development and agricultural operations are expected to continue in the cumulative RSA. The use of electricity and radio frequency communications would increase because of increased development, greater use of electrical devices, and technological advances in wireless transmission (such as wireless data communication).

A cumulative EMI impact that would be significant under CEQA would occur if the combined impact of the proposed improvements within the Bakersfield to Palmdale Project Section, cumulative projects, and anticipated growth in the region combined to expose people to a documented EMF health risk, including a field intensity over the limit of an applicable standard, or if these EMFs interfered with unshielded sensitive equipment such as a medical equipment or devices.

Construction

As discussed in Section 3.5, Electromagnetic Interference and Electromagnetic Fields, existing standards for human exposure to EMI or EMF would not be exceeded during construction inside or outside the right-of-way of the proposed improvements within the Bakersfield to Palmdale Project Section. Because cumulative projects in the RSA are construction projects with the same types of impacts that would result from construction of the proposed improvements within the Bakersfield to Palmdale Project Section, and because these projects would not result in the types of activities that may cause general EMI or EMF interferences during construction, the projects would not approach the standards for human exposure to EMF. Therefore, those projects in combination with the proposed improvements within the Bakersfield to Palmdale Project Section would not result in cumulative EMF impacts on humans that would be significant under CEQA.

CEQA Conclusion

The proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects would comply with standards established to prevent interference and would not combine to result in cumulative EMI/EMF impacts under CEQA. Therefore, CEQA does not require mitigation.

Operation

As discussed in Section 3.5, Electromagnetic Interference and Electromagnetic Fields, existing standards for human exposure to EMI or EMF would not be exceeded inside or outside the right-of-way of the proposed improvements within the Bakersfield to Palmdale Project Section. Although some of the cumulative projects in the RSA would result in the types of activities that may cause general EMI or EMF during operation, the uses associated with these projects are not anticipated to result in general EMI or EMF that approach the standards for human exposure to EMF.

Radio systems used for the proposed improvements within the Bakersfield to Palmdale Project Section would comply with standards established to prevent interference with other neighboring communications systems. These standards are listed in Appendix 2-D of this EIR/EIS. Cumulative projects using electromagnetic communications systems also must comply with these standards.

For the proposed improvements within the Bakersfield to Palmdale Project Section, the potential sensitive locations identified are the Antelope Valley Enrichment Services, Family Urgent Care, and North Valley Veterinary Clinic. However, none of these facilities currently operate magnetically sensitive imaging equipment, but provide X-ray and lab work services only (which are not sensitive to magnetic fields).

CEQA Conclusion

The proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects would comply with standards that have been established to prevent interference and would not combine to result in cumulative EMI/EMF impacts under CEQA. Therefore, CEQA does not require mitigation.

3.19.5.6 Public Utilities and Energy

The cumulative impact analysis for public utilities and energy evaluates potential effects of the proposed improvements within the Bakersfield to Palmdale Project Section, the specific projects listed in Appendix 3.19-A, the adjacent HSR project sections (Fresno to Bakersfield and Palmdale to Burbank), and growth projections which combined constitute the cumulative condition relevant to public utilities. This development and continued population growth anticipated in the cumulative RSA would result in corresponding increases in demand for utility services, storm drain facilities, water use (including irrigation), communications, and gas services. The planned development and growth would also contribute to cumulative increases in demands on the existing utility and electricity infrastructure in the cumulative RSA.

A cumulative impact on public utilities or energy that would be significant under CEQA would occur if development and growth occurred faster than the local community utility, landfill and waste handling, and energy providers could accommodate, and if demand levels exceeded the capacity of existing infrastructure. An impact would also occur if construction of new utility or energy services, facilities, and systems was necessary to accommodate the increased demand and resulted in other direct or indirect impacts on the environment. These projects are planned or approved to accommodate the growth projections in the area. As discussed in Section 3.6.5, Affected Environment, of Section 3.6, Public Utilities and Energy, local utilities have capital improvement plans to accommodate the anticipated population growth. These improvements include expansion of the wastewater treatment plants and infrastructure additions, as well as upgrades to provide services to growing populations.

Construction

Public Utilities

Construction of the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects may require the temporary shutdown of utility lines to safely move, extend, or connect to those lines. Relocation, extension, expansion, and connection of utilities as a result of development are an everyday practice throughout California. As with any project, the Authority has been coordinating with utility providers to plan for the protection or relocation of utility crossings and infrastructure in the RSA. This coordination would take place throughout project construction. The proposed improvements within the Bakersfield to Palmdale Project Section and all other developments in the San Joaquin and Antelope Valleys, such as the High Desert Corridor project (LA-4), would adhere to standard practices for the provision and relocation of utilities during construction. These include locating and marking utilities prior to construction; designing and relocating utilities, where necessary, under the supervision of the utility provider prior to initiation of project construction; and planning and notifying customers of any temporary utility interruptions prior to connecting project facilities to existing utilities or tying in relocated utility infrastructure to the existing utility system. Because of the short duration of the planned HSR interruptions during construction, the interruption notification procedures, and the standard practices for utility identification, construction of the proposed improvements within the Bakersfield to Palmdale Project Section, in combination with cumulative projects, would not result in a cumulative impact on public utilities that would be significant under CEQA.

Electricity Demand

Construction of the proposed improvements within the Bakersfield to Palmdale Project Section, in combination with cumulative projects, would result in temporary increases in demand for energy. Although construction of the cumulative projects listed in Appendix 3.19-A (including the Canyons (K-1), the Grapevine (K-9), and the Oak Tree Village (T-7) projects), in combination with the

proposed improvements within the Bakersfield to Palmdale Project Section, would result in incremental increases in electricity demand, the energy used would not require significant additional capacity or substantially increase peak- or base-period demands for electricity and other forms of energy. Most construction activities for the projects evaluated under the cumulative scenario, as well as the proposed improvements within the Bakersfield to Palmdale Project Section, would not use substantial amounts of electricity from the statewide grid, but would rely primarily on fossil fuels to operate construction equipment and vehicles. The SJVAPCD, EKAPCD, and AVAQMD require implementation of emission control procedures for all large development projects in the San Joaquin Valley, as discussed in Section 3.3, Air Quality and Global Climate Change. Therefore, construction of the proposed improvements within the Bakersfield to Palmdale Project Section, in combination with cumulative projects, would have not result in a cumulative impact on electricity demand that would be significant under CEQA.

Water Infrastructure and Water Resources

Construction activities associated with the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects, such as the BNSF Improvement Project (K-8), SR 184 widening (K-14), 24th Street improvements (B-34), Tehachapi Walmart project (T-11), High Desert Corridor (LA-4), Northwest 138 Corridor Improvement Plan (LA-5), and Lockheed Martin solar facility (P-5), would use water to prepare concrete, increase the water content of soil to optimize compaction, control dust, and re-seed disturbed areas. Cumulative projects close to the proposed improvements within the Bakersfield to Palmdale Project Section would also use water resources that may come from similar sources. However, as discussed in Section 3.6, Public Utilities and Energy, construction of the proposed improvements within the Bakersfield to Palmdale Project Section would result in a net decrease in annual water consumption for the area impacted by construction when annualized over a 5-year period, largely as a result of removing farmland from agricultural production. It is estimated that the water use during construction of the project would only be 5.5 percent of existing water use on an annual basis for the project footprint (Appendix 3.6-B, Technical Memorandum: Water Usage Analysis for the HSR Bakersfield to Palmdale Project Section). Because construction water demand for the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects is intermittent, limited, and of short duration, it would not drive the need for additional water infrastructure. The construction water demand for the proposed improvements within the Bakersfield to Palmdale Project Section would not require the development of additional water facilities and would have no effect on water infrastructure and resources.

Solid Waste/Recycling Facilities

Construction of the proposed improvements within the Bakersfield to Palmdale Project Section, in combination with cumulative projects, would result in contributions of solid waste and debris to regional landfills. Cumulative projects that would contribute waste to landfills include any listed in Appendix 3.19-A, especially those that require demolition of existing facilities or infrastructure, such as the 21,000-square-foot retail building at 401 Union Avenue (B-12) and 50-unit apartment complex at 1006 Baker Street (B-17). Vegetation removal, grading, and demolition of existing structures during construction would generate solid waste. As standard practice for the proposed improvements within the Bakersfield to Palmdale Project Section, construction and demolition waste would be diverted from landfills through reuse or recycling. Waste would either be segregated and recycled at a certified facility or disposed of (for mixed or not segregated waste) at a certified recycling facility. State law requires a minimum of 50 percent of construction waste be diverted from landfills. This requirement applies to the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects. The Authority's 2013 sustainability policy requires a higher diversion rate, specifying that 100 percent of steel and concrete would be recycled and a minimum of 75 percent of construction waste would be diverted from landfills (Authority 2016). The proposed improvements within the Bakersfield to Palmdale Project Section would therefore comply with the Local Government Construction and Demolition Guide (Senate Bill 1374) by exceeding the state's solid waste diversion goals.

The nonhazardous and hazardous solid waste landfills serving the RSA currently are not expected to reach their planned capacity before 2040, with the exception of the Tehachapi Landfill. As described in Section 3.6, Public Utilities and Energy, adequate remaining capacity exists for all other RSA landfills to accommodate the HSR system and other planned projects in the RSA. It is estimated that the total volume of construction and demolition material would be a maximum of 1.3 million cubic yards before recycling (approximately 1 percent of the total remaining capacity of the five active landfills that accept construction and demolition material). In actual practice, after diversion construction and demolition materials would occupy approximately 0.26 percent of the total remaining capacity of the active landfills. State regulations, such as Assembly Bill 939, require local governments to manage solid waste reuse and disposal. Additional landfill capacity is expected to be developed in the region to meet future demand beyond that of the cumulative projects evaluated herein. The expansion of existing facilities and construction of new facilities would be addressed under separate environmental review completed for specific future projects. Because state law and the general provisions of the Authority's construction contracts require recycling of waste generated by construction, landfill capacity is anticipated to be sufficient for the combined demand of the cumulative projects evaluated herein, and construction of the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects would not result in a cumulative impact on solid waste facilities that would be significant under CEQA.

CEQA Conclusion

Given the short duration of interruptions to public services during construction of the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects, as well as interruption notification procedures and standard practices for utility identification, the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects would not result in a significant cumulative impact on public utilities. Additionally, existing public utilities have adequate capacity and infrastructure to support demand for electricity, water, and solid waste disposal from existing and planned development, including construction of the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects. Therefore, CEQA does not require any mitigation.

Operation

Public Utilities

With the projected 2040 population and employment growth in the RSA, which includes numerous planned residential subdivisions and commercial developments, increased demand would occur for utilities and energy. The proposed improvements within the Bakersfield to Palmdale Project Section would require wastewater treatment for the stations and the LMF, MOWF, and/or MOIS. Sewage treatment capacity in the RSA is adequate to support proposed cumulative developments and the proposed improvements within the Bakersfield to Palmdale Project Section. As discussed in Section 3.6, Public Utilities and Energy, HSR facilities would not exceed or substantially contribute to the exceedance of the existing capacity of any of these municipal systems.

Electricity Demand

With the projected 2040 population and employment growth in the RSA, which includes numerous planned residential subdivisions and commercial developments, increased demand would occur for energy that would require additional generation and transmission capacity. The energy supplied under the cumulative condition would be provided from the statewide energy grid. Long-term projections by the California Energy Commission of in-state generation capacity (e.g., for 2040) are limited to 10 years using decennial census population data, economic growth projections, and climate change forecasts. Electricity generation and distribution infrastructure decisions typically are not made more than 2 to 3 years in advance of construction. However, effective management of California's grid requires that new electricity generation remains balanced with demand, so an extensive planning and review process is undertaken to ensure this balance remains constant. As indicated in Section 3.6, Public Utilities and Energy, the statewide

projected average summer power supply in 2015 was 63,822 megawatts per day. California's population is forecast to exceed 49 million by 2025 and more than 53 million by 2030, increasing energy use in both residences and commercial and industrial buildings, and requiring an additional 92,000 megawatts of peak summer capacity in 2030 to meet demand while maintaining an adequate reserve margin (Electric Power Group 2004).

Residential, commercial, and industrial development projects are required to obtain permits and undergo environmental review, in part to ensure electricity demands of the project can be met. In addition, electricity providers make regular, near-term demand projections that incorporate anticipated demand from planned development and the 10-year projections. New transmission and distribution lines or existing facilities upgrades needed to serve the increased demand are generally projected 2 to 3 years in advance of construction. Although electrical power is provided from a statewide grid, many solar farms are proposed in the RSA and are listed in Appendix 3.19-A; these facilities would provide additional supply of electricity.

As discussed in Section 3.6, Public Utilities and Energy, the electrical demand of the proposed improvements within the Bakersfield to Palmdale Project Section, including the stations and the LMF, MOWF, and/or MOIS, has been conservatively estimated to be 4,807.05 GWh annually (13.17 GWh per day) under the 50 percent fare scenario and 3,204.7 GWh annually (8.78 GWh per day) under the 83 percent fare scenario. This includes transmission losses, train propulsion, and train operation at terminal stations, storage depots, and maintenance facilities. Given the available planning period and the known demand from the proposed improvements within the Bakersfield to Palmdale Project Section, energy providers have sufficient information to include the proposed improvements within the Bakersfield to Palmdale Project Section and other projects as part of this cumulative scenario in their demand forecasts; these forecasts inform future decisions regarding new infrastructure necessary to meet energy demand. Therefore, electrical companies would be able to respond to increasing demand from the project and cumulative projects. In addition, to enhance the benefits of the HSR system, the Authority has a goal to procure renewable electricity to power HSR operations. Therefore, operation of the proposed improvements within the Bakersfield to Palmdale Project Section, in combination with cumulative projects, would not result in a cumulative impact on electrical infrastructure that would be significant under CEQA.

Water Infrastructure and Resources

Cumulative development would generate increased water demand, projected by water providers and approved through a permitting process. Throughout communities in California, more conservation measures are expected to be required to reduce water demand during multiple years of drought. In particular, the Water Conservation Act of 2009 (Senate Bill X7-7) requires urban water purveyors to reduce customer water demand by 20 percent by 2020 through increases in water efficiency. California Executive Order B-37-16 established a new water use efficiency framework for California. The order bolstered the state's drought resilience and preparedness by establishing long-term water conservation measures that include permanent monthly water use reporting, new urban water use targets, programs to reduce system leaks and eliminate clearly wasteful use, strong urban drought contingency plans, and improved agricultural water management and drought plans.

Recent changes in water management include improvements in water storage during dry years, on-farm water management and irrigation systems, water exchange agreements, water optimization techniques, water transfers, and water banking. Many of these activities emphasize long-term water management objectives to improve management of local water supply, augment supply, increase water efficiency, and reduce demand. The proposed improvements within the Bakersfield to Palmdale Project Section would have a net decrease in demand compared with current uses, as follows.

Water demand for the proposed improvements within the Bakersfield to Palmdale Project Section is associated with daily water use during operation at the Bakersfield and Palmdale Stations and the LMF, MOWF, and/or MOIS, as described in Section 3.6, Public Utilities and Energy. As discussed in Appendix 3.6-B, Technical Memorandum: Water Usage Analysis for the HSR

Bakersfield to Palmdale Project Section, operation and maintenance of the proposed improvements within the Bakersfield to Palmdale Project Section would result in a net decrease of water use compared to existing use, based on current and projected land uses. Part of this water use reduction results from the removal of farmland from agricultural production. The proposed improvements within the Bakersfield to Palmdale Project Section would also cause an indirect increase in urban water demand associated with the population increase from induced growth effects anticipated from the project.

The proposed Bakersfield and Palmdale Stations would be supplied with treated municipal water from the California Water Service Company and possibly other providers. For the proposed Bakersfield Station locations, the largest share of affected acreage occurs under institutional and industrial uses served by municipal water sources. The Lancaster North B MOWF site is in the geographic area serviced by the Antelope Valley-East Kern Water Agency, which is covered by its own urban water management plan. The Avenue M maintenance facility site is in the geographic area serviced by Los Angeles County Waterworks District 40, covered by the Antelope Valley Integrated Regional Water Management Plan. The Los Angeles County Waterworks District, Antelope Valley-East Kern Water Agency, and Rosamond Community Services District are all part of a regional water management group that collaborated to create the Antelope Valley Integrated Regional Water Management Plan. According to the water management plans that apply to the RSA, water supply would be adequate for meeting the projected water demand associated with future growth, including those projects considered under the cumulative scenario (Antelope Valley East Kern Water Agency 2015; Arvin-Edison Water Storage District 2015; City of Bakersfield 2014; California Water Service 2016a, 2016b; Palmdale Water District 2016; Rosamond Community Services District 2011; Tehachapi-Cummings County Water District et al. 2016). Therefore, operation of the proposed improvements within the Bakersfield to Palmdale Project Section, in combination with cumulative projects, would not result in a cumulative impact on municipal water infrastructure or resources that would be significant under CEQA.

Solid Waste Disposal/Recycling Facilities

Operation of the proposed improvements in the Bakersfield to Palmdale Project Section, including the stations and the LMF, MOWF, and/or MOIS, in combination with cumulative projects, would result in the generation of solid waste and debris. California is expected to continue its existing solid waste diversion policies to further reduce the per-capita need for landfill capacity in the future, and this would apply to cumulative development. In particular, Assembly Bill 341 establishes a goal of reaching a statewide diversion rate of 75 percent by 2020. California's Green Building Standards (California Code of Regulations, Title 24, Part 11, §4.408 [Residential Construction] and §5.408 [Commercial Construction]) include provisions for recycling and/or salvaging for reuse at a minimum of 50 percent of the nonhazardous construction and demolition debris from construction projects.

Under the Resource Conservation and Recovery Act and the California Integrated Waste Management Act of 1989 (Assembly Bill 939), county or municipal solid waste disposal facilities are required to plan for nonhazardous solid waste facility expansions and to meet recycling diversion goals. Therefore, existing laws and regulations would ensure that there is adequate landfill capacity to serve the projects developed under the cumulative condition, including the proposed improvements within the Bakersfield to Palmdale Project Section. Therefore, operation of the proposed improvements within the Bakersfield to Palmdale Project Section, in combination with cumulative projects, would not result in a cumulative impact on solid waste disposal and recycling that would be significant under CEQA.

CEQA Conclusion

There are no anticipated significant cumulative impacts under CEQA related to public utilities and landfills or to energy systems to which the proposed improvements within the Bakersfield to Palmdale Project Section would contribute because there is adequate capacity to accommodate project growth. Therefore, CEQA does not require any mitigation.

3.19.5.7 Biological and Aquatic Resources

The cumulative impact analysis for biological and aquatic resources evaluates the potential effects of the proposed improvements within the Bakersfield to Palmdale Project Section, the specific projects identified in Appendix 3.19-A, and the adjacent HSR project sections (Fresno to Bakersfield and Palmdale to Burbank), which combined constitute the cumulative condition relevant to biological and aquatic resources.

Under the cumulative condition, existing development trends affecting biological and aquatic resources are expected to continue to degrade some natural systems. Development pressure would continue in the RSA, based on adopted general and specific plans (Section 3.13, Station Planning, Land Use, and Development, and Section 3.18, Regional Growth). Low-density development on the urban fringe would likely continue and potentially result in the loss of habitat in these currently undeveloped areas; this would include high-value habitat such as wetlands and riparian areas. Current and future conservation easements on properties near urban boundaries would protect some areas. Impacts on biological and aquatic resources would be avoided, reduced, and, in accordance with permit requirements for the development projects, mitigated through the preservation of compensatory habitat and restoration of disturbed sites. These projects would continue to have some impact on the wildlife, aquatic resources, native vegetation, oak woodland, and other biological resources in the RSA.

Changes in crop production and rotation would continue to improve or degrade habitat conditions for species that forage or nest on farmland. Widening of existing transportation corridors or new transportation improvements could result in additional impacts on biological and aquatic resources. Each of these improvement projects would be subject to environmental review, including evaluation of the impacts of habitat loss, habitat degradation, and mortality of special-status species. Impacts on biological and aquatic resources would be mitigated as part of those projects, including avoidance of impacts to individuals of species during construction, minimization of impacts during construction and operation, restoration of disturbed sites, and preservation of compensatory habitat.

A cumulative impact on biological resources that would be significant under CEQA would occur if the proposed improvements within the Bakersfield to Palmdale Project Section, in combination with cumulative projects, would substantially impact wildlife movement corridors, aquatic resources, and special-status plant and wildlife species.

Construction

Wildlife Movement Corridors

Construction of the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects such as High Desert Corridor (LA-4) and Northwest 138 Corridor Improvement Plan (LA-5) could result in construction activities and placement of wildlife movement barriers in natural lands such that they would interfere with the movement of wildlife species. Opportunities for wildlife movement in the cumulative RSA would be diminished because the HSR project is a linear project, spanning hundreds of miles, which could affect known and modeled wildlife movement corridors. Similarly, the High Desert Corridor and Northwest 138 Corridor Improvement Plan are linear projects that could also restrict wildlife movement corridors.

As discussed in Section 3.7, Biological and Aquatic Resources, the proposed improvements within the Bakersfield to Palmdale Project Section would affect known and modeled wildlife movement corridors during the construction period from placement of temporary barriers (e.g., temporary fencing), construction staging areas, increased vehicular traffic, or construction laydown within natural lands and known linkages. Cumulative projects could have similar effects during their respective construction periods. The proposed improvements within the Bakersfield to Palmdale Project Section include mitigation measures to reduce impacts in wildlife movement corridors by avoiding construction fencing where the tracks are elevated (e.g., viaducts or bridges), avoiding ground disturbing activities during nighttime hours, and shielding nighttime lighting. Impacts would still occur and would be temporary, lasting from 1 to 2 months, up to 3 years during construction. As transportation and development projects are generally subject to

environmental review under CEQA and/or NEPA, cumulative development would similarly incorporate appropriate mitigation measures to reduce potential impacts on wildlife movement corridors. Impacts from cumulative projects would also be temporary.

The proposed improvements within the Bakersfield to Palmdale Project Section include elevated viaducts and underground tunnels to facilitate wildlife movement. Additionally, IAMFs and mitigation measures would reduce wildlife movement corridor impacts related to impediments to movement, night lighting, noise, and vehicle traffic. Among other requirements, the Authority would create dedicated wildlife-crossing features at frequent intervals and along sensitive areas to facilitate wildlife movement and minimize or avoid impacts on wildlife corridors.

The incorporation of these measures would reduce the impacts of interfering with established wildlife movement corridors and other impacts relating to the potential for isolation of populations. By including wildlife-crossing features in the project design, the proposed improvements within the Bakersfield to Palmdale Project Section are expected to maintain existing wildlife movement corridors within the project footprint. The project design would provide opportunities for wildlife to cross the alignment and maintain gene flow connectivity. For example, within the mountain lion species range, genetic connectivity would be maintained between these populations through the use of 14 elevated viaducts, 6 underground tunnels, and 5 dedicated wildlife crossings. As discussed in Section 3.7.6.5, the mountain lion "least cost corridor" would cross the HSR alignment at a 2.37-mile-long underground tunnel segment, which would allow mountain lion to freely cross over the project unimpeded. Mountain lion would be able to cross portions of the HSR, specifically at the viaducts and tunnels during construction. By maintaining wildlife connectivity, the project would maintain gene flow connectivity.

Cumulative projects, including the High Desert Corridor and Northwest 138 Corridor Improvement Plan, could restrict wildlife movement. However, these projects would be subject to environmental review and would be required to address impacts on wildlife movement corridors through incorporation of design features and/or mitigation measures. Additionally, while the proposed improvements within the Bakersfield to Palmdale Project Section would impact wildlife movement corridors in the east-west direction, these cumulative projects would impact wildlife movement corridors in the north-south direction. Therefore, these projects would not result in cumulative effects in the same direction of travel. Building structures could also hinder movement depending on their location and size, but these facilities are generally located in previously developed areas, and wildlife would likely move around them.

Aquatic Resources

Construction activities associated with cumulative commercial and residential development projects, including numerous proposed developments in Bakersfield, Keene, Tehachapi, Rosamond, Lancaster, and Palmdale, are likely to result in construction of culverts in streams, armoring of channels, removal of riparian vegetation, and placement of fill in jurisdictional aquatic resources near similar impacts that result from construction of the proposed improvements within the Bakersfield to Palmdale Project Section. Projects in the Rosamond and Lancaster areas could also alter surface hydrology (sheet flow) and result in filling of claypan features. These projects include the NW 138 corridor improvement plan (LA-5), an automotive recycling yard in Lancaster (L-5), a single-family residence subdivision in Lancaster (L-10), and the Amargosa Creek Specific Plan (L-1), all of which have the potential to influence desert streams and claypans. The Amargosa Creek Specific Plan has already influenced Amargosa Creek based on aerial photographs that show a major wash has been undergrounded at that location. Tables 3.7-8, 3.7-9, and 3.7-10 in Section 3.7, Biological and Aquatic Resources, show the effects of the proposed improvements within the Bakersfield to Palmdale Project Section on aquatic resources in the RSA. Alternative 2 would impact the largest area of aquatic resources (when measured from the ordinary high water mark), with 59.8 impacted acres. Alternatives 1 and 3 would follow with 58.6 and 58.1 impacted acres respectively. Alternative 5 would permanently impact the smallest area of aquatic resources, with 54.2 impacted acres. The CCNM Design Option would permanently impact an additional 0.1 acres and the Refined CCNM Design Option would permanently impact an additional 2.0 acres.

The U.S. Army Corps of Engineers (USACE) issued an approved jurisdictional determination for the HSR Bakersfield to Palmdale Project Section, excluding the LGA. The approved jurisdictional determination evaluated waters by the major watersheds they would affect, including the Caliente Creek Watershed, Proctor Lake Watershed, Oak Creek Watershed, and Lake Rosamond Watershed. The USACE determined that although many features in these areas meet federal technical criteria that define wetlands and other waters of the U.S., these features are not jurisdictional under the Clean Water Act. The waterbodies that would be affected by the proposed improvements within the Bakersfield to Palmdale Project Section, excluding the LGA, are all isolated waters, meaning that they lack links to navigable waters or interstate commerce. Because these waters are isolated, the USACE will not assert jurisdiction under Section 404 of the Clean Water Act over any areas that would be delineated as wetlands or waters of the U.S.

The USACE has issued a preliminary jurisdictional determination for the LGA portion of the Bakersfield to Palmdale Project Section. The preliminary jurisdictional determination evaluated waters by the major watersheds they would affect, including the Tulare-Buena Vista Lakes Basin Watershed, Upper Poso Basin Watershed, and Middle Kern-Upper Tehachapi Grapevine Basin Watershed. The USACE concurred in the preliminary jurisdictional determination that approximately 0.37 acres of “other waters” present in the LGA portion of the Bakersfield to Palmdale Project Section are potential jurisdictional aquatic resources (waters of the U.S.) regulated under Section 404 of the Clean Water Act. No wetlands were identified. Other waters of the U.S. were dominated by man-made features (canals/ditches and retention/detention basins) that are generally used for agricultural purposes. The only natural feature in the LGA area is the Kern River (seasonal riverine). Therefore, the proposed improvements within the Bakersfield to Palmdale Project Section would result in an impact on Section 404 jurisdictional waters in the LGA portion of the Bakersfield to Palmdale Project Section. However, the proposed improvements within the Bakersfield to Palmdale Project Section would comply with all conditions of the approved jurisdictional determination and implement measures to reduce impacts to aquatic resources, including BIO-IAMF#4, which requires maintenance personnel attend Worker Environmental Awareness Program training and certify that they understand the regulatory agency requirements and procedures necessary to protect biological and aquatic resources. Therefore, the proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact to waters of the U.S. under the jurisdiction of the USACE. Potential impacts on jurisdictional waters governed by other agencies, such as the State Water Resources Control Board and the California Department of Fish and Wildlife, are discussed below.

Construction of the proposed improvements within the Bakersfield to Palmdale Project Section, in combination with cumulative projects, may result in increased erosion, siltation, and runoff in other aquatic resources (e.g., seasonal wetlands, riparian areas, and streams). Chemical spills or leaks of fuel, transmission fluid, lubricating oil, or motor oil from construction equipment could also contaminate waters and degrade their quality. Construction activities could result in spread of noxious aquatic and riparian weeds. IAMFs would be implemented, however, to reduce these effects. Measures that mitigate for impacts would be required for the Tehachapi Creek watershed. Mitigation for impacts on claypan areas near Lancaster and Rosamond would also be required in the Antelope Valley watershed to ensure impacts on these systems are reduced appropriately. Mitigation measures identified in Section 3.7.7, Mitigation Measures, of Section 3.7, Biological and Aquatic Resources, would compensate for permanent and temporary impacts on jurisdictional waters through creation, restoration, enhancement, and preservation of wetlands, which would prevent reduction of or degradation of jurisdictional wetlands. These features would also minimize turbidity and siltation and ground-disturbing activities by incorporating a dewatering plan and construction site best management practices.

Construction of the proposed improvements within the Bakersfield to Palmdale Project Section, in combination with cumulative projects, would not impact areas where aquatic resources are constructed features, including canals, ditches, and detention basins. In these areas, the project design incorporates facilities that would continue to convey the appropriate volume of flow in canals. Impacted stormwater ditches and detention basins would be relocated and constructed to

appropriately accommodate stormwater. Similarly, agricultural ditches and detention basins would be relocated and sized to serve remaining fields once the project is operational, retaining the functions of these features post-project. Additionally, cumulative projects would be required to comply with similar conditions of approval, thereby reducing their potential impacts. Constructed drainage features would continue to convey the appropriate volume of flow.

With the implementation of the project-level mitigation measures identified in Section 3.7.7, Mitigation Measures, of Section 3.7, Biological and Aquatic Resources, the incremental contribution from construction of the proposed improvements within the Bakersfield to Palmdale Project Section would not be cumulatively considerable.

Special-Status Plant and Wildlife Species

Construction of the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects would result in cumulative impacts on special-status plant and wildlife species as a result of habitat loss, habitat fragmentation, introduction of invasive species, and harassment from increased noise and human disturbance. This includes the monarch butterfly, which is now a candidate for listing under the Federal Endangered Species Act (FESA) due to significant population declines, and the Southern California and Central Coast evolutionary significant unit mountain lion (south of SR-58), which is now a candidate for listing as Threatened under the California Endangered Species Act (CESA) due to the continued fragmentation and loss of habitat. Construction of cumulative development and transportation projects such as the Tehachapi Walmart project (T-11), Lockheed Martin solar facility (P-5), High Desert Corridor (LA-4), and Northwest 138 Corridor Improvement Plan (LA-5), combined with the proposed improvements within the Bakersfield to Palmdale Project Section and adjacent HSR project sections (Fresno to Bakersfield and Palmdale to Burbank), would contribute to the net loss of special-status plant and wildlife species. Additionally, construction of these projects could result in land disturbance, increased vehicle traffic, and topography alteration, which could lead to disturbance, injury, or mortality of various special-status wildlife species and their respective habitats.

These species are protected by law and any planned development or transportation projects would be required to incorporate measures to minimize disturbance of special-status species. These measures could include conducting protocol-level surveys; salvaging, relocating, and propagating identified species; and restoring potential habitat areas after construction. Additionally, proposed improvements within the Bakersfield to Palmdale Project Section include requirements that would avoid or minimize many of the direct and indirect impacts associated with construction of the HSR system. For example, the IAMFs and mitigation measures identified in Section 3.7, Biological and Aquatic Resources, include measures to delineate environmentally sensitive and restrictive areas to avoid and minimize the potential direct disturbance of special-status species during construction. This would minimize the indirect impact on special-status plants and other native vegetation occurring outside the project footprints by requiring the cleaning of construction equipment and incorporating a weed control plan to minimize the spread of invasive species. Other planned development and transportation projects would have in place similar measures to minimize impacts. While these measures would minimize project-specific impacts, they would not completely avoid destruction of habitat or loss of individual members of the species. These effects would combine in the RSA to result in a cumulative impact that would be significant under CEQA.

As described in Section 3.7, Biological and Aquatic Resources, construction of the proposed improvements within the Bakersfield to Palmdale Project Section would result in the removal of vegetation for the placement of permanent infrastructure during construction, the removal of vegetation in temporary impact areas and from construction vehicles, and the disturbance of vegetation from personnel (i.e., trampling, covering, and crushing individual plants, plant populations, or suitable potential habitat for special-status species). The contribution of the proposed improvements within the Bakersfield to Palmdale Project Section to this cumulative impact would vary depending on the alternative and the type of habitat affected by each alternative. Mitigation measures would require protocol-level surveys to identify individual specimens that could be avoided, relocated, or propagated. They would also involve the

preparation and implementation of a habitat mitigation plan to offset impacts on special-status species by creating, restoring, enhancing, and/or preserving habitat that provides the same function and value as that habitat permanently affected by construction. With the implementation of these mitigation measures, the incremental contribution from construction of the proposed improvements within the Bakersfield to Palmdale Project Section would not be cumulatively considerable.

CEQA Conclusion

Construction of the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects would result in a less than significant cumulative impact on wildlife movement corridors because construction activities would be short-term and mitigated as required based on environmental review. Additionally, incorporation of project design features and mitigation measures such as wildlife-crossing features would facilitate wildlife movement and minimize or avoid impacts on wildlife movement corridors over the long term. The Bakersfield to Palmdale Project Section's incremental contribution to this impact would not be cumulatively considerable, and no additional mitigation is required.

Implementation of the proposed improvements within the Bakersfield to Palmdale Project Section under any of the B-P Build Alternatives would result in impacts on jurisdictional aquatic resources and special-status plant and wildlife. With implementation of the project-level mitigation measures identified in Section 3.7.7, Mitigation Measures, of Section 3.7, Biological and Aquatic Resources, the proposed improvements in the Bakersfield to Palmdale Project Section would result in less than significant impacts to jurisdictional aquatic resources and special-status plants and wildlife. Therefore, a cumulatively considerable contribution to significant cumulative impacts would not occur during construction.

Operation

Wildlife Movement Corridors

During operations, regularly scheduled maintenance activities of the proposed improvements within the Bakersfield to Palmdale Project Section may deter wildlife from approaching those areas or using them as part of a wildlife movement corridor, as wildlife may associate them with human presence and disturbance. However, potential impacts would be minimal because the activities would be dispersed over time and location and would typically occur during daylight hours. In addition, IAMFs included in Section 3.7, Biological and Aquatic Resources, require the Authority to ensure that maintenance personnel attend worker environmental awareness program (WEAP) training and certify that they understand the regulatory agency requirements and procedures necessary to protect biological resources, including wildlife movement crossings and habitat linkages.

Impacts on wildlife movement corridors from operations would include disturbance from the passage of trains (noise, motion, and startle effects). Regular or frequent disturbances could cause wildlife to discontinue use of crossing structures, which could lead to a decrease in foraging habitat, restriction of gene flow, and habitat fragmentation. The level of impact caused by a particular alternative would be dependent on the number, type, and length of wildlife corridor crossed by the alternative, as well as the frequency of passing trains. As explained in Section 3.7, due to the intermittent nature of the train operations, it is expected that the noise environment would only be affected for short periods of time (i.e., less than four seconds) and predominantly during daytime hours (exposure to maximum noise would have a total duration of approximately 6-12 minutes per day along the alignment, and noise levels during an exposure would decrease rapidly after the train passes). Due to the short duration and intermittent occurrence, operational noise would not be expected to affect animal species communications. Moreover, the proposed improvements include elevated viaducts and underground tunnels to facilitate wildlife movement. Wildlife movement IAMFs and mitigation measures would reduce wildlife movement corridor impacts related to impediments to movement, night lighting, noise, vehicle traffic. Among other requirements, the Authority would create dedicated wildlife-crossing features at frequent intervals and along sensitive areas to facilitate wildlife movement and minimize or avoid impacts on wildlife corridors. To minimize operational noise impacts, sound barriers such as berms and berm/wall

combinations would shield nearby natural habitat and/or crossing structures that wildlife could use for movement corridors from loud noise that exceeds 100 dBA at distances greater than 50 feet from the perimeter fence. These measures would work together with design features to minimize, avoid, or mitigate impacts on wildlife movement during project operation. Therefore, while disturbance to wildlife corridors from operations could combine with other regional projects' impacts to disrupt normal movement within wildlife corridors, the proposed improvements within the Bakersfield to Palmdale Project Section's contributions to these cumulative impacts would not be cumulatively considerable.

Aquatic Resources

Operation of the proposed improvements within the Bakersfield to Palmdale Project Section would require maintenance and vehicular activity near jurisdictional aquatic resources. The IAMFs identified in Section 3.7, Biological and Aquatic Resources, require maintenance personnel to attend worker environmental awareness program training to understand and identify sensitive biological resources and associated regulatory requirements. With these measures in place, the likelihood of accidental spills, introduction of contaminants/pollutants, and degradation of jurisdictional waters would be minimized. Therefore, it is not anticipated that the Bakersfield to Palmdale Project Section would contribute to a cumulative impact during operations.

Special-Status Plant and Wildlife Species

Operation of the proposed improvements within the Bakersfield to Palmdale Project Section would avoid or minimize the potential for impacts from maintenance activities with the potential to trample or crush plant communities and wildlife. These impacts would be avoided through the IAMFs identified in Section 3.7, Biological and Aquatic Resources, which would require that maintenance personnel attend worker environmental awareness program training to understand and identify sensitive biological resources and associated regulatory requirements. The IAMFs would also avoid and/or minimize the potential for trampling or otherwise impacting special-status plant species or habitat. They would also minimize the potential for impacts on special-status wildlife species (e.g., mountain lion, mule deer, and other species) by training maintenance personnel to understand environmental compliance issues. Additionally, the proposed improvements within the Bakersfield to Palmdale Project Section would provide wildlife crossings and would not include nighttime lighting. Therefore, it is not anticipated that operations and maintenance activities within the Bakersfield to Palmdale Project Section would contribute to a cumulative impact.

CEQA Conclusion

Operation of the proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to cumulative impacts on wildlife movement corridors because activities would be dispersed over time and location, diluting potential impacts. Additionally, operations of the proposed improvements within the Bakersfield to Palmdale Project Section would avoid or minimize the potential for impacts from maintenance activities to jurisdictional aquatic resources, special-status plant species, and special-status wildlife species through implementation of IAMFs that require maintenance personnel to attend worker environmental awareness program training, and therefore would not contribute to cumulative impacts on these resources.

3.19.5.8 Hydrology and Water Resources

The cumulative impact analysis for hydrology and water quality evaluates the potential effects of the proposed improvements within the Bakersfield to Palmdale Project Section the specific projects identified in Appendix 3.19-A, and the adjacent HSR project sections (Fresno to Bakersfield and Palmdale to Burbank). The evaluation also considers development projections developed by the cities, counties, and water supply districts in the RSA.

A cumulative impact to hydrology and water resources that would be significant under CEQA would occur if the incremental impacts of the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects were combined to increase the risk of release of pollutants from inundation; change drainage patterns in a manner that would increase erosion

or siltation, increase flooding, or exceed the capacity of or provide additional polluted runoff to existing or planned stormwater facilities; violate any water quality standards, waste discharge requirements, or otherwise degrade water or groundwater quality; decrease groundwater supplies; or conflict with water quality control plans or sustainable groundwater management plans.

Construction

Floodplains

Construction of the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects in the RSA could temporarily redirect flood flows or contribute pollutants to the floodplains if construction activities would occur in a floodplain. Cumulative linear transportation projects such as the SR 58 widening (K-13), Northwest 138 Corridor Improvement Plan (LA-5), 24th Street Improvements (B-34), and High Desert Corridor (LA-4) cross surface waters and could require the placement of structures in a Federal Emergency Management Agency-designated floodway or floodplain. Cumulative projects in a floodplain would be required to comply with the Construction General Permit and resource agency permits, and would implement construction best management practices (BMP), including good housekeeping practices, to reduce pollutants in runoff during storm events. Additionally, as part of good construction practices, contractors would either limit construction in floodplains to the dry season or implement measures to direct flows around work areas. The Bakersfield to Palmdale Project Section also is not in close proximity to the other four cumulative projects that could potentially impact floodplains. Therefore, construction projects would not overlap such that the same floodplains would be impacted. Construction activities of the proposed improvements within the Bakersfield to Palmdale Project Section and other cumulative projects would not result in a cumulative construction impact to floodplains that would be significant under CEQA.

Surface Water Quality

Construction of the proposed improvements in the Bakersfield to Palmdale Project Section and cumulative transportation and development projects, such as the SR 184 widening (K-14), Tehachapi Walmart project (T-11), High Desert Corridor (LA-4), Northwest 138 Corridor Improvement Plan (LA-5), and Lockheed Martin solar facility (P-1), would include ground-disturbing activities that could introduce pollutants of concern into stormwater runoff. Ground-disturbing activities such as grading and excavation could alter drainage patterns, redirect stormwater runoff, and increase the potential for erosion. In addition, construction activities could increase the amount of stormwater runoff by removing natural vegetation or compacting soil, thereby decreasing infiltration. Typical pollutants of concern associated with construction activities include sediment, trash, petroleum products, concrete waste (dry and wet), sanitary waste, and chemicals. Any of these pollutants have the potential to be transported via stormwater runoff into receiving waters during construction.

Construction in, across, near, and/or over surface water channels has the potential to degrade water quality directly, and this degradation could be exacerbated by concurrent construction schedules for multiple projects. In-water work during construction of the proposed improvements within the Bakersfield to Palmdale Project Section combined with that of cumulative projects would be restricted to the dry season; in the case where a waterbody has year-round flows, the construction contractor would develop water diversion and water crossing plans prior to construction to reduce impacts on surface water. Where temporary water diversion is established, it would be removed once construction is complete, and the channel would be restored to its pre-existing condition.

Cumulative projects that disturb greater than 1 acre of soil would be subject to the requirements of the Construction General Permit during construction, unless exempt because they can demonstrate that they do not pose a threat to water quality. Compliance with the Construction General Permit requires the preparation of a stormwater pollution prevention plan to identify project-specific best management practices that would target pollutants of concern during construction. In addition, the stormwater pollution prevention plan would describe temporary and

permanent drainage patterns on construction sites and would indicate stormwater discharge locations from those sites to the existing drainage system to maintain the existing drainage pattern to the maximum extent practicable. Although the proposed improvements within the Bakersfield to Palmdale Project Section are not subject to the requirements of the Construction General Permit because receiving waterbodies are all hydrologically isolated from waters of the U.S., the Authority would prepare a stormwater pollution prevention plan and implement construction BMPs to reduce impacts to surface water quality during construction. Implementation of the stormwater pollution prevention plan for the proposed improvements within the Bakersfield to Palmdale Project Section and each cumulative project would reduce potential impacts on surface water quality. Furthermore, hydromodification management controls would be implemented during construction to maintain pre-project hydrology by emphasizing on-site retention of stormwater runoff for each of the cumulative projects.

Dewatering groundwater during construction of proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects could degrade water quality if the water were to be contaminated and discharged directly to surface water or land without treatment. Groundwater levels throughout the RSA are deep, however, with depths generally greater than 60 feet below ground surface. Therefore, low potential exists for groundwater to be encountered during construction activities except at bridge piers. If groundwater is encountered during construction, it would be removed, tested, and disposed of according to the requirements of the Central Valley and Lahontan Regional Water Quality Control Boards' dewatering permits. Adherence to the requirements of the dewatering permits by the proposed improvements within the Bakersfield to Palmdale Project Section and all cumulative projects would ensure the water discharged to surface water or land would not degrade water quality.

Surface Water Hydrology

Construction activities, such as grading and excavation, associated with the proposed improvements within the Bakersfield to Palmdale Project Section and other cumulative projects could alter existing drainage patterns and redirect stormwater runoff. During ground-disturbing activities, soil would be compacted, thereby decreasing infiltration and increasing the volume and rate of stormwater runoff during storm events. However, the proposed improvements within the Bakersfield to Palmdale Project Section and other cumulative projects would comply with the Construction General Permit and implement BMPs to control and manage stormwater runoff during construction.

Groundwater

As discussed in Section 3.8, Hydrology and Water Resources, construction of the proposed improvements within the Bakersfield to Palmdale Project Section would not affect groundwater quality because no direct path for construction-related contaminants to reach groundwater would exist due to the depth of groundwater near the proposed improvements within the Bakersfield to Palmdale Project Section. Tunnel construction has the potential to interfere with the groundwater flow systems, cause dewatering of overlying springs and riparian areas, and affect groundwater quality. Mitigation Measure WQ-MM#3, Tunnel Constructability and Hydrogeological Monitoring, requires that groundwater levels, flow, and quality be monitored at domestic wells, springs, and seeps prior to, during, and after construction. Regular monitoring would indicate potential changes in the depth to ground water beyond the expected seasonal variations. The tunnels would be lined to minimize groundwater seepage, and the tunnel lining would be inspected regularly throughout the construction phase to monitor for potential leaks. There are currently no cumulative projects that would interfere with the groundwater flow systems, cause dewatering of overlying springs and riparian areas, or affect groundwater quality in the Tehachapi Mountains near the proposed improvements within the Bakersfield to Palmdale Project Section. Therefore, the impact on groundwater from the proposed improvements within the Bakersfield to Palmdale Project Section would not combine with those from cumulative projects and, accordingly, would not contribute to a cumulative impact on groundwater resources that would be significant under CEQA. This issue is not discussed further.

CEQA Conclusion

Construction of the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects would not result in a significant cumulative impact related to increased risk of release of pollutants from inundation because projects in a floodplain would be expected to implement BMPs in compliance with NPDES requirements to minimize release of pollutants in the event flooding occurs during a storm event. Therefore, CEQA does not require mitigation.

Construction of the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects would not result in a significant cumulative impact related to violation of water quality standards or waste discharge requirements, degradation of surface water quality, addition of polluted runoff to existing or planned stormwater facilities, or conflict with water quality control plans because projects disturbing greater than 1 acre are required to comply with the Construction General Permit and implement Construction BMPs to reduce pollutants in stormwater runoff. Therefore, CEQA does not require mitigation.

Construction of the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects would not result in a significant cumulative impact related to increased erosion or siltation, increased flooding from changes in drainage patterns, or exceedance of the capacity of existing or planned stormwater facilities because the proposed improvements and cumulative projects would comply the Construction General Permit, which requires BMPs to control and management stormwater runoff during construction. Therefore, CEQA does not require mitigation.

Construction of the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects would not result in a significant cumulative impact related to decreased groundwater supplies or conflict with sustainable groundwater management plans because there are currently no cumulative projects that would have the potential to degrade groundwater quality, interfere with the groundwater flow systems, cause dewatering of overlying springs and riparian areas, or affect groundwater quality near the proposed improvements within the Bakersfield to Palmdale Project Section. The proposed improvements within the Bakersfield to Palmdale Project Section would implement project-specific mitigation so as to not contribute to any cumulative reduction in groundwater levels or quality during tunnel construction. Therefore, CEQA does not require additional mitigation.

Operation

Floodplains

Construction of the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects in the RSA could increase floodplain elevations in areas affected by inundation in the cumulative floodplain RSA. Cumulative linear transportation projects such as the SR 58 widening (K-13), Northwest 138 Corridor Improvement Plan (LA-5), 24th Street Improvements (B-34), and High Desert Corridor (LA-4) cross surface waters and could require the placement of structures in a Federal Emergency Management Agency-designated floodway or floodplain. Blockage of flood flows by multiple linear projects is typically not a cumulative issue because increases in flood levels are generally limited to the vicinity of any new structures placed in the floodplain. Because changes in water surface elevation from new structures placed in the 100-year floodplain are localized and these cumulative projects do not cross floodplains in the vicinity of the proposed improvements within the Bakersfield to Palmdale Project Section, structures placed in the floodplains by the proposed improvements would not be in close enough proximity to the structures placed in the floodplain by these other cumulative projects to result in a cumulative increase in the floodplain elevation.

Additionally, all ongoing and planned projects, including the proposed improvements within the Bakersfield to Palmdale Project Section, are subject to and must comply with applicable federal, state, and local regulations, as discussed in Section 3.8, Hydrology and Water Resources, which would reduce the incremental impact on floodplains and flood risks. Projects in a designated 100-year flood zone would be required to comply with Federal Emergency Management Agency regulations and the requirements set forth in U.S. Executive Order 11988. These rules dictate

floodplain analysis and implementation of measures to prevent projects from increasing the base flood elevation by more than one foot in floodplains or substantially changing the floodplain limits. Accordingly, cumulative impact and proposed improvements in the Bakersfield to Palmdale Project Section would not result in permanent cumulative operations impacts on floodplains.

Placement of piers in a floodplain can increase erosion and sedimentation; however, the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects would be expected to design structures to minimize impacts associated with erosion and sedimentation. In addition, all cumulative projects would implement BMPs, including Good Housekeeping Practices and Source Control BMPs, in compliance with NPDES requirements to minimize release of pollutants in the event flooding occurs during a storm event.

Surface Water

The proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects could introduce pollutants of concern into stormwater runoff. On-site stormwater runoff captured along the proposed improvements within the Bakersfield to Palmdale Project Section would be directed to on-site infiltration/detention basins in compliance with the Authority's Phase II MS4 Permit. These features would reduce pollutants of concern in stormwater runoff. Other cumulative projects would be required to comply with the applicable NPDES MS4 Permits and implement BMPs to reduce pollutants of concern in stormwater runoff. Adherence to the requirements of the NPDES MS4 Permits by the project and all cumulative projects would ensure stormwater runoff would not degrade water quality. Therefore, the proposed improvements within the Bakersfield to Palmdale Project Section in combination with cumulative projects would not result in a cumulative impact on surface water that would be significant under CEQA.

Surface Water Hydrology

The proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects would incrementally increase impervious surfaces and potentially result in increased peak flows, which could place a strain on existing drainage systems. Laws and permitting processes, including NPDES MS4 permits, generally require new development and transportation projects to incorporate drainage facilities and permanent stormwater capture and infiltration features (e.g., basins, bioswales, storage features) into the project design, such that runoff volumes would not exceed the capacity of planned and existing stormwater facilities. These requirements and features work together to minimize impacts from incremental contributions of new impervious surfaces, and cumulative operations impacts would not occur.

The proposed improvements within the Bakersfield to Palmdale Project Section would result in an increase in impervious surface area from structures along the alignment, as well as from structures and parking facilities at the Bakersfield and Palmdale Stations and the LMF, MOWF, and/or MOIS. The other transportation and development projects on the cumulative projects list would increase impervious surface and result in other land use changes that could increase pollutants in stormwater runoff. As discussed in Section 3.8, Hydrology and Water Resources, the change in impervious surface would be minimal in the portion of the F-B LGA from the intersection of 34th Street and L Street to Oswell Street because this portion of the F-B LGA is already urbanized. However, between Oswell Street and the Palmdale Station, Alternatives 1, 2, 3, and 5 would result in a net increase in impervious surface of 764, 771, 743, and 760 acres, respectively. Implementation of the CCNM Design Option and Revised CCNM Design Option would result in 1 acre less and 5.9 acres less of impervious surface area, respectively, compared to the B-P Build Alternatives without the design option. The HSR project's design includes a drainage system that would collect, convey, and discharge surface water runoff from the track right-of-way, through a network of channels, ditches, and culverts, while maintaining the existing drainage pattern to the maximum extent practicable. On-site stormwater runoff captured along the B-P Build Alternatives would be directed to on-site infiltration/detention basins in compliance with the Authority's Phase II MS4 Permit. These features would provide hydromodification controls to offset the increase in volume and rate of runoff.

New development would be required similarly to adhere to stormwater control ordinances and post-construction hydromodification requirements from applicable NPDES MS4 permits. Stormwater ordinances and hydromodification requirements would facilitate stormwater infiltration and detention and reduce peak stormwater runoff such that runoff would not exceed the capacity of existing or planned stormwater facilities. Together, the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects would not incrementally change drainage patterns such that runoff would exceed the capacity of existing or planned stormwater facilities.

Groundwater

The proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects could result in decreased groundwater supplies through increased water use in areas where municipal water supplies include groundwater and through a decrease in infiltration from increased impervious surface areas. Cumulative projects, particularly development projects, would increase water use. However, water agencies are required to manage supplies, including complying with the Sustainable Groundwater Management Plan and implementing sustainability plans to ensure sustainable groundwater management. Water agencies also account for water use from cumulative projects in their Urban Water Management Plans. As discussed in Section 3.8, Hydrology and Water Resources, the proposed improvements within the Bakersfield to Palmdale Project Section would not reduce groundwater supply, as it would not tap any new or unpermitted groundwater sources. Furthermore, use of groundwater during project operation would be considerably less than the existing condition in the project footprint on account of high agricultural groundwater use. Additionally, the increase in impervious surface area resulting from implementation of the proposed improvements within the Bakersfield to Palmdale Project Section would not result in a reduction in infiltration to an extent that would interfere with groundwater recharge. Operation of the B-P Build Alternatives or design options would not affect groundwater quality because there would not be a direct path for operation-related contaminants to reach groundwater and implementation of BMPs would target pollutants of concern and prevent pollutants from infiltrating the underlying groundwater basin. Other cumulative projects would also implement BMPs to treat stormwater prior to any infiltration pursuant to NPDES MS4 Permit requirements. Because the proposed improvements within the Bakersfield to Palmdale Project Section would not result in a direct or indirect impact on groundwater supply or quality, it would not contribute to a cumulative impact.

CEQA Conclusion

The proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects would not result in a significant cumulative impact related to the increased risk of release of pollutants from inundation because projects in a floodplain would be expected to design structures to minimize impacts associated with erosion and sedimentation and to implement BMPs in compliance with NPDES requirements to minimize release of pollutants in the event flooding occurs during a storm event. Therefore, CEQA does not require mitigation.

The proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects would not result in a significant cumulative impact related to violation of water quality standards or waste discharge requirements, degradation of surface water quality, addition of polluted runoff to existing or planned stormwater facilities, or conflict with water quality control plans because projects are required to comply with the applicable NPDES MS4 permits and implement site-specific BMPs to reduce pollutants in stormwater runoff. Therefore, CEQA does not require mitigation.

The proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects would not result in a significant cumulative impact related to increased erosion or siltation or increased flooding from changes in drainage patterns or related to exceedance of the capacity of existing or planned stormwater facilities because the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects would comply with existing laws and permitting processes, including NPDES MS4 permits. These laws and permitting processes require new development to incorporate drainage facilities and BMPs into project design to

accommodate, control, and reduce stormwater runoff to levels at or below existing conditions so that on- and off-site erosion, siltation, or flooding would not occur. Therefore, CEQA does not require mitigation.

The proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects would not result in a significant cumulative impact related to decreased groundwater supplies or conflict with sustainable groundwater management plans because the proposed improvements and other cumulative projects would implement BMPs to treat stormwater prior to infiltration. Additionally, the applicable water agencies account for increased groundwater use that would result from development of the cumulative projects. Therefore, CEQA does not require mitigation.

3.19.5.9 Geology, Soils, Seismicity, and Paleontological Resources

The cumulative impact analysis for geology, soils, seismicity, and paleontological resources evaluates potential effects of the proposed improvements within the Bakersfield to Palmdale Project Section the specific projects identified in Appendix 3.19-A, and the adjacent HSR project sections (Fresno to Bakersfield and Palmdale to Burbank), which combined constitute the cumulative condition relevant to geology, soils, seismicity, and paleontological resources.

A cumulative impact related to geology, soils, seismicity, and paleontological resources that would be significant under CEQA would occur if the proposed improvements within the Bakersfield to Palmdale Project Section combined with cumulative projects, would result in substantial impacts on mineral resources or disturb unidentified paleontological resources through construction ground disturbance. The proposed improvements within the Bakersfield to Palmdale Project Section would not impact these resources during operations and therefore would not contribute to a cumulative impact. Therefore, these issues as they relate to operations are not discussed further. Impacts related to seismic and other geologic hazards (Impacts GSS #1 through GSS #2 and Impacts GSS #4 through GSS #7) are localized in nature; they do not accumulate to cause broader environmental consequences, and cumulative impacts would not occur. Therefore, these issues are not discussed further.

Construction

Geology, Soils, and Seismicity

Construction of the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects listed in Appendix 3.19-A would require aggregate, ballast rock, concrete, and steel reinforcement, but not all of these materials would originate from the RSA. Earthwork for construction of the B-P Build Alternatives and the CCNM Design Option would be performed in a manner that achieves a balanced condition where the quantity of soil or earthen materials removed through excavation would be roughly equal to the quantity of material being placed in embankments. Therefore, construction of the B-P Build Alternatives and CCNM Design Option would not introduce a large amount of aggregate material. If the Refined CCNM Design Option is implemented, 2 to 14 million cubic yards of excess materials would be generated; as such, a balanced amount of earthwork would not be attainable. However, the stockpiling of excess material at the soil disposal site would not result in an impact related to geology or soils. Therefore, the proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to this cumulative impact.

Construction of the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects, including the Palmdale to Burbank Section of the California HSR System, 24th Street Improvements (B-34), Hageman Flyover road expansion (B-35), SR 99 Auxiliary Lane project (B-36), and Truxton Avenue/Oak Street Intersection Improvements (B-37) would be located on areas of land designated as Mineral Resource Zones (MRZ) 2. The B-P Build Alternatives are estimated to acquire 207.3 acres of land designated as MRZ-2. The identified cumulative projects would also be located on land designated as MRZ-2; however, with the exception of the California HSR System, the cumulative projects cross land designated as MRZ-2 in urbanized and developed areas not used for mining. Because the developed areas are not used for mining, cumulative projects in these areas would not result in the loss of availability

of a known mineral resource that would be of value to the region and to California, or result in the loss of availability of a locally important mineral resource recovery site delineated on a general plan, specific plan, or other land use plan.

The Bakersfield to Palmdale Section and Palmdale to Burbank Section of the California HSR System would result in a minimal loss of availability of a known mineral resource that would be of value to the region and residents of the state. Large portions of the MRZ-2 areas that would be converted to a transportation use encompass extensive developed areas where existing development currently obstructs potential extraction activities, particularly in the San Fernando Valley for the Palmdale to Burbank Section and the City of Bakersfield for the Bakersfield to Palmdale Section. In undeveloped areas, including areas in which mining is permitted, the Bakersfield to Palmdale Section and Palmdale to Burbank Section of the California HSR System would prevent mining activities. Additionally, the loss of MRZ-2 areas would be minimal given the MRZ-2 inventory available in Kern and Los Angeles Counties. The Palmdale to Burbank Section of the California HSR System would permanently convert a maximum of 0.6 percent of Los Angeles County's total MRZ-2 areas. The Bakersfield to Palmdale Section of the California HSR System would result in the loss of only 0.11 percent of MRZ-2 inventory in Kern and Los Angeles Counties. For these reasons, the project combined with cumulative projects would not result in a cumulative impact to mineral resources.

Paleontological Resources

Cumulative development in the region could result in the loss and/or degradation of paleontological resources, which would result in a cumulative impact that would be significant under CEQA. Multiple projects in close proximity to the proposed improvements within the Bakersfield to Palmdale Project Section would traverse large areas of previously undisturbed land, including the BNSF Improvement Project (K-8), SR 184 widening (K-14), High Desert Corridor (LA-4), Northwest 138 Corridor Improvement Plan (LA-5), and Lockheed Martin solar facility (P-5), thereby resulting in potential impacts on paleontological resources. There are no known paleontological resources in the footprints for the B-P Build Alternatives, CCONM Design Option, Refined CCONM Design Option, the portion of the F-B LGA from the intersection of 34th Street and L Street to Oswell Street, or the maintenance facilities. However, based on the paleontological sensitivity of geologic units along the alignments, there is a potential for paleontological resources to be discovered during project development.

As discussed in Section 3.9, Geology, Soils, Seismicity, and Paleontological Resources, the design of the proposed improvements within the Bakersfield to Palmdale Project Section includes IAMFs that require direct monitoring by a paleontological resource specialist during construction, a paleontological resource monitoring and mitigation plan, and halting construction in the event paleontological resources are found. This would ensure that construction of the proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to the cumulative loss of paleontological resources. As transportation and development projects are generally subject to environmental review under CEQA and/or NEPA, cumulative development would similarly incorporate appropriate project design features and mitigation measures to reduce potential impacts on paleontological resources.

CEQA Conclusion

Construction of cumulative projects in the RSA could result in a significant cumulative impact on mineral resources under CEQA as unknown amounts of mineral resources would be needed for cumulative projects. Earthwork for construction of the proposed improvements within the Bakersfield to Palmdale Project Section would either achieve a balanced condition or result in excess material. Therefore, the proposed improvements within the Bakersfield to Palmdale Project Section would have no incremental contribution to the cumulative effect. Construction of cumulative projects in the RSA could result in a significant cumulative impact on paleontological resources, a nonrenewable resource. Construction of the proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to the cumulative loss of paleontological resources because effective measures would be in place throughout construction.

3.19.5.10 Hazardous Materials and Wastes

The cumulative impact analysis for hazardous materials and waste evaluates the potential effects of the proposed improvements within the Bakersfield to Palmdale Project Section the specific projects listed in Appendix 3.19-A, and the adjacent HSR project sections (Fresno to Bakersfield and Palmdale to Burbank), which combined constitute the cumulative condition relevant hazardous materials and waste.

A cumulative impact related to hazardous materials and wastes that would be significant under CEQA would occur if the impacts of the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects combined to create new and substantial hazards to the public or the environment through the routine transport, use, or disposal of hazardous materials; upset and accident conditions that involve the release of hazardous materials into the environment; or hazardous material releases such that they would pose a risk to human health or safety.

Construction

Construction activities associated with the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects in the RSA (e.g., adjacent HSR project sections, SR 184 widening [K-14], Tehachapi Walmart project [T-11], and Lockheed Martin solar facility [P-5]) would temporarily result in an incremental increase in the transportation, storage, use, and disposal of hazardous materials (e.g., construction fuels, oils, paints and solvents, and cement products containing strong basic or acidic chemicals). This incremental increase could result in accidental site-specific spills and releases of hazardous materials. While hazardous materials handling may occur intermittently during construction, and, in some may cases be located within 0.25 mile of an existing or proposed school, compliance with federal, state, and local regulations and implementation of IAMFs related to the transport, handling, cleanup, and disposal of hazardous materials and wastes would reduce or avoid the potential for HSR construction activities to result in an impact that could combine with similar impacts of cumulative projects.

CEQA Conclusion

The projected increase in population and development by the year 2040 is anticipated to contribute incrementally to the transport, storage, use, and disposal of hazardous materials and wastes in the cumulative RSA. However, these incremental contributions are tightly controlled by existing regulations and would not result in a significant cumulative impact under CEQA. Therefore, CEQA does not require any mitigation.

Operation

As discussed in Section 3.10, Hazardous Materials and Wastes, operational use of hazardous materials would be minimal along the alignment and at stations, and would be focused at the maintenance facilities where small amounts of hazardous materials (e.g., solvents, paints, vehicle fuels, and pesticides) would be required for maintenance activities. Transport, use, storage, and disposal of hazardous materials and wastes would be in accordance with existing regulations and project IAMFs, reducing the risk of exposure to or release of hazardous materials that could combine to result in a cumulative impact that would be significant under CEQA. Operation of the proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to this cumulative impact because effects related to use of hazardous materials are localized.

CEQA Conclusion

The projected increase in population and development by the year 2040 is anticipated to contribute incrementally to the transport, storage, use, and disposal of hazardous materials and wastes within the cumulative RSA. However, these incremental contributions are tightly controlled by existing regulations, and there would not be a significant cumulative impact under CEQA. Therefore, CEQA does not require any mitigation.

3.19.5.11 Safety and Security

The cumulative impact analysis for safety and security considers potential effects of the proposed improvements within the Bakersfield to Palmdale Project Section the specific projects identified in Appendix 3.19-A, and the adjacent HSR project sections (Fresno to Bakersfield and Palmdale to Burbank), which combined constitute the cumulative condition relevant to safety and security. Under the cumulative condition, ongoing growth trends in the cumulative RSA are expected to continue, resulting in continued demand for emergency response services, law enforcement, and fire protection.

A cumulative impact on safety and security that would be significant under CEQA would occur if the impacts of the proposed improvements within the Bakersfield to Palmdale Project Section, combined with cumulative projects, would result in inadequate emergency access, impair implementation of or physically interfere with an adopted emergency response or emergency evacuation plan, or exacerbate wildfire risks due to project locations (e.g., near slopes or in an area with prevailing winds,) and design features.

Construction

The construction of the proposed improvements within the Bakersfield to Palmdale Project Section, in combination with cumulative projects, would require several thousand construction workers per year. The localized temporary increase in population due to the influx of construction workers could temporarily increase the demand for fire protection, law enforcement, and other emergency response services in the project region, which, in turn, could require new or improved facilities, the construction of which could result in adverse effects to the environment. In addition, road closures and detours could result in increased response times for emergency responders. Similar to the proposed improvements within the Bakersfield to Palmdale Project Section, the cumulative projects identified in Appendix 3.19-A would be required to follow strict Occupational Safety and Health Administration and safety practices. They would also be required to implement standard construction and safety plans, construction transportation plans, and traffic control plans, as necessary, to reduce the need for emergency services and reduce impacts on emergency response times. However, as with other project development, environmental review of specific projects would be required to ensure that impacts are identified and mitigated. Therefore, impacts associated with the demand for public services are project-specific and not cumulative in nature.

The proposed improvements within the Bakersfield to Palmdale Section, in combination with cumulative projects, would result in construction activities in State Responsibility and Local Responsibility Fire Severity Hazard Severity Zones in Kern and Los Angeles counties. Construction activities in such areas would be required to apply techniques to reduce potential ignition sources, including, but not limited to, designating smoking areas for construction employees, maintaining vegetation clearance around construction areas (defensible space), and using spark arrestors. Environmental review of specific projects would be required to ensure that impacts are identified and mitigated. Therefore, impacts associated with wildfire exacerbation are project-specific and not cumulative in nature.

CEQA Conclusion

There are no significant cumulative construction-related impacts under CEQA associated with demand for public services or exacerbation of wildfire risks to which the proposed improvements within the Bakersfield to Palmdale Project Section would contribute because impacts are project-specific. Therefore, CEQA does not require any mitigation.

Operation

The proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects (including the Canyons [K-1], the Grapevine project [K-9], the Oak Tree Village projects [T-7], and development under local general plans) would increase the population and workforce in the RSA and result in an increase in demand for fire protection, law enforcement, and other emergency response services that, in turn, could require new or improved facilities, the

construction of which could result in adverse effects to the environment. The proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects would also increase the potential for exacerbation of wildfire risks. However, as with other project development, environmental review would be required for specific public facility projects and projects in State Responsibility and Local Responsibility Areas Fire Hazard Severity Zones to ensure that impacts are identified and mitigated. Therefore, impacts associated with the demand for public services or exacerbation of wildfire risks are project-specific and not cumulative in nature.

CEQA Conclusion

There are no significant cumulative operations-related impacts under CEQA associated with demand for public services, including emergency response, or exacerbation of wildfire risks to which the proposed improvements within the Bakersfield to Palmdale Project Section would contribute because impacts are project-specific. Therefore, CEQA does not require any mitigation.

3.19.5.12 Socioeconomics and Communities

The cumulative impact analysis for socioeconomics and communities considers the proposed improvements within the Bakersfield to Palmdale Project Section the specific projects identified in Appendix 3.19-A, and the adjacent HSR project sections (Fresno to Bakersfield and Palmdale to Burbank) for issues such as community-specific division, as well as regional growth projections in Section 3.19.5.1, Overview of Future Conditions, for broader issues such as economics and population growth.

A cumulative impact related to socioeconomics and communities that would be significant under CEQA would occur if the proposed improvements within the Bakersfield to Palmdale Project Section, in combination with cumulative projects, would result in the disruption or division of communities or the displacement and relocation of residents, businesses, and community facilities. NEPA requires evaluation of potential disruption of existing communities, while CEQA requires evaluation of potential division of established communities.

Construction

Population and Community Impacts

Construction of the proposed improvements within the Bakersfield to Palmdale Project Section, in combination with cumulative projects, could contribute to cumulative effects associated with the disruption or division of communities, and displacement and relocation of residents, businesses, and community facilities from areas along the proposed improvements within the Bakersfield to Palmdale Project Section. Some of the cumulative projects are also anticipated to directly impact community cohesion and displace residents and businesses. Temporary impacts associated with the construction of projects adjacent to each other and to the proposed improvements within the Bakersfield to Palmdale Project Section could contribute to increased traffic and changes to traffic patterns, changes in access to community facilities, and increased construction noise and dust.

Disruption or division of communities could result from the construction of the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects, including, but not limited to, the BNSF/UPRR Mojave Subdivision Tehachapi Rail Improvement project (K-8), the SR 58 Widening project (K-13), the SR 184 Widening project (K-14), the 24th Street Improvements (B-34), the Hageman Flyover (B-35), the SR 99 Auxiliary Lane/Rosedale Highway Off-ramp Improvements (B-36), the Truxtun Avenue/Oak Creek Intersection Operational Improvements project (B-37), the MetroLink project (LA-3), the High Desert Corridor (LA-4), the Northwest 138 Corridor Improvement Plan (LA-5), and various street widening and improvement projects in the Cities of Lancaster and Palmdale (L-16 through L-18 and P-7 through P-32). Right-of-way acquisition and construction activities associated with these projects could impact access and community cohesion due to displacements and relocations, increased congestion, out-of-direction travel associated with detours, and lane or road closures, including to nonmotorized circulation and access (sidewalks, bicycle lanes, and other similar facilities). A construction

transportation plan would be developed as an IAMF that would require the design-build contractor to implement activities for each construction phase that would maintain traffic flow during peak travel periods.

Construction of the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects would displace residents and businesses in a manner that could result in the disruption or division of communities, contributing to a cumulative impact that would be significant under CEQA. The proposed improvements within the Bakersfield to Palmdale Project Section include project-level mitigation that reduces disruption and division of residential neighborhoods and communities by providing educational outreach about the effects of the project and by making efforts to locate suitable replacement properties. However, this mitigation would not fully address the disruption and division of existing communities. Therefore, the cumulative effect of the proposed improvements within the Bakersfield to Palmdale Project Section, in combination with cumulative projects, to communities would be a permanent cumulative impact.

Sufficient replacement housing and commercial space are available to accommodate the residential and business relocations necessitated by the proposed improvements within the Bakersfield to Palmdale Project Section. However, there would be a deficit of available industrial parcels to accommodate the business relocations in the Lancaster and Palmdale area. These resources could be strained, particularly in the Lancaster and Palmdale areas, if relocations associated with cumulative projects were to occur concurrently with those related to the project. However, the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects that result in property acquisitions would be required to comply with the Uniform Relocation Assistance and Real Property Acquisition Act, legislation that ensures fair treatment of those displaced by federal activities. The proposed improvements within the Bakersfield to Palmdale Project Section include mitigation measures aimed at reducing impacts associated with the divisions of communities and residential neighborhoods through relocation programs for displaced residents; community workshops for affected residents; and outreach to homeowners, residents, business owners, and community organizations to maintain community cohesion and avoid physical deterioration. Despite these measures, the proposed improvements within the Bakersfield to Palmdale Project Section would still result in a large number of displacements and relocations.

The incremental impact would vary depending on the B-P Build Alternative because each alternative would displace a different number of residences, businesses, and community facilities. Alternative 5 would impact the largest number of facilities, displacing 338 residential units, 285 businesses, and 4 community facilities. Alternative 3 it would result in fewer displacements than Alternative 5, with 244 residential units, 231 businesses, and 4 community facilities displaced. Alternatives 1 and 2 it would result in the fewest displacements, with 243 residential units, 231 businesses, and 4 community facilities. Implementation of the CCNM Design Option or the Refined CCNM Design Option would not change the number of displacements under any of the B-P Build Alternatives. Cumulative Mitigation Measure CUM-SO-MM#1, Coordination with Cumulative Construction Project Sponsors, discussed in Section 3.19.6, Mitigation Measures, would require HSR project sponsors to coordinate construction schedules and potential closures, detours, and other elements of construction with other entities, including local or regional governments. This coordination would minimize cumulative effects to the extent feasible. However, despite this measure, construction of the proposed improvements within the Bakersfield to Palmdale Project Section would permanently disrupt established patterns of interaction among community residents and directly displace residents, businesses, and community facilities.

Economic Impacts

Construction of the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects could result in displacement of existing residential, commercial, industrial, and agricultural uses on affected properties, and by association, could impact the sales and property tax bases of the municipalities in which those properties are located. Cumulative projects, such as the 24th Street improvements (B-34), could also result in displacement of

existing uses, resulting in similar sales and property tax impacts. Many of these impacts on property and sales tax bases would be temporary, as it is expected that displaced residents and businesses could be relocated within their existing municipalities. As discussed in Section 3.12, Socioeconomics and Communities, impacts on the local tax base would be offset by additional revenues resulting from indirect local economic activity associated with construction spending.

CEQA Conclusion

Construction of the proposed improvements within the Bakersfield to Palmdale Project Section, in combination with cumulative projects, would result in permanent disruption or division of communities and permanent displacement and relocation of residents, businesses, and community facilities in the RSA. Therefore, construction of the proposed improvements within the Bakersfield to Palmdale Project Section, in combination with other cumulative development, could affect established communities. Cumulative Mitigation Measure CUM-SO-MM#1, Coordination with Cumulative Construction Project Sponsors, would require HSR project sponsors to coordinate construction schedules and potential closures, detours, and other elements of construction with other entities, including local or regional governments, to minimize cumulative effects to the extent feasible. However, the project's incremental contribution to this impact would be cumulatively considerable because the proposed improvements within the Bakersfield to Palmdale Project Section would contribute to the permanent disruption or division of communities and displace residents, businesses, and community facilities.

The cumulative economic impact from construction of the proposed improvements within the Bakersfield to Palmdale Project Section, in combination with cumulative projects, is not considered an environmental impact under CEQA because it would not cause a physical change in the environment. Nevertheless, impacts on the local tax base would be offset by additional revenues resulting from indirect local economic activity associated with construction spending.

Operation

Population and Community Impacts

The proposed improvements within the Bakersfield to Palmdale Project Section, in combination with cumulative projects, have the potential to affect communities. The proposed improvements within the Bakersfield to Palmdale Project Section would bring social benefits to the region by improving access to jobs and community amenities, decreasing travel times, and reducing traffic congestion during operation. The project would likely stimulate redevelopment efforts in areas near the stations that could strengthen community cohesion. Cumulative projects, particularly transportation projects such as the SR 58 Widening project (K-13) and SR 184 Widening project (K-14), may have similar beneficial effects on the same communities affected by the proposed improvements within the Bakersfield to Palmdale Project Section. However, none of those transportation projects are anticipated to stimulate redevelopment efforts and improve community cohesion to the same degree as the proposed improvements within the Bakersfield to Palmdale Project Section.

Economic Impacts

Operation of the proposed improvements within the Bakersfield to Palmdale Project Section in conjunction with other planned projects would result in increases in employment and employment-related spending as well as tax revenues in the RSA. Increased connectivity to other metropolitan areas would contribute to the economic health and vitality of the region, and under the cumulative scenario, the new homes, businesses, and infrastructure proposed for the RSA would benefit from the proposed improvements within the Bakersfield to Palmdale Project Section. Operation and maintenance of the project would create new jobs and increase project-related direct and induced spending in the RSA. As noted above, most of the economic impacts related to business and job displacements are anticipated to be temporary. Any permanent job losses are expected to be offset by the new direct and indirect job creation resulting from the proposed improvements within the Bakersfield to Palmdale Project Section.

In addition, nearby rail projects may have positive impacts on property values. Per the discussion provided in Section 3.12, Socioeconomics and Communities, research on the effects of HSR projects in particular yield mixed findings and no real consensus, but the proposed improvements within the Bakersfield to Palmdale Project Section's contribution to the impacts on property values would be very small. The development envisioned for station planning areas is expected to encourage more infill growth rather than sprawl, which is a beneficial effect to local economies.

CEQA Conclusion

The cumulative impact on communities and the economy from operation of the proposed improvements within the Bakersfield to Palmdale Project Section, in combination with cumulative projects, would be less than significant because the project would stimulate redevelopment efforts and improve community cohesion. Therefore, no cumulative mitigation measures are required.

3.19.5.13 Station Planning, Land Use, and Development

The cumulative impact analysis for station planning, land use, and development considers the proposed improvements within the Bakersfield to Palmdale Project Section the specific projects identified in Appendix 3.19-A, the adjacent HSR project sections (Fresno to Bakersfield and Palmdale to Burbank), and regional growth projections, which combined constitute the cumulative condition relevant to station planning, land use, and development. Under the cumulative condition, ongoing growth trends in the cumulative RSA are expected to continue, resulting in the continued conversion of undeveloped and agricultural land to residential, commercial, and industrial uses, and for transportation infrastructure. In general, this conversion of existing land uses is planned for by the communities and counties in which these projects occur.

A cumulative impact related to station planning, land use, and development that would be significant under CEQA would occur if this cumulative growth resulted in changes in the pattern or density of land use such that it resulted in incompatible land use patterns in the cumulative RSA.

Construction

As described in Section 3.18, Regional Growth, the populations of Kern and Los Angeles Counties are projected to increase approximately 68 percent and 17 percent, respectively, by 2040. Development needed to accommodate this population growth is planned largely in the existing cities, as described in the general plans for the counties and cities in the RSA. This development would result in land use changes, particularly shifts from agricultural uses to urbanized uses. Additionally, planned changes in transportation systems, including projects listed in Appendix 3.19-A, would affect land uses either directly, through the acquisition of properties, or indirectly by providing new or improved access to areas. Under the cumulative condition, roadway improvements provided in regional transportation plans would typically reduce congestion and shorten travel times by expanding road capacity. Although this has historically encouraged development on the fringes of urban areas and subsequently resulted in longer commutes and additional congestion, the sustainable communities strategies or alternative planning strategies requirements established pursuant to Senate Bill 375 (2008) may result in different trends. For example, to meet the Senate Bill 375 targets for reduced GHG emissions from automobiles and light trucks, future regional transportation plans may encourage more compact development patterns. Development of the stations would offer opportunities for transit-oriented development and compact growth patterns.

CEQA Conclusion

Construction of the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects would result in a less than significant cumulative impact on land use, and this development would not result in incompatible land uses. Therefore, no mitigation is required.

Operation

Once constructed, there would also not be a cumulative operations impact related to this conversion of land. Therefore, no impact would result.

3.19.5.14 *Agricultural Farmland and Forest Land*

The cumulative impact analysis for agricultural farmland considers the proposed improvements within the Bakersfield to Palmdale Project Section the specific projects identified in Appendix 3.19-A, the adjacent HSR project sections (Fresno to Bakersfield and Palmdale to Burbank), and regional growth projections, which combined constitute the cumulative condition relevant to agricultural farmland.

Under the cumulative condition, urbanization and continued population growth, along with associated development, would continue to expand; economic factors and lack of available resources such as water would lead to the continued conversion of agricultural land to nonagricultural use.

A cumulative impact on agricultural farmland resources that would be significant under CEQA would occur if the proposed improvements within the Bakersfield to Palmdale Project Section, combined with cumulative projects, would result in the loss of Important Farmland, land under a Williamson Act contract, or land zoned for agricultural use or agricultural conservation easements. The proposed improvements in the Bakersfield to Palmdale Project Section would not impact forestland (or land zoned as such), Farmland of Local Importance, Farmland Security Zone contracts, confined-animal facilities, or agricultural easements. In addition, although Grazing Land is an important and widespread agricultural land use in the RSA, it is not included in the Department of Conservation or U.S. Department of Agriculture definitions of Important Farmland, and is not a type of farmland protected pursuant to NEPA or CEQA. Therefore, cumulative effects associated with forestland, Farmland of Local Importance, Farmland Security Zone contracts, confined-animal facilities, agricultural easements, and Grazing Land are not analyzed in this section.

Construction

Construction of the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects (e.g., the FRV Orion and Maricopa Sun Solar projects [K-7 and K-2], the High Desert Corridor project [LA-4], and urban development under the Kern County and Los Angeles County General Plans) on Important Farmland, Williamson Act Contract Land, or land zoned for agricultural use would contribute to the permanent conversion of Important Farmland, Williamson Act Contract Land, and land zoned for agricultural use to nonagricultural use. This would be a cumulative impact that would be significant under CEQA because mitigation would not create new agricultural land to replace that which was permanently converted to nonagricultural use and therefore would not address the permanent net loss of Important Farmland, Williamson Act Contract Land, and land zoned for agricultural use.

As discussed in Section 3.14, Agricultural Farmland and Forest Land, construction of the B-P Build Alternatives would permanently convert 565 to 611 acres of Important Farmland, including 71 to 86 acres of Important Farmland under a Williamson Act contract and 552 to 621 acres of Important Farmland zoned for agricultural use to nonagricultural use. Alternative 3 would result in the largest incremental impact, with the conversion of 611 acres of Important Farmland, 559 of which are zoned for agricultural use and 71 of which are under a Williamson Act contract. Alternatives 1 and 5 would follow, each resulting in the conversion of 604 acres of Important Farmland, 552 of which are zoned for agriculture use and 71 of which are under a Williamson Act contract. Alternative 2 would have the smallest incremental impact, as it would result in the conversion of 565 acres of Important Farmland, 621 of which are zoned for agriculture use and 86 of which are under a Williamson Act contract. Implementation of the CCNM Design Option would not change the number of acres of Important Farmland, the number of acres zoned for agricultural use, or the number of acres of land under a Williamson Act contract that would be permanently converted under any of the B-P Build Alternatives. These conversions, combined with those that would occur for development of cumulative projects, would result in a cumulative impact that would be significant under CEQA. Implementation of the CCNM Design Option or the Refined CCNM Design Option would not change the number of acres of Important Farmland, the number of acres of Important Farmland under a Williamson Act contract, or the number of acres

of Important Farmland zoned for agriculture use that would be permanently converted under any of the B-P Build Alternatives.

Although the Authority has entered into an agreement with the Department of Conservation and its California Farmland Conservancy Program to implement agricultural land mitigation for the HSR system, no new agricultural land would be created to replace converted land. Therefore, the contribution of the B-P Build Alternatives to these cumulative impacts would be cumulatively considerable. As discussed in Section 3.14.6.3, Bakersfield to Palmdale Project Section Build Alternatives, of Section 3.14, Agricultural Farmland and Forest Land, while the B-P Build Alternatives include a project-level measure to mitigate for the loss of Important Farmland, including funding the purchase of agricultural conservation easements at a ratio of not less than 1:1 for direct impacts and 0.5:1 for Important Farmland within a 25-foot-wide area adjacent to HSR permanently fenced infrastructure, the measure would not create new farmland (i.e., convert natural land to agriculture) and therefore would not address the net loss of Important Farmland. It is not feasible to convert hundreds of acres of vacant land, which is how much Important Farmland would be converted to nonagricultural use in the cumulative scenario, to functional Important Farmland. Therefore, there is no further mitigation available to address this cumulative impact.

CEQA Conclusion

Construction of the proposed improvements within the Bakersfield to Palmdale Project Section, in combination with cumulative projects, would permanently convert Important Farmland, including that under Williamson Act contract and that zoned for agricultural use, to nonagricultural use, a significant cumulative impact under CEQA. Because the B-P Build Alternatives would permanently convert Important Farmland, Important Farmland under a Williamson Act contract, and Important Farmland zoned for agricultural use to nonagricultural use, the project's incremental contribution to this impact would be cumulatively considerable under CEQA. No mitigation is available to address this cumulative impact.

Operation

Operational activities of the proposed improvements within the Bakersfield to Palmdale Project Section would not result in impacts on Important Farmland, as discussed in Section 3.14, Agricultural Farmland and Forest Land. Therefore, this issue is not discussed further.

3.19.5.15 Parks, Recreation, and Open Space

The cumulative impact analysis for parks, recreation, and open space evaluates potential effects of the proposed improvements within the Bakersfield to Palmdale Project Section the specific projects listed in Appendix 3.19-A, and the adjacent HSR project sections (Fresno to Bakersfield and Palmdale to Burbank). In incorporated cities, cumulative effects to park, recreation, and/or open space resources are evaluated based on the cities' general plans, which include goals, policies, and programs that address existing and future conditions in the city relative to these types of resources. In unincorporated areas, cumulative effects to park, recreation, and/or open space resources are localized to where demand for these resources occurs, rather than in the county as a whole, and are evaluated based on the location of potential impacts.

A cumulative impact on parks, recreation, and open space that would be significant under CEQA would occur if the proposed improvements within the Bakersfield to Palmdale Project Section combined with cumulative projects, would result in substantial physical deterioration or diminish the capacity of these resources.

Construction

Construction activities associated with the proposed improvements within the Bakersfield to Palmdale Project Section in combination with cumulative projects could affect traffic, noise, and/or air quality near parks, recreation, and open space resources in the RSA and thereby indirectly affect park users. Traffic impacts could interfere with access to parks by causing congestion adjacent to or near parks, thereby increasing transportation time for park users traveling to parks, recreation, and open space resources. Construction noise and reduced air

quality could diminish park user experience through a loud noise environment and dust and other pollutants in the air.

Cumulative projects near parks, recreation, and open space resources in the RSA include Oak Tree Village (T-7); CUP 07-06 (L-2); 15BW008 bicycle and pedestrian improvements (L-16); a Department of Motor Vehicles facility (L-4); a 9,960-square-foot storage building (L-6); the Avenue M/STR 023 street widening (P-19); and the Avenue N widening/STR 028 (P-20). IAMFs provided in Section 3.15, Parks, Recreation, and Open Space; Section 3.3, Air Quality and Global Climate Change; and Section 3.4, Noise and Vibration, would avoid, minimize, and/or mitigate the construction effects associated with the proposed improvements within the Bakersfield to Palmdale Project Section. Additionally, cumulative projects would be required to implement project mitigation measures to avoid, minimize, and/or mitigate the temporary construction effects.

Many of the cumulative projects are far enough away from the alignment for the proposed improvements within the Bakersfield to Palmdale Project Section or would result in minimal impacts such that it would not be expected to contribute to temporary cumulative traffic, air quality, and/or noise effects on parks, recreation, and open space resources in the RSA. Therefore, construction of the proposed improvements within the Bakersfield to Palmdale Project Section in combination with cumulative projects would not result in a cumulative impact on parks, recreation, and open space (including as related to noise, air quality, aesthetics, and traffic) that would be significant under CEQA. In addition, the proposed improvements within the Bakersfield to Palmdale Project Section and the nearby cumulative projects would include measures to avoid, minimize, and/or mitigate the temporary impacts of those projects during construction.

CEQA Conclusion

Under CEQA, the proposed improvements within the Bakersfield to Palmdale Project Section, in combination with cumulative projects, would not result in a significant cumulative impact on parks, recreation, or open space. Therefore, CEQA does not require mitigation.

Operation

As discussed in Section 3.15, Parks, Recreation, and Open Space, operation of the proposed improvements within the Bakersfield to Palmdale Project Section would not affect parks or recreational facilities, except for the PCT, and therefore would not contribute to a cumulative impact. With regards to the PCT, the B-P Build Alternatives would cross the PCT once. There are no other cumulative projects in the vicinity of this crossing. Therefore, the effects of the project would not combine with other projects in the area to result in additional cumulative impacts.

Although the HSR system would cross the PCT in two places (one for the Bakersfield to Palmdale Project Section and one for the Palmdale to Burbank Project Section), both crossings in combination would not result in substantial physical deterioration or diminish the capacity of the PCT. The preferred alternative for the Palmdale to Burbank Section, SR14A, would cross the PCT in a tunnel and would not be visible (the nearest HSR tunnel portal would be approximately 1 mile north of the PCT) or otherwise affect the experience of PCT users. In addition, the HSR crossings would be approximately 99 trail miles apart. Therefore, day hikers and equestrian users would likely not experience both crossings, but would visit one location or the other during an outing to the PCT. Through-hikers could encounter both crossings within a few days to a week. Overall, the PCT would remain operable and accessible to PCT users, including through-hikers, day hikers, and equestrian users at the HSR crossing within the Bakersfield to Palmdale Project Section and the HSR crossing within the Palmdale to Burbank Project Section.

CEQA Conclusion

Under CEQA, potential impacts of the Bakersfield to Palmdale Project Section would not combine with potential impacts of cumulative projects, such that there would be a cumulative impact on parks, recreation, or open space. Therefore, CEQA does not require mitigation.

3.19.5.16 Aesthetics and Visual Quality

The cumulative impact analysis for aesthetics and visual quality evaluates the potential effects of the proposed improvements within the Bakersfield to Palmdale Project Section the specific projects identified in Appendix 3.19-A, and the adjacent HSR project sections (Fresno to Bakersfield and Palmdale to Burbank), which combined constitute the cumulative condition relevant to aesthetics and visual quality.

A cumulative impact on aesthetics and visual quality that would be significant under CEQA would occur if the proposed improvements within the Bakersfield to Palmdale Project Section, in combination with cumulative projects, would substantially degrade the existing visual quality in the RSA.

Construction

Construction of the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects, including roadway and highway improvement projects, and residential, commercial, and industrial developments near the proposed improvements within the Bakersfield to Palmdale Project Section, would result in construction activities that would create temporary visual changes from construction staging, equipment, and lighting. Projects that could be under construction concurrently with the proposed improvements in the Bakersfield to Palmdale Project Section include, but are not limited to, the BNSF Improvement Project (K-8), SR 184 widening (K-14), 24th Street improvements (B-34), High Desert Corridor (LA-4), Northwest 138 Corridor Improvement Plan (LA-5), and adjacent HSR project sections (Fresno to Bakersfield and Palmdale to Burbank).

Although construction activities for the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects would be temporary, these activities could overlap and combine to create a cumulative impact on visual quality that would be significant under CEQA due to the scale and proximity of the cumulative projects.

Construction staging areas and pre-cast operations yards would be surrounded generally by commercial or industrial lands, away from high-sensitivity viewer groups, or outside the immediate foreground (0 to 500 feet) of existing residential, recreational, or other high-sensitivity viewers. Therefore, construction staging areas and pre-cast operations yards for the proposed improvements within the Bakersfield to Palmdale Project Section would not substantially degrade visual quality for high-sensitivity viewers. Cumulative projects would likely adhere to similar practices, resulting in limited effects from construction staging areas or pre-cast operations yards.

Construction laydown areas used to store construction materials and equipment would be located throughout the length of the right-of-way and could temporarily cause substantial changes to visual quality were highly visible construction activities located near sensitive viewers. In addition, lighting of temporary structures (e.g., trailers, fencing, and parking) and that used in nighttime construction could spill over to off-site areas, resulting in substantial disturbances to nearby residents and motorists. To reduce potential temporary impacts associated with construction laydown areas during the construction period, the construction contractor would prepare a technical memorandum identifying how the proposed project would minimize construction-related aesthetic and visual quality disruption, as outlined in AVR-MM#1a and AVQ-MM#1, Minimize Visual Disruption from Construction Activities. To reduce disruption to nearby residents and motorists during the construction period, the construction contractor would also prepare a technical memorandum to verify that the construction contractor would shield nighttime construction lighting and direct it downward in such a manner as to minimize the light that falls outside the construction site boundaries, as outlined in AVR-MM#1b and AVQ-MM#2, Minimize Light Disturbance during Construction. No cumulative projects are located close to construction staging/laydown areas with high-sensitivity viewers.

The permanent conversion of existing land uses to urban or transportation uses associated with new development and transportation projects would degrade the existing visual quality for residents and other sensitive viewers in the RSA. The proposed improvements within the Bakersfield to Palmdale Project Section would affect aesthetics and visual quality in the East Bakersfield landscape unit, the Edison Rural Valley landscape unit, and the Cities of Tehachapi, Lancaster, and Palmdale. The potential effect of the proposed improvements within the Bakersfield to Palmdale Project Section in combination with cumulative projects in each of these areas follows, relative to the location of these impacts.

In the East Bakersfield landscape unit, one of the largest cumulative projects is the planned widening of SR 184 to four lanes, from SR 58 north to SR 178 (K-14). Adjacent residents and students and staff at Foothill High School would clearly see and be exposed to the effects of the widening project. This and other projects in the area would occur in an urban setting with low to moderately low visual quality. The B-P Build Alternatives, the road widening project, and other cumulative projects would intensify the area's urban visual character where viewer sensitivity is high. However, existing visual quality is relatively low and would not be substantially degraded as result of cumulative development. Therefore, given the low viewer sensitivity in the area, operation of the project in combination with cumulative projects would not result in a cumulative impact in the East Bakersfield landscape unit that would be significant under CEQA.

In the Edison Rural Valley landscape unit, cumulative development includes an approved solar project with a 135-megawatt solar facility on 633 acres near SR 58 and Tower Line Road (K-10). The solar project would be located in an agricultural area with orchards and cultivated fields, and in transportation corridors such as SR 58, Edison Highway, and the UPRR line. Distant views of the Tehachapi Mountains are available approximately 10 miles southeast of the alignment for the B-P Build Alternatives. Existing visual quality is moderate in this area. The installation of the solar facility would change the site's visual character from agricultural to industrial, but the solar panels would not obstruct background views of mountains from the perspective of commuters on SR 58. The B-P Build Alternatives would include elevated structures up to 40 feet above the existing grade that, combined with the solar project and cumulative projects, would change the visual character in the Edison Rural Valley landscape unit. Nevertheless, they would not obstruct views of the mountains, and as no highly sensitive viewers are in the area, the project in combination with cumulative projects would not result in a cumulative impact in the Edison Rural Valley landscape unit that would be significant under CEQA.

In the Tehachapi Mountains, cumulative projects would be clustered in and near the City of Tehachapi. The visual character of the Tehachapi Valley is defined by the contrast between the undeveloped slopes and ridges of the surrounding mountains with the expansive and partially developed, level valley floor. Existing visual quality is moderate to moderately high. Several cumulative projects in Tehachapi would be constructed north of SR 58 in a planned growth area that is currently undeveloped grasslands near the foothills of the Tehachapi Mountains. These include a 210-acre senior housing project (T-7), a hospital campus (T-2), a medical office (T-4), and two hotels (T-6, T-8). The city's general plan anticipates the future development of rural estates and neighborhoods as well as a highway service district in this area (City of Tehachapi 2012).

The conversion of undeveloped grasslands to urban development would degrade visual quality from the perspective of viewers from nearby future residences. Future residences could be located as close as 0.5 mile from the approximately 40-foot-high HSR embankment, which would skirt the base of the foothills. Depending on the location of these residences and if views are hindered or blocked by other development, viewer exposure and awareness may be high. However, only the residences closest to the alignment would experience high exposure, and intervening development would filter other residential views. Therefore, given the low number of sensitive viewers near the alignment, construction of the B-P Build Alternatives, in combination with cumulative projects, would not result in a cumulative impact on residential viewers in the Tehachapi Mountains that would be significant under CEQA.

Under the B-P Build Alternatives, without the CCNM Design Option or Refined CCNM Design Option, views from La Paz in Keene, California, would include a viaduct up to 160 feet tall

approximately 0.25 mile from the property. Given the high viewer awareness and moderate to high viewer exposure at this location, overall viewer sensitivity would be high. However, there are currently no cumulative projects that are visible from this property. Therefore, the visual impact from the B-P Build Alternatives would not combine with those from cumulative projects.

In Lancaster, cumulative projects include residential subdivisions, commercial and industrial developments, and roadway improvements (L-1 through L-15, L-17 through L-30, and LA-5). Because these projects would convert vacant sites with exposed dirt and ruderal vegetation, they would not degrade visual quality relative to existing conditions.

In Palmdale, the primary cumulative projects involve widening the south side of Avenue M from SR 14 to Sierra Highway and widening and improving the streetscape of Avenue N from 10th Street West to Sierra Highway (P-19, P-20). These projects would be located in areas with a mix of commercial development and natural desert landscape that includes Joshua trees. Because no highly sensitive viewers occur in the area, construction of the B-P Build Alternatives, Palmdale station, or maintenance facilities, in combination with cumulative projects, would not result in a cumulative impact that would be significant under CEQA.

CEQA Conclusion

The construction of the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects would not result in a significant cumulative impact on visual quality as the combination of these projects would not substantially degrade the existing visual quality.

Operation

The operational activities of the proposed improvements within the Bakersfield to Palmdale Project Section would not result in impacts on visual quality, as discussed in Section 3.16, Aesthetics and Visual Quality. Therefore, this issue is not discussed further.

3.19.5.17 Cultural Resources

The cumulative effects analysis for cultural resources evaluates potential effects of the proposed improvements within the Bakersfield to Palmdale Project Section the specific projects identified in Appendix 3.19-A, and the adjacent HSR project sections (Fresno to Bakersfield and Palmdale to Burbank), which combined constitute the cumulative condition relevant to cultural resources.

This analysis assumes the presence of as-yet-undiscovered archaeological resources. This analysis evaluates the impacts of the proposed improvements within the Bakersfield to Palmdale Project Section in combination with cumulative projects, and then provides additional information about the differing construction effects under Alternative 5.

Impacts on cultural resources—including historic architectural properties, prehistoric- and historic-era archaeological properties, and traditional cultural properties—tend to be specific to the context of the resource and to the aspects that contribute to a property's eligibility for listing in the National Register of Historic Places or California Register of Historical Resources. Several identified archaeological properties are located in the RSA. Because their individual significance is unknown until analyzed, potential impacts on these cultural resources caused by cumulative projects can collectively contribute to an incremental loss to the aggregate of cultural resources, which are often nonrenewable, in the environment. In addition, implementation of multiple projects can result in cumulative effects on individual historic properties, historic districts, or landscapes. Cumulative development in the RSA may contribute to the loss of or impacts on known historic properties. In addition, currently unknown archaeological properties or historic properties may be affected by other foreseeable projects.

A cumulative impact on cultural resources that would be significant under CEQA would occur if the proposed improvements within the Bakersfield to Palmdale Project Section, combined with cumulative projects, would collectively contribute to a potentially substantial loss of cultural resources, including historic architectural properties, prehistoric- and historic-era archaeological properties, and traditional cultural properties.

Construction

Construction of the proposed improvements within the Bakersfield to Palmdale Project Section, in combination with cumulative projects, could result in exposure and disruption of cultural resources, including archaeological resources and traditional cultural properties, and would result in the removal or alteration of historic architectural resources. The significance of archaeological resources is unknown until analyzed; therefore, potential impacts on these resources caused by cumulative projects could collectively contribute to an incremental loss to the aggregate of cultural and archaeological resources. Cumulative development could result in losses of unique resources (as defined in Public Resources Code Section 21083.2) or historical resources (as defined in Section 21083.2 of CEQA and Section 15064.5 of the State CEQA Guidelines) if excavation exposes archaeological deposits that cannot be effectively removed or recovered due to the circumstances of their exposure (e.g., in railroad rights-of-way or urbanized settings) or if recovery would not be sufficient to prevent the loss of significant archaeological resources.

Prehistoric and historic archaeological resources could be affected during construction of the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects. Linear projects in the cumulative scenario that require extensive excavation, such as the Fresno to Bakersfield and Palmdale to Burbank Project Sections of the HSR system, the BNSF/UPRR Mojave Subdivision Tehachapi Rail Improvement Project (K-8), and possible widening of SR-58 and SR-184 (K-13, K-14), are examples of projects with the potential to affect archaeological resources. As discussed in Section 3.17, Cultural Resources, construction of Alternatives 1 and 2 would each affect 47 archaeological resources; Alternatives 3 and 5 would each affect 46 archaeological resources. Implementation of the CCNM Design Option or Refined CCNM Design Option would not change the number of affected archaeological resources under any of the B-P Build Alternatives. It should be noted that, due to various engineering refinements, a revised APE was created. To identify archaeological historic properties in the revised APE, previously conducted records searches at the Southern San Joaquin Valley Information Center at California State University, Bakersfield and the South Central Coastal Information Center at California State University, Fullerton were reviewed. The records searches identified two previously recorded archaeological sites and one isolate within the revised APE, and ten archaeological sites that are no longer within the revised APE. Further, there is a potential for buried archaeological deposits (i.e., archaeological sites with no surface manifestation) to be encountered during ground-disturbing activities inside portions of the RSA. It is likely that cultural resources, specifically prehistoric and historic archaeological resources, could be disturbed, damaged, or destroyed during construction activities associated with the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects, resulting in a cumulative impact that would be significant under CEQA. However, as discussed in Section 3.17.8, Mitigation Measures, of Section 3.17, Cultural Resources, these effects could be minimized and mitigated under any of the B-P Build Alternatives. Likewise, cumulative projects would identify measures through the CEQA and/or NEPA process to mitigate for effects on cultural resources.

The proposed improvements within the Bakersfield to Palmdale Project Section would have a direct effect to historic architectural properties and contribute to this cumulative impact. Implementation of Alternatives 1, 2, 3, and 5 would result in substantial adverse changes to one built historical resource (the Big Creek Hydroelectric System Historic District). Implementation of Alternatives B-P Build Alternatives or the CCNM Design Option would result in direct visual changes to one built historical resource (La Paz). Under the Refined CCNM Design Option, impacts to La Paz would be less than significant. In addition to these effects, implementation of Alternative 5 would require demolition of the historic Denny's Restaurant #30. The effects to the Big Creek Hydroelectric System Historic District could be mitigated and minimized (discussed in Section 3.17.8, Mitigation Measures, of Section 3.17, Cultural Resources) such that these impacts would not result in a significant cumulative impact on historic architectural properties. Further, refinements to the APE caused by various engineering refinements added three historic properties that are listed or eligible for listing in the National Register of Historic Places and California Register of Historical Resources to the B-P APE. These historic properties consist of

Cedar Avenue Historic District / Cedar Avenue Complex in Lancaster, and two residential properties in Lancaster. As discussed in the Section 106 Addendum Finding of Effect Report (Authority 2021), Alternatives 1, 2, 3, and 5 would have no adverse effect on the Cedar Avenue Historic District / Cedar Avenue Complex and the property on Trevor Avenue. Alternatives 1, 2, and 3 would have no adverse effect on the property on Lancaster Boulevard; the effects could be mitigated and minimized such that these impacts would not contribute to a significant cumulative impact on historic architectural properties. The proposed improvements within the Bakersfield to Palmdale Project Section would also comply with mitigation measures aimed at mitigating adverse visual effects. However, Alternative 5 would contribute to a cumulative impact that would be significant under CEQA and cumulatively considerable because the Denny's Restaurant #30 historical resource would be demolished.

CEQA Conclusion

Construction of the proposed improvements within the Bakersfield to Palmdale Project Section, in combination with other cumulative projects, would result in a significant cumulative impact on archaeological resources because it would potentially expose and disrupt these resources. The proposed improvements within the Bakersfield to Palmdale Project Section's incremental contribution to this impact would be cumulatively considerable, and no mitigation is available to address this cumulative impact. Construction of Alternative 5 and cumulative projects would result in a significant cumulative impact on historic resources because it would involve demolition of a historic structure. Implementation of the CCNM Design Option or Refined CCNM Design Option would not change this impact. The incremental contribution of Alternative 5 to this impact would be cumulatively considerable because of the demolition of a historic structure. No mitigation is available to address this cumulative impact if this alternative were chosen.

Operation

Operations impacts from the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects could result in direct cumulative effects to historic architectural properties due to noise from operation of cumulative infrastructure projects. Operation of the B-P Build Alternatives, in combination with cumulative projects, is anticipated to result in noise impacts at the La Paz property in Keene, California.

Mitigation measures would reduce the potential effects of the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects. The proposed improvements within the Bakersfield to Palmdale Project Section include project-level mitigation that would reduce operations impacts on cultural resources, as discussed in Section 3.17.8, Mitigation Measures, of Section 3.17, Cultural Resources. A built environment treatment plan and an archaeological treatment plan are required compliance documents for cultural resources impacted by the proposed improvements within the Bakersfield to Palmdale Project Section. The archaeological treatment and built environment treatment plans would define the process by which mitigation would be applied to each known resource and would outline measures for the phased identification of historic properties as additional parcel access is obtained and design work is completed. The built environment treatment plan would describe appropriate IAMFs and mitigation measures to address noise and vibration impacts on the historic La Paz property. Cumulative projects would be required to develop similar plans to reduce the potential effects to cultural resources prior to project approval. These measures would reduce potential indirect effects to historic architectural properties. Additionally, if selected, the CCNM Design Option or Refined CCNM Design Option would further reduce noise effects to La Paz by locating the alignment farther away from this property.

CEQA Conclusion

Under CEQA, operation of the proposed improvements within the Bakersfield to Palmdale Project Section and cumulative projects would not result in a significant cumulative impact on cultural resources. Therefore, no mitigation is required.

3.19.6 Mitigation Measures (for Any Newly Identified Significant Cumulative Impacts)

This section provides a discussion of mitigation measures required specifically to reduce any newly identified cumulative impacts of the proposed improvements within the Bakersfield to Palmdale Project Section. This summary does not include project-level mitigation measures discussed previously in the EIR/EIS sections for each resource area (Sections 3.2 through 3.18). One mitigation measure was identified, which would apply to all of the B-P Build Alternatives.

3.19.6.1 *Fresno to Bakersfield Locally Generated Alternative Mitigation Measures from 34th Street and L to Oswell Street*

The *Fresno to Bakersfield Section Final Supplemental EIR* (Authority 2018b) and the *Final Supplemental EIS* (Authority 2019b) identified mitigation measures that are applicable to the entire length of the F-B LGA from just north of Poplar Avenue in Shafter to Oswell Street in Bakersfield. Not all measures identified in the Final Supplemental EIR and the Final Supplemental EIS are applicable to the portion of the F-B LGA from 34th Street and L Street to Oswell Street. The following cumulative impacts-related mitigation measures apply to the portion of the F-B LGA from 34th Street and L Street to Oswell Street:

- **F-B LGA CUM-N&V-MM#1: Consult with Agencies Regarding Construction Activities—** To minimize the potential overlapping noise-generating construction activities within the same area, the Authority would consult with local city and county planning departments and other agencies as determined necessary. Consultation would entail notifying the departments/agencies regarding the anticipated HSR construction schedule and would allow for adjustment of construction schedules for adjacent projects or projects in close proximity to the HSR alignment, to the extent feasible.
- **F-B LGA CUM-SO-MM#1: Consult with Agencies Regarding Construction Activities—** To minimize the potential cumulative effects of overlapping construction activities within the same area, the Authority would consult with the local city and county planning departments and other agencies as determined necessary, to notify the departments/agencies regarding the anticipated HSR construction schedule and allow for adjustment of construction schedules for adjacent projects or projects in close proximity to the HSR alignment, to the extent feasible, in order to limit the overlap of community disruption.
- **F-B LGA CUM-VQ-MM#1: Consult with Agencies on HSR Project Design—** Prior to construction, the Authority would consult with local city and county planning departments to provide information about the HSR project design. This would allow for local plans and proposed development projects that could be adversely affected by the HSR project to be modified and potential visual impacts to high-sensitivity viewers to be reduced, as determined feasible by project applicants/planning departments.

F-B LGA CUM-VQ-MM#1: Consult with Agencies on HSR Project Design has been replaced by AVQ-IAMF#2: Aesthetic Review Process.

3.19.6.2 *Socioeconomics and Communities*

CUM-SO-MM#1: Coordination with Cumulative Construction Project Sponsors

During construction of the HSR project section, coordination would occur with the project sponsors or other entities, including local or regional governments, to coordinate construction schedules and potential closures, detours, and other elements of construction, to the greatest extent feasible, in order to minimize impacts on surrounding communities. Such coordination would include planning for vehicular, pedestrian, and bicycle detours; performing community outreach to ensure residents and businesses are aware of potential issues in advance; and allowing for public input and feedback in planning for construction.

3.19.6.3 Mitigation Summary

Table 3.19-7 summarizes the cumulative mitigation measure that would be required for the proposed improvements within the Bakersfield to Palmdale Project Section to reduce the project's contribution to the identified cumulative impact. A summary of the residual impact following implementation of this mitigation measure is also provided in the table. For a discussion of residual impacts following implementation of these measures, refer to Section 3.19.7, Impacts Summary.

Table 3.19-7 Summary of Mitigation Measures

Mitigation Measure	Description	Alternatives	Residual Impact
CUM-SO-MM#1 Coordination with Cumulative Construction Project Sponsors	Coordination of construction schedules and potential closures, detours, and other elements of construction	Alternatives 1, 2, 3, and 5 (regardless of the CCNM Design Option)	Some residual impacts may occur but would be minimized to the greatest extent feasible

3.19.7 Impacts Summary

This section provides a summary of cumulative construction impacts and cumulative operation impacts for all resource areas for the proposed improvements within the Bakersfield to Palmdale Project Section which includes the B-P Build Alternatives, CCNM Design Option, Refined CCNM Design Option, the portion of the F-B LGA from the intersection of 34th Street and L Street to Oswell Street, and the maintenance facilities and any cumulative mitigation measures that apply to these impacts in Table 3.19-8 and Table 3.19-9. Project-level mitigation measures are not included in these tables. A comparison of impacts associated with each of the B-P Build Alternatives, the CCNM Design Option, or Refined CCNM Design Option is included where applicable.

Table 3.19-8 Summary of Cumulative Construction Impacts

Resource	Comparison of Cumulative Construction Impacts	CEQA Impact	Cumulative Mitigation
Transportation			
Transportation	The proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact.	Not Significant	None required
Air Quality and Global Climate Change			
Air Quality	Construction of the proposed improvements within the Bakersfield to Palmdale Project Section would contribute to a cumulative impact (CO emissions only). Cumulative impacts would have the same significance findings under all B-P Build Alternatives and design options.	Significant—Cumulatively Considerable This impact would remain significant and cumulatively considerable because despite mitigation, the Bakersfield to Palmdale Project Section would increase emissions of CO for which the RSA is in nonattainment under an applicable federal or state ambient air quality standard during construction.	None available
GHG Emissions	The proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact.	Not Significant	None required
Noise and Vibration			
Noise	The proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact.	Not Significant	None required
Vibration	The proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact.	Not Significant	None required

Resource	Comparison of Cumulative Construction Impacts	CEQA Impact	Cumulative Mitigation
EMI and EMF			
EMI and EMF	The proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact.	No Impact	None required
Public Utilities and Energy			
Public Utilities	The proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact.	Not Significant	None required
Energy	The proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact.	Not Significant	None required
Water	The proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact.	Not Significant	None required
Solid Waste	The proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact.	Not Significant	None required
Biological and Aquatic Resources			
Wildlife Movement Corridors	The proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact after project-level mitigation.	Not Significant	None required
Aquatic Resources	The proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact after project-level mitigation.	Not Significant	None required

Resource	Comparison of Cumulative Construction Impacts	CEQA Impact	Cumulative Mitigation
Special-Status Plant and Wildlife Species	The proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact after project-level mitigation.	Not Significant	None required
Hydrology and Water Resources			
Floodplains	The proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact.	Not Significant	None required
Surface Waters	The proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact.	Not Significant	None required
Groundwater	The proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact.	Not Significant	None required
Geology, Soils, Seismicity, and Paleontological Resources			
Geology, Soils, Seismicity	The proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact.	Not Significant	None required
Paleontological Resources	The proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact.	Not Significant	None required
Hazardous Materials and Wastes			
Hazardous Materials and Waste	The proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact.	Not Significant	None required

Resource	Comparison of Cumulative Construction Impacts	CEQA Impact	Cumulative Mitigation
Safety and Security			
Safety and Security	The proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact.	Not Significant	None required
Socioeconomics and Communities			
Population and Community Impacts	Cumulative impacts would have the same significance findings under all B-P Build Alternatives, but the number of residents, businesses, and community facilities displaced would vary. Alternative 5 would have the largest incremental impact due to displacing 338 residential units, 285 businesses, and 4 community facilities. Alternative 3 would result in fewer displacements than Alternative 5, with 244 residential units, 231 businesses, and 4 community facilities displaced. Alternatives 1 and 2 would result in the fewest displacements, with 243 residential units, 231 businesses, and 4 community facilities. The CCNM Design Option or Refined CCNM Design Option would not change the number of displacements under the B-P Build Alternatives.	Significant—Cumulatively Considerable This impact would remain cumulatively considerable because despite mitigation, the B-P Build Alternatives would permanently disrupt established patterns of interaction among community residents and directly displace residents, businesses, and community facilities.	CUM-SO-MM#1
Economic Impacts	The proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact.	Not Significant	None required

Resource	Comparison of Cumulative Construction Impacts	CEQA Impact	Cumulative Mitigation
Station Planning, Land Use, and Development			
Station Planning, Land Use, and Development	The proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact.	Not Significant	None required
Agricultural Farmland and Forest Land			
Agricultural Farmland	Cumulative impacts would have the same significance findings under all B-P Build Alternatives, but the number of acres of Important Farmland that would be converted to other uses would vary. Alternative 3 would result in the largest incremental impact based on the conversion of 611 acres of Important Farmland, 559 of which are zoned for agricultural use and 71 of which are under a Williamson Act contract. Alternatives 1 and 5 would follow, each resulting in the conversion of 604 acres of Important Farmland, 552 of which are zoned for agriculture use and 71 of which are under a Williamson Act contract. Alternative 2 would have the smallest incremental impact, as it would result in the conversion of 565 acres of Important Farmland, 621 of which are zoned for agriculture use and 86 of which are under a Williamson Act contract. The CCNM Design Option would not change the number of acres of Important Farmland, acres of Williamson Act Contract Land, or acres of land zoned for agriculture use that would be permanently converted under the B-P Build Alternatives.	Significant—Cumulatively Considerable This impact would remain cumulatively considerable because despite mitigation, the B-P Build Alternatives would permanently convert Important Farmland, including that under Williamson Act contract and that zoned for agricultural use, to nonagricultural use.	No feasible mitigation available

Resource	Comparison of Cumulative Construction Impacts	CEQA Impact	Cumulative Mitigation
Parks, Recreation, and Open Space			
Parks, Recreation, and Open Space	The proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact.	Not Significant	None Required
Aesthetics and Visual Quality			
Aesthetics and Visual Quality	The proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact.	Not Significant	None Required
Cultural Resources			
Cultural Resources	The cumulative impact of the proposed improvements within the Bakersfield to Palmdale Project Section to archaeological resources would have the same significance findings under all B-P Build Alternatives, the CCNM Design Option, and the Refined CCNM Design Option. Alternative 5 would also result in a cumulative impact on historic architectural resources due to the alignments' direct impact on the historic Denny's Restaurant #30. Alternatives 1, 2, and 3, the CCNM Design Option, and the Refined CCNM Design Option would not impact historic architectural resources.	Significant—Cumulatively Considerable This impact would remain cumulatively considerable because despite mitigation, the proposed improvements within the Bakersfield to Palmdale Project Section would potentially expose and disrupt archaeological resources. Alternative 5 would also contribute a significant and cumulatively considerable impact to historic architectural resources.	No feasible mitigation available

B-P = Bakersfield to Palmdale Project Section
 CCNM = César E. Chávez National Monument
 CEQA = California Environmental Quality Act
 EMF = electromagnetic field(s)
 EMI = electromagnetic interference
 GHG = greenhouse gas

Table 3.19-9 Summary of Cumulative Operations Impacts

Resource	Comparison of Cumulative Operations Impacts	CEQA Impact	Cumulative Mitigation
Transportation			
Transportation	The cumulative operation impact would be similar under all B-P Build Alternatives, the CCNM Design Option, or the Refined CCNM Design Option.	Beneficial—Not Significant	None required
Air Quality and Global Climate Change			
Air Quality	The cumulative operation impact would be similar under all B-P Build Alternatives, the CCNM Design Option, and the Refined CCNM Design Option.	Beneficial—Not Significant	None required
GHG Emissions	The cumulative operation impact would be similar under all B-P Build Alternatives, the CCNM Design Option and the Refined CCNM Design Option.	Beneficial—Not Significant	None required
Noise and Vibration			
Noise	Cumulative operations impacts would have the same significance findings under all B-P Build Alternatives, but the number of sensitive receptors affected varies. Alternative 5 would have the largest incremental noise impact because it would severely affect 578 sensitive receptors. Alternative 3 would follow, severely affecting 516 sensitive receptors. Alternatives 1 and 2 would result in the smallest incremental noise impacts, as they would each severely affect 502 sensitive receptors. The CCNM Design Option and Refined CCNM Design Option applied to any of the B-P Build Alternatives would reduce the number of severely affected sensitive receptors by 1. Nonetheless, the Bakersfield to Palmdale Project Section would result in a cumulatively considerable impact.	Significant—Cumulatively Considerable This impact would remain significant and cumulatively considerable because despite mitigation, the B-P Build Alternatives would exceed noise standards at sensitive receptors.	No feasible cumulative mitigation available
Vibration	The proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact.	No Impact	None Required
EMI and EMF			
EMI and EMF	The proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact.	No Impact	None required
Public Utilities and Energy			
Public Utilities	The proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact.	Not Significant	None required
Energy	The proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact.	Not Significant	None required

Resource	Comparison of Cumulative Operations Impacts	CEQA Impact	Cumulative Mitigation
Water	The proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact.	Not Significant	None required
Solid Waste	The proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact.	Not Significant	None required
Biological and Aquatic Resources			
Wildlife Movement Corridors	The proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact.	Not Significant	None required
Aquatic Resources	The proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact.	Not Significant	None required
Special-Status Plant and Wildlife Species	The proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact.	Not Significant	None required
Hydrology and Water Resources			
Floodplains	The proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact.	Not Significant	None required
Surface Waters	The proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact.	Not Significant	None required
Groundwater	The proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact.	Not Significant	None required
Geology, Soils, Seismicity, and Paleontological Resources			
Geology, Soils, Seismicity	The proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact.	Not Significant	None required
Paleontological Resources	The proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact.	No Impact	None required
Hazardous Materials and Waste			
Hazardous Materials and Waste	The proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact.	Not Significant	None required
Safety and Security			
Safety and Security	The proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact.	Not Significant	None required

Resource	Comparison of Cumulative Operations Impacts	CEQA Impact	Cumulative Mitigation
Socioeconomics and Communities			
Population and Community Impacts	The proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact.	Not Significant	None required
Economic Impacts	The cumulative impact of would be similar under all B-P Build Alternatives, the CCNM Design Option, and the Refined CCNM Design Option.	Beneficial—Not Significant	None required
Station Planning, Land Use, and Development			
Station Planning, Land Use, and Development	The proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact.	Not Significant	None required
Agricultural Farmland and Forest Land			
Agricultural Farmland	The proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact.	Not Significant	None required
Parks, Recreation, and Open Space			
Parks, Recreation, and Open Space	The proposed improvements within the Bakersfield to Palmdale Project Section would not contribute to a cumulative impact.	Not Significant	None required
Aesthetics and Visual Quality			
Aesthetics and Visual Quality	The Bakersfield to Palmdale Project Section would not contribute to a cumulative impact.	Not Significant	None required
Cultural Resources			
Cultural Resources	The Bakersfield to Palmdale Project Section would not contribute to a cumulative impact.	Not Significant	None required

The conclusions of this table are the same with or without the CCNM Design Option.

B-P = Bakersfield to Palmdale Project Section

CCNM = César E. Chávez National Monument

CO = carbon monoxide

CEQA = California Environmental Quality Act

EMF = electromagnetic field(s)

EMI = electromagnetic interference

GHG = greenhouse gas

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