3.19 Cumulative Impacts

This section presents an analysis of the cumulative effects of implementing the HST alternatives in combination with other past, present, and reasonably foreseeable future projects that may result in environmental impacts similar to those discussed in this EIR/EIS. The focus of this cumulative impacts analysis is on the Fresno to Bakersfield Section of the HST System and the regional context appropriate for each resource area, including adjacent sections of the HST System. For a discussion of the impacts of implementing the California HST System in its entirety, see the 2005 Statewide Program EIR/EIS for the HST System (Authority and FRA 2005). For a discussion of the impacts of implementing the HST System in the San Francisco Bay Area to Central Valley region, see the *Bay Area to Central Valley High-Speed Train (HST) Partially Revised Program Environmental Impact Report* (EIR) (Authority 2012). As discussed in Section 3.1.5 and the Executive Summary, the analysis in this chapter includes revisions based on design refinements and analytical refinements. Gray shading is used as a guide to help the reader navigate the revisions.

3.19.1 Laws, Regulations, and Orders

3.19.1.1 National Environmental Policy Act

Pursuant to National Environmental Policy Act (NEPA) regulations, project effects are evaluated based on the criteria of context and intensity. Context means the affected environment in which a proposed project occurs. Intensity refers to the severity of the effect, which is examined in terms of the type, quality, and sensitivity of the resource involved; location and extent of the effect; duration of the effect (short- or long-term); and other considerations. Beneficial effects are identified and described. When there is no measurable effect, an impact is found not to occur. The intensity of adverse effects is the degree or magnitude of a potential adverse effect, described as negligible, moderate, or substantial. Context and intensity are considered together when determining whether an impact is significant under NEPA. Thus it is possible that a significant adverse effect may still exist when the intensity of the impact is determined to be negligible.

Under NEPA, a cumulative impact is the impact on the environment that results from the combination of incremental impacts of the action and other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or nonfederal), entity, or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions that take place over a period of time (40 CFR 1508.7). A cumulative impact includes the combined effect on a natural resource, ecosystem, or human community that is attributable to past, present, or reasonably foreseeable future activities and actions of federal, nonfederal, public, and private entities. Cumulative impacts may include the effects of natural processes and events, depending on the specific resource. Accordingly, there may be different levels of cumulative impacts on different environmental resources.

California Environmental Quality Act

Similar to NEPA, cumulative impacts under the California Environmental Quality Act (CEQA) are defined as two or more individual effects which, when considered together, are considerable or compound or increase other environmental impacts. The cumulative impact from several projects is the change in the environment that results from the incremental impact of a project in combination with other closely related past, present, and reasonably foreseeable future projects. Cumulative impacts can result from the combination of individually minor but collectively significant projects over a period of time (CEQA Guidelines Section 15355).

Under CEQA, when a project would contribute to a cumulative impact, an EIR must discuss whether the project's incremental effect is "cumulatively considerable." Cumulatively considerable means that the project's incremental effect is significant when viewed in the context of past, present, and reasonably probable future projects. The discussion of cumulative impacts need not provide as much detail as is provided for the effects attributable to the project alone (State CEQA Guidelines Section 15130(b)). CEQA does not require an EIR to analyze cumulative impacts to which the project would not contribute.

3.19.2 Methods

The following steps helped determine the contribution of the HST alternatives to cumulative impacts, if any, for each resource:

- Review the impacts of the proposed project for each resource area. In those instances where the project would have a beneficial effect, consider this in conjunction with any adverse effects on the resource and proposed mitigation.

- Define the study area for the cumulative effects for each resource.

- Compile a list and description, as well as environmental impact information for past, present, and reasonably foreseeable projects causing related or cumulative impacts (see Appendices 3.19-A and 3.19-B). For purposes of this analysis, reasonably foreseeable future projects are defined as those that are likely to occur within the 2035 planning horizon for the HST project and that would contribute to the cumulative impact on a particular resource. Additionally, for the purposes of this analysis, these proposed projects are assumed to be constructed during the same timeframe as the HST project construction, to provide a conservative analysis of construction-related impacts. Generally, projects are reasonably foreseeable under 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 local and regional planning agencies or may have been analyzed in a recent environmental document.
  - The project is included in regional transportation plans (RTP); regional transportation improvement plans (RTIP); local long-range transportation plans; local land use, general, and specific plans; or an agency's budget or capital improvement program.

- Where relevant to the analysis for a particular resource, the cumulative impacts of construction and operation of adjacent HST sections (Merced to Fresno and Bakersfield to Palmdale) are considered.

- Gather applicable projected growth trends (projections) contained in adopted local, regional, or statewide plans, including general plans and regional transportation plans, which describe and evaluate conditions contributing to potential cumulative effects.

- Identify the resource areas where the proposed project and other past, present, and reasonably foreseeable projects could, together, cause a significant cumulative effect. The cumulative impact analysis is based on the cumulative project list (Appendices 3.19-A and 3.19-B) for the majority of the resources addressed below. However, for some resources, the analysis is based on both the cumulative project list and projections, as noted under the respective resources below.

- Determine whether the proposed HST alternatives' incremental contribution to significant cumulative impacts identified for each resource area is cumulatively considerable under

CEQA, and whether its contribution would be significant under NEPA (assuming implementation of mitigation measures previously identified for the respective resource). As described above, both context and intensity (defined for each resource topic within its respective section of this EIR/EIS) are considered when making the NEPA impact determination.

- If a significant cumulative impact to a resource is identified and the HST project would have a cumulatively considerable contribution to the impact, then the major differences between the HST alternatives' contributions to the impact are described.
- Identify reasonable, feasible options for avoiding or mitigating the project's contribution to significant cumulative impacts.
- The No Project Alternative, which represents the state's transportation system and major planned land use changes anticipated by 2035, is analyzed for each resource topic within the respective project analysis for that topic (see Sections 3.2 to 3.18) and is not discussed below because there would be no contribution from the HST project under the No Project scenario.

3.19.3 Cumulative Projects and Growth Forecasts

This section discusses the historical context of the San Joaquin Valley and how development trends in the past have influenced the environmental character of the area. This section also discusses projected development trends and describes how future urbanization is projected to change the character of the San Joaquin Valley to the year 2035.

3.19.3.1 Historical Context of Project Area

This section provides an overview of the history of cultural development in the area from the Spanish Period (1769 to 1822) through the Gold Rush period and the development of railroads that brought new settlers to this area (see *Fresno to Bakersfield Section: Archaeological Survey Technical Report* [Authority and FRA 2012]).

The discovery of gold in 1848 at Sutter's Mill near Sacramento enticed thousands of settlers and immigrants to pour into California, mostly in larger northern urban areas such as San Francisco and the Sierra foothill regions. During the Gold Rush years of the 1850s and 1860s, immigrants also traveled to the southern Mother Lode in the northern San Joaquin Valley. Many headed for the "gold hills," and enterprising individuals and businesses met the miners' increasing demand for food and supplies, boosting the establishment of farms, ranches, and small towns along navigable waterways and tributaries. The cattle business and grain farming were particularly suited to the region's soils and climate, and in the 1870s the valley became the center of California's wheat belt.

It was not until after the Central Pacific Railroad constructed its Southern Pacific line through the San Joaquin Valley in 1870 that the regional population and economy grew significantly. The railroad connected the valley to Sacramento and San Francisco and revolutionized the transportation network, passenger travel, and the ability of farmers and ranchers to sell their goods to distant markets. The railroad established stops and sidings along the tracks, forming the basis for the settlement and growth of local farms and ranches, small communities, and later urban centers.

Irrigation transformed the agricultural potential of the drier portions of the northern San Joaquin Valley. By 1887, water from canal systems irrigated more than 600,000 acres in Fresno County. The popularity of the automobile ushered in the establishment of a state highway system in the early 1900s. Within the interior Central Valley, widening of the first paved road segments, which

correspond to today's SR 99, occurred in the 1920s and 1930s. This improvement in surface transportation encouraged the growth of existing and new residential, commercial, and industrial developments (i.e., neighborhoods, shopping centers, and light industry) along SR 99, particularly during the latter half of the 20th century. SR 99 was completed as a four-lane expressway between Sacramento and Los Angeles in the 1950s. SR 99 and I-5 are the primary north-south road arteries serving the San Joaquin Valley. Because it generally parallels the rail lines that first accommodated the development of the Valley's major cities and towns, SR 99 connects the Valley's major population centers.

Before the Gold Rush began, the Central Valley was characterized by California prairie, marshlands, valley oak savanna, and extensive riparian woodlands (Hickman 1993). Since that time, much of the region has been converted to either urban or agricultural uses. The San Joaquin Valley continues to be a powerful economic center for the agricultural and livestock industries, and remains more rural in character than other parts of the state. The south San Joaquin Valley, where the Fresno to Bakersfield Section is located, is California's and the nation's leading agricultural production region (CDFA 2010). The cash farm receipts from Fresno, Kings, Tulare, and Kern counties of about $16.5 billion in 2008 represented 46% of the state's total agricultural revenues. The total county land area committed to agricultural production ranges from 38% in Tulare County (the eastern part of the county is composed primarily of public lands within Sequoia National Park, Sequoia National Forest, and the Mineral King, Golden Trout, and Domelands Wilderness areas) to 77% in Kings County. According to the Census of Agriculture profile for Fresno County, there were 6,081 farms occupying more than 1.6 million acres of land in 2007, with an average farm size of 269 acres (USDA 2009). In 2007, Kings County had 1,129 farms occupying 680,000 acres of land, with an average farm size of 603 acres (USDA 2009). In Tulare County, 5,240 farms occupied more than 1.1 million acres of land in 2007, with an average farm size of 223 acres. In Kern County, 2,117 farms occupied more than 2.3 million acres of land in 2007, with an average farm size of 1,116 acres.

The San Joaquin Valley's rate of population growth has exceeded the statewide growth rate since 1970 (Fresno Council of Governments [COG] 2007); currently more than 10% of the state's population resides in this region. Fresno and Bakersfield, the fifth and ninth largest cities in California as of January 1, 2010, respectively, are the financial and commercial hubs of the southern San Joaquin Valley. Development in the southern San Joaquin Valley area has historically been typified by low-density sprawl extending out from a city's center. Because of the large amount of available land, new development has largely occurred on "greenfield" sites rather than on urban infill sites. In addition, very low-density residential "ranchette" development has converted large areas of agricultural lands (including all types reported on by the Farmland Mapping and Monitoring Program), removing them from agricultural production. The extent of past and current conversion of agricultural lands to other uses associated with population growth is substantial, as discussed in Section 3.14, Agricultural Lands (see Table 3.14-3 for acres of farmland converted between 2000 and 2008, by type).

3.19.3.2 Projected Growth Trends

As discussed in Chapter 2, Alternatives, under the No Project Alternative projections show that the San Joaquin Valley would grow at a faster rate than any other region in California. General plans and other planning documents for cities and counties in the region project the locations and types of growth likely to occur under build-out of the plans. Projections also show that Fresno, Kings, Tulare, and Kern counties would continue to grow an average of 2.9% per year. By 2035, the study area is projected to grow to a population of 4.2 million, which is a net increase of 1.7 million people and 360,000 new jobs (Chapter 1.2.4.1, Purpose and Need, Section 2.4.1, Alternatives, and Section 3.18, Regional Growth). This increase could result in approximately 173,000 acres of new development to support the increased population. Much, although not all, of this development would take place on what is currently agricultural land

(Section 3.14.5.2, Agricultural Lands). Land and the construction of new residential areas, roadways, electric power generation facilities, utilities, schools, hospitals, and commercial and industrial facilities would be required to accommodate the new population. The combined environmental influence of these future changes in conjunction with the HST alternatives is referred to as the "cumulative condition" for 2035.

In addition to considering the potential impacts from project-related population growth, the cumulative project list discussed in the following section identifies the known projects that would become a part of the cumulative condition.

3.19.3.3 Cumulative Project List

Appendix 3.19-A provides detailed information about the reasonably foreseeable development projects and plans, and Appendix 3.19-B provides similarly detailed information about transportation projects considered in the cumulative condition. These two combined lists form the cumulative project list, which includes projects that are intended to help accommodate the projected 2035 study area population in the four-county area through which the Fresno to Bakersfield Section would extend. The development projects identified in the cumulative project list represent only a portion of the projects that are likely to be constructed within the study area through 2035 because the list is predominately based on data that represent 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 substantial future growth beyond existing development levels under their respective land use elements. Additional development projects that are not included on this list are expected to proceed in the future on the basis of the general plans' land use designations.

Appendix 3.19-A includes a series of tables that list major capital or new development projects by jurisdiction for the study area counties and cities. The tables include developments planned for the near term and general plan updates to accommodate long-term development and urbanization, including the conversion of agricultural land anticipated to occur with the corresponding growth in population.

Appendix 3.19-B includes roadway improvements ranging from restriping roads to creating additional lanes and interchange and capacity expansions. This list is based on applicable plans, such as RTPs, as well as Capital Improvement Programs, for the cities and counties in the study area.

3.19.4 Analysis of Cumulative Impacts

The cumulative impacts discussion for each resource area considers the resource-specific study area, the existing condition of the resource, concurrent construction activities, cumulative effects with the project, and the contribution of the HST alternatives to those cumulative effects. The cumulative condition, as defined below, includes planned and projected development projects and roadway projects listed in Appendix 3.19-A and Appendix 3.19-B. The cumulative impact analysis includes consideration of adjacent HST sections or the entire San Joaquin Valley Air Basin where appropriate for the environmental resource under consideration.

3.19.4.1 Cumulative Condition

Projected growth and conversion of land to urban uses associated with the cumulative condition, as reflective of adopted city and county general plans, as well as the cumulative project list, is anticipated to have a substantial environmental effect in the counties crossed by this section of the HST System over the 2010 to 2035 planning period. Between 2010 and 2035, the population is projected to grow in Fresno, Kings, Tulare, and Kern counties by more than 59%, 75%, 80%, and 81%, respectively. These increases would result in approximately 173,000 acres of new land

development (see Section 2.4.1, Alternatives, Chapter 1.2.4.1, Purpose and Need, Section 3.14.5.2, Agricultural Lands, and Section 3.18, Regional Growth). The San Joaquin Valley Blueprint (San Joaquin Valley Regional Planning Agencies 2009) calls for planning in the region to adopt smart growth principles, such as strengthening and directing development toward existing communities, that would focus growth in urban areas and population centers. The Blueprint further lays out a preferred scenario for the future of the San Joaquin Valley and may be used to guide growth over the next 50 years (San Joaquin Valley Regional Planning Agencies 2010).

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's cities and counties. Under the cumulative condition, traffic would increase; ambient noise levels would increase; the demand for energy and water would increase; habitat for wildlife would become less available; the amount of impervious surfaces 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 study area would change from rural to urban. Growth is projected to result in an increase of employment by approximately 360,000 jobs.

For each of the resource topics analyzed below, the cumulative condition includes build-out of the general plans in the four-county region, including the cumulative development listed in Appendix 3.19-A and 3.19B, unless otherwise noted.

3.19.4.2 High-Speed Train Alternatives Contributions

In many cases, the HST alternatives make a small incremental contribution to cumulative impacts. As analyzed in Section 3.18, Regional Growth, the project would result in a 2% to 3% population and 3% employment increase compared to the No Project Alternative. Over the 25-year planning horizon, these incremental population increases and associated development would have environmental impacts that are cumulatively considerable in some areas and provide beneficial effects in others.

The HST project has evolved throughout the EIR/EIS process and the project design has been refined to avoid and minimize effects, while meeting the project purpose and objectives. As described in the preceding chapters and as applicable, each resource analysis includes a description of design features, including standards, regulations, and best management practices (BMPs) that would be implemented during construction and operation to further minimize effects. When an impact was determined to be potentially significant under CEQA or NEPA, each resource analysis provided one or more feasible mitigation measures that could be adopted to reduce the impacts.

The analysis below first considers the impacts of the HST project in combination with the other cumulative projects (listed in Appendix 3.19-A and 3.19-B) to determine if there is a significant cumulative impact to the resource. If significant cumulative impacts are identified, the second consideration is whether the HST alternatives would have an incremental effect (after project mitigation) that would be cumulatively considerable. For impacts to which the HST alternatives would have a cumulatively considerable contribution, the notable differences in the HST alternatives' contributions are described. Additional feasible mitigation measures are proposed where appropriate to mitigate the incremental but significant contribution to a cumulative impact.

Transportation

The study area for the transportation cumulative analysis includes Fresno, Kings, Tulare, and Kern counties. Because the operational transportation analysis addresses the HST alternatives and other past, present, and foreseeable future projects in the study area, the transportation impacts presented in Section 3.2, Transportation, represent the cumulative condition.

In Fresno, major roadways such as Golden State Boulevard, Shaw Avenue, and McKinley Avenue in the vicinity of the proposed HST alignment generally operate at level of service (LOS) D or better under existing conditions. In the area of the Kings/Tulare Regional Station alternatives, roadways operate at LOS D and better except at local street intersections with SR 198 ramps. In Bakersfield, most of the major roadways operate at LOS D or better in the vicinity of the HST alignment except for some intersections along Union Avenue and one intersection along Truxtun Avenue.

The cumulative impact analysis for transportation is based on the planned and potential project lists (Appendix 3.19-A and 3.19-B) as well as plans/projections listed in Table 3.2-1, Regional and Local Plans and Policies, in Section 3.2, Transportation.

Construction

Cumulative impacts could occur if reasonably foreseeable future projects have construction schedules that overlap with the HST alternatives and are located in proximity to the HST. Such cumulative projects may include:

- Within the Fresno Station Area construction-period cumulative impacts could occur from the HST Alternatives as well the Merced to Fresno Section of the HST (F01), the Fresno Freight Rail Alignment Project (F09), the Ventura Boulevard widening (FC18), the Monterey Street bridge replacement (FC19), the California Avenue widening (FC22), and the Jensen Avenue overpass rehabilitation (FC23).

- Within the Kings/Tulare Regional Station Area cumulative impacts could occur from the HST project as well as roadway improvement projects in the city of Hanford (see KI02-KI12, H01-19, 22, 23), the Villagio Project (KI01), Hanford Downtown East Precise Plan (KI02), and Highway 43/198 Commercial Center Project.

- Within the Bakersfield Station area, cumulative impacts could occur from the HST alternatives as well as Jastro Second Main Track (B03), the widening of Rosedale Highway (KE15), Oak Street bridge repair (B07), construction of the Centennial Corridor (B09), reconstruction of Truxtun Avenue and Stine Road (B10), and SR 178 widening (B13).

- Circulation within rural areas and non-station areas would be impacted from road closures as a result of the HST Alternatives in combination with the Gregg double track of the Amtrak San Joaquin Corridor in Fresno County, the Intersection 6 ½ and Orange upgrade (C01), Orange Avenue realignment (C02), and Whitely Avenue improvements (C03) in Corcoran, and the Shafter Avenue reconstruction (S01), Richland Drive improvements (S04) and Lerdo Highway improvements (S06, S07, S08 and S09) in Shafter.

Impacts at the station areas as well as within the rural areas would include reductions in intersection and roadway levels of service and emergency, school bus and non-vehicular access. However, these impacts would be temporary, with staggered and off-peak construction hours and alternative routes provided during the HST construction period. The Authority would prepare a detailed Construction Transportation Plan that would minimize the impact of construction and construction traffic on roadways. The Construction Transportation Plan would be prepared in close consultation with the pertinent city or county, would include projects being constructed concurrently, and would be reviewed and approved by the Authority before commencing ground disturbing activities. Therefore, the cumulative construction period impacts to both station areas and rural areas would not be significant under NEPA and would not be cumulatively considerable under CEQA.

Operations

Without implementation of the HST alternatives, vehicle miles traveled (VMT) in the study area would reach approximately 79.9 million annual VMT daily by 2035; however, with the implementation of the HST project, VMT would be reduced by approximately 8 million, or 9%, within Fresno, Kings, Tulare, and Kern counties. Highway improvements planned in the study area would not reduce daily VMT but would help to reduce future congestion in some areas. Cumulatively, at a regional level, the HST alternatives and planned highway improvements would reduce congestion, reduce travel delays, and stimulate economic growth as a result of improvements in mobility for the study area population. Offering a broader range of transportation modes improves accessibility to the state's urban centers from the Central Valley beyond what would occur by only widening freeways.

Under existing conditions, at the local level even without implementation of the HST alternatives, up to 24 of the up to 209 intersections and 7 of the up to 156 roadway segments within the three station study areas would operate at an unacceptable LOS (E or F). The station areas would be affected by the HST alternatives as well as other ongoing and reasonably foreseeable future projects such as:

- The Merced to Fresno Section of the HST, SR 99 interchange improvements at Grantland Avenue, Willow Avenue widening (FC03), Harden Avenue widening (FC05/06), Shaw Avenue (FC12) and Clovis Avenue (FC27) widening, Intelligent Transportation System (ITS) installation, lane additions and widening to SR 41 (FC13, FC14, FC15),and the Ventura Boulevard widening (FC16) in the Fresno Station area;

- Roadway improvement projects in the city of Hanford (see KI02-KI12, H01-19, 22, 23) in the Kings/Tulare Regional Station area, and the widening of Rosedale Highway (KE15); and

- Oak Street Bridge repair (B07), construction of the Centennial Corridor (B09), reconstruction of Truxtun Avenue and Stine Road (B10), Oak and 24th Streets intersection expansion (B11), 24th Street widening (B12), SR 178 widening (B13), and the SR 58 widening and gap closure (B19 and B20) in the Bakersfield Station area.

Implementation of the HST alternatives would be expected to reduce already unacceptable LOS levels by at least 4 seconds at up to 15 intersections in either the morning or afternoon peak hour and increase the volume-to-capacity ratio on 7 roadway segments under existing conditions. The project would reduce LOS from acceptable levels to unacceptable levels at up to 10 intersections in either the morning or afternoon peak hour. With these impacts, which are before mitigation, the HST project in conjunction with other planned projects in these three station areas would result in cumulatively considerable impacts due to the increased traffic associated with people traveling to and from stations, as described in Section 3.2.5, Environmental Consequences. However, all affected intersections and roadway segments would be mitigated to a minimum of LOS D through the implementation of mitigation measures, as described in Section 3.2.7, Mitigation Measures. After this mitigation, therefore, the project would make no contribution to cumulative congestion impacts, so impacts to station areas would not be significant under NEPA and would not be cumulatively considerable under CEQA.

Under future 2035 conditions, at the local level without implementation of the HST alternatives, up to 47 of the up to 209 intersections and 16 of the up to 156 roadway segments within the three station study areas would operate at unacceptable LOS (E or F). The roadway networks in the station areas would be affected by the HST project as well as ongoing and reasonably foreseeable future projects such as the Merced to Fresno Section of the HST (F01), Roeding Regional Park and Fresno Chaffee Zoo Facility Master Plans (FC03), Fulton Corridor Specific Plan (FC05) and the Downtown Neighborhood Community Plan (FC06) in the Fresno Station area; the

Villagio Project (KI01), Hanford Downtown East Precise Plan (KI02), Highway 43/198 Commercial Center Project (KI03), and Live Oak Master Plan (KI06) in the Kings/Tulare Regional Station areas; and the Baker Street Village Redevelopment Project in the Bakersfield Station area. Other residential and commercial developments would be located too far from the station areas to result in a noticeable increase in daily trips. Moreover, the future 2035 conditions analysis is inherently cumulative in that it includes future traffic growth, thereby accounting for traffic from past, present, and future projects that may not presently be empirically measurable.

Also at station areas, implementation of the HST project would be expected to reduce already unacceptable LOS levels by at least 4 seconds at up to 34 intersections in either the morning or afternoon peak hour and increase the volume-to-capacity ratio on up to 15 roadway segments by 2035. The project would reduce LOS from acceptable levels to unacceptable levels at up to 13 intersections in either the morning or afternoon peak hour and on up to two roadway segments. However, all affected intersections and road segments would be mitigated to LOS D or better through the implementation of the mitigation measures as described in Section 3.2.7, Mitigation Measures. After this mitigation, therefore, the project would make no contribution to cumulative congestion impacts, so impacts to station areas would not be significant under NEPA and would not be cumulatively considerable under CEQA.

Summary of NEPA/CEQA Impacts

The cumulative construction-related traffic impacts of the HST alternatives combined with other large projects would not be significant under NEPA and would be less than significant under CEQA. Cumulative construction-related impacts would be temporary and would be minimized through preparation and implementation of a detailed Construction Transportation Plan that would be prepared for the HST project and would include projects being constructed concurrently.

During operation, the regional cumulative impact of the HST alternatives would be beneficial under NEPA because the HST would take passenger vehicles off the road. At a local level, the project in combination with other past, present, and reasonably foreseeable projects would decrease the level of service on some roadway segments and at intersections in the vicinity of HST stations, and the project's contribution would be significant under NEPA; however, incorporated project mitigation measures would ensure operating conditions would not decrease below LOS D. Therefore, the cumulative operation impacts would not be significant under NEPA and would be less than significant under CEQA.

Mitigation Measures

No mitigation is required beyond that presented in Section 3.2.7, Mitigation Measures.

Air Quality and Global Climate Change

The study area for cumulative air quality impacts from criteria pollutants is the San Joaquin Valley Air Basin (SJVAB)[1] because the entire Fresno to Bakersfield Section of the HST System is located in the SJVAB and meteorological and topographical factors generally limit criteria pollutant mixing across air basin boundaries. The study area for greenhouse gas (GHG) emissions encompasses the State of California because existing reports and plans typically describe GHG emissions at the state-level, policies establish emissions targets at the state level, and the San Joaquin Valley Air

[1] The SJVAB includes eight counties in California's Central Valley: San Joaquin, Stanislaus, Merced, Madera, Fresno, Kings, Tulare, and a portion of Kern. The SJVAB is governed by the San Joaquin Valley Air Pollution District (SJVACPD).

Pollution Control District (SJVAPCD) CEQA thresholds are established based upon statewide goals. Additionally, the HST 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 HST System. The study area for direct and indirect impacts related to the HST alternatives is described in Section 3.3, Air Quality and Global Climate Change.

To provide guidance in assessing cumulative air quality and GHG impacts under CEQA in the SJVAB, the SJVAPCD developed the document "Guidance for Assessing and Mitigating Air Quality Impacts" (Guidance) (SJVAPCD 2012).[2] This guidance document contains significance thresholds for assessing project-specific as well as cumulative air quality impacts under CEQA. These thresholds were derived to prevent exceedances of federal air quality standards, and therefore are used for the NEPA assessment as well because the federal air quality standards are designed to protect human health and the environment.

Regulatory agencies continue to adopt increasingly stringent standards for criteria pollutants, toxic air contaminants (TACs), and GHGs with the goal of reducing the amount of pollutant emissions in the atmosphere (e.g., California Air Resources Board's [CARB] advanced clean car regulation and CARB's implementation of AB 32). The Global Warming Solutions Act (AB 32) sets overall GHG emissions reduction goals and mandates that CARB create a plan, which includes market mechanisms, and implement rules to achieve "real, quantifiable, cost-effective reductions of GHGs. Many of these regulations are not yet fully implemented as of 2013 but would be implemented prior to the project planning horizon of 2035. Overall air quality has improved and is anticipated to continue to improve because of these current and foreseeable regulations. However, population growth and proposed developments are projected to result in thousands of new homes and millions of square feet of new retail uses. The associated increase in traffic congestion would continue to incrementally affect air quality and GHG emissions.

The SJVAB is in federal nonattainment for ozone and PM2.5 (particulate matter smaller than or equal to 2.5 microns in diameter), federal maintenance for PM10 (particulate matter smaller than or equal to 10 microns in diameter) and CO (for the urban portion of Fresno County and Kern County only), and state nonattainment for ozone, PM10, and PM2.5. As a result, the area is subject to stringent emissions requirements for ozone precursors (volatile organic compounds [VOC] and nitrogen oxides NOx) and particulate matter. The analysis below is organized by state, regional, and local geography depending on the specific pollutant, as outlined in Table 3.19-1.

Some material needed for construction of the HST project, such as ballast, may be sourced from areas outside of the SJVAB.[3] As described in Section 3.3.6.3, Impact AQ #3, the transport of ballast construction materials from quarries outside the SJVAB to the project site may result in exceedances of NO_x mass emission thresholds in other air districts, thereby contributing cumulatively considerable amounts to a cumulative impact. Emission offsets would be purchased to reduce these exceedances to less than significant as required by Mitigation Measure AQ-MM#5. With the purchase of offsets, the HST project would not contribute to air quality impacts outside the SJVAB. The cumulative scenario is based upon the District's future emissions inventories.

[2] For criteria pollutants see Section 7.14 of the Guidance; for toxic air contaminants see Section 8.7.3 of the Guidance; for Greenhouse Gases see Section 8.8 of the Guidance.

[3] From areas such as the San Francisco Bay Area Air Basin, South Coast Air Basin, and Mojave Desert Air Basin.

Table 3.19-1
Geographic Extent of Analysis for Various Pollutant Types

Pollutant	Geographic Extent of Analysis			Assessment methodology
	State	Regional	Local	
GHG	Y	--	--	Compared to state-wide goals.
PM2.5, PM10 (criteria pollutants)	--	Y	Y	Emitted directly (local impacts) as well as forms by reactions in the atmosphere (regional impact). Mass emissions assessed for regional impacts. Dispersion modeling performed for local impact assessment.
ROG and NOx (criteria pollutant precursors)	--	Y	--	ROG and NOx react with each other over longer time periods to form ozone (smog). Mass emissions assessed for regional impacts.
TACs	--	--	Y	Dispersion modeling performed for local impact assessment.
CO (criteria pollutant)	--	--	Y	Dispersion modeling performed for local impact assessment.
NO2 (criteria pollutant)	--	--	Y	Dispersion modeling performed for local impact assessment.

Notes:
Y = Addressed
-- = Not Addressed

Acronyms:
GHG = Greenhouse Gas
PM2.5 = Particulate matter smaller than or equal to 2.5 microns in diameter
PM10 = Particulate matter smaller than or equal to 10 microns in diameter
ROG= Reactive Organic Gas
NOx = Nitrogen Oxide
TACs = Toxic Air Contaminants
CO = Carbon Monoxide
NO2 = Nitrogen Dioxide

Construction

As discussed in Section 3.3, Air Quality and Global Climate Change, air quality construction impacts associated with the HST project would be above the SJVAPCD's significance thresholds for regional criteria pollutants and together with other related projects would be cumulatively considerable before mitigation; however, with implementation of the mitigation measures identified in Section 3.3.9, Mitigation Measures, the project's emissions would be net zero with offsets. Therefore, consistent with the SJVAPCD's Guidance for cumulative impacts analysis, the HST alternatives' contribution to cumulative construction air quality impacts after mitigation would not be significant under NEPA and would not be cumulatively considerable under CEQA, as further described below.

State. As described in Section 3.3.6.3, Impact AQ #4, construction of the HST would result in a one-time increase in GHG emissions. The emissions associated with construction of the HST are anticipated to be offset in less than a year of train operations because of reduced passenger

vehicle travel on roadways. Based on this short offset time period, the overall GHG impacts (construction plus operation) would be negative and would therefore be consistent with the AB 32 goals. The SJVAPCD guidance states that projects that are consistent with California's State-wide goals listed in AB 32 should be considered to have a less than significant impact on global climate change and a less than significant cumulative impact. Therefore, because the project meets these goals by reducing GHG emissions overall, the HST alternatives' contribution to GHG emissions would not be significant under NEPA and would not be cumulatively considerable under CEQA.

Regional. For criteria pollutants, the SJVAPCD has adopted a cumulative threshold of significance of 10 tons per year for ozone precursors (ROG and NO_x) and 15 tons per year for PM_{10} and $PM_{2.5}$ (see Table 3.3-3 in Section 3.3, Air Quality and Global Climate Change). The SJVAPCD has determined that projects below these significance thresholds would not have a cumulatively considerable impact on air quality in the SJVAB as they are consistent with the SJVAPCD's attainment strategy and would not prevent the District from achieving attainment. The unmitigated project construction emissions would exceed these limits for ROG, NO_x, PM_{10}, and $PM_{2.5}$, and thus the effect would have substantial intensity under NEPA and would be a cumulatively considerable impact under CEQA. Implementation of mitigation measures described in Section 3.3.9, Mitigation Measures, would reduce construction emissions of these criteria pollutants to net zero. Specifically, mitigation measure AQ MM# 4 offsets construction emissions above the SJVAPCD thresholds for ozone precursors and particulate matter through the Voluntary Emissions Reductions Agreement (VERA), where the Authority will provide funds to the SJVAPCD to fund emission reduction projects. Therefore, HST project construction emissions of these criteria pollutants after mitigation would not be significant under NEPA and the incremental contribution of these emissions would not be cumulatively considerable under CEQA.

Local. Emissions analysis at the local level includes certain criteria pollutants (PM_{10}, $PM_{2.5}$, and NO_2) and toxic air contaminants (TACs). The construction of the HST project would result in criteria pollutant emissions near the HST guideway/alignment area, power substations, road crossing areas, and station areas.

If incremental PM_{10} and $PM_{2.5}$ concentration increases are estimated to result in an increase in ambient concentrations less than 10.4 micrograms per cubic meter in the local project vicinity, the increases would not contribute substantially to further exceedances of the ambient air quality standards, as discussed in Section 3.3, Air Quality and Global Climate Change. The project design features identified in Section 3.3.8, Project Design Features, incorporate the enhanced dust control measures recommended by SJVAPCD, which would decrease PM_{10} and $PM_{2.5}$ emissions and concentrations. With implementation of these project design measures, the contribution of HST project construction emissions to localized PM_{10} and $PM_{2.5}$ concentrations would be less than 10.4 micrograms per cubic meter.

The cumulative NO_2 threshold is the ambient air quality standard for hourly (188 micrograms per cubic meter) and annual (57 micrograms per cubic meter) concentrations. Maximum concentrations for the HST project would be less than these thresholds as discussed in the Section 3.3. Therefore, construction emissions would not cause or contribute to projected localized exceedances of the NO_2 air quality standards.

Cumulative CO impacts are accounted for in the CO analysis presented in Section 3.3.6.3. The various federal and California air quality standards are listed in Table 3.3-1. The CALINE4 air dispersion modeling evaluation indicated that the cumulative CO emissions from past, present, and reasonably foreseeable future projects would not exceed state and federal ambient air quality standards.

The principal source of project emissions that could cause health risks are diesel particulate emissions associated with project construction equipment. Those emissions would be most concentrated at station construction sites. Cancer risks associated with TAC emissions from project construction were compared to the SJVAPCD CEQA threshold of 10 in a million to assess the level of impact. Chronic and acute hazard indices associated with project construction emissions were compared to the SJVAPCD CEQA threshold of 1. The HST assessment of localized TAC health impacts to sensitive receptors near construction work areas indicates that risks would be below the TAC risk thresholds of significance (see Section 3.3.6.3). For projects to have a cumulative cancer risk and chronic and acute health hazards, their emissions must overlap in time. There are no other construction projects scheduled in the immediate vicinity of the Kings/Tulare and Bakersfield alternative station sites at the time when those stations are scheduled to be built. Therefore, there would be no cumulative health risk impacts in those areas. It is possible that construction of the Fresno Station could overlap with the revitalization of the Fulton Mall. However, the Fulton Corridor Specific Plan (FC05), which addresses revitalization of the mall, has not yet been adopted by Fresno and specific development projects for that revitalization have not been identified. Therefore, it would be speculative to determine if the HST project and implementation of the Fulton Corridor Specific Plan would cause a cumulative health risk impact. CEQA reviews will be required for any projects proposed to implement the Fulton Corridor Specific Plan. Those reviews will require health risk assessments and development of mitigation measures in the event that significant project-specific or cumulative health risks are identified.

Operations

State. Even with the more stringent regulations on GHG emissions expected in the future, the projected growth in California may result in cumulative increases in GHG emissions. Increased GHG emissions from past, present, and reasonably foreseeable projects in the state may result in significant cumulative impacts on global climate change under NEPA and CEQA. The HST project demand for electricity, estimated to be 11.04 to 16.55 gigawatt hours per day (based on ridership estimates with a ticket price equivalent to 83% and 50% of air fare, respectively) could result in indirect GHG emissions from power generation facilities. Although the Authority has adopted a policy to purchase renewable, clean power energy sources, it cannot ensure that only renewable energy is used to power the HST System, because the PG&E power distribution network does not distribute energy based on energy sources. Therefore, there may be GHG emissions associated with the provisions of energy to the HST System. However, overall, the HST project would decrease GHG emissions by reducing vehicle and aircraft trips and also would result in a net reduction in carbon dioxide emissions as described in Section 3.3.6.3, Air Quality and Global Climate Change. This reduction in GHG emissions would more than offset the increase in GHG emissions associated with project facilities. Therefore, the HST project would result in a net decrease in GHG emissions from operation.

Regional. Operation of the HST would help the region attain air quality standards and plans by reducing the amount of regional vehicular traffic and providing an alternative mode of transportation. Because the HST project would help to decrease emissions of criteria pollutants and precursors (such as NO_x and ROG), it would result in a net benefit to regional air quality. Therefore, project contribution to cumulative air quality impacts would not be significant under NEPA and would not be cumulatively considerable under CEQA.

Local. Cumulative CO impacts are accounted for in the CO hotspot analysis, presented in Section 3.3.6.3, Air Quality and Global Climate Change. The various federal and California air quality standards are listed in Table 3.3-1. The CALINE4 air dispersion modeling

What is a sensitive receptor?

A sensitive receptor for pollutant emissions includes schools, churches, residences, hospitals, and areas where the general public would congregate.

evaluation indicated that the cumulative CO emissions[4] from past, present, and reasonably foreseeable future projects in combination with the HST project would not exceed state and federal ambient air quality standards.

PM_{10} and $PM_{2.5}$ emissions from traffic near the HST stations may combine with other traffic and sources of particulate matter emissions in the area to contribute to localized PM_{10} and $PM_{2.5}$ concentrations. A qualitative hot spot analysis was performed (Section 3.3.6.3) and indicated that the particulate matter emissions associated with operation of the HST stations would not significantly contribute to an increase in local concentrations.

Summary of NEPA/CEQA Impacts

At the state level, GHG emissions from HST project construction and operations would meet the State goals by reducing GHG emissions overall and therefore, would not be cumulatively significant under NEPA and would not result in a cumulatively considerable impact under CEQA. At the regional level, since criteria pollutant emissions from project construction would be mitigated to net zero, as described above, the project's contribution to cumulative air quality impacts would not be significant under NEPA and would not be cumulatively considerable under CEQA. Similarly, localized impacts from criteria pollutants and TACs emissions associated with project construction would not be cumulatively significant under NEPA and would not be cumulatively considerable under CEQA.

Operation of the HST System would help the region attain air quality standards and plans by reducing the amount of regional vehicular traffic and providing an alternative mode of transportation. Because the HST project would help to decrease emissions of criteria pollutants, the project would result in a net benefit to regional air quality. Therefore, at the regional level, project operation would have a beneficial contribution under NEPA and not contribute to cumulative air quality impacts under CEQA.

At a local level, the CO and particulate matter emissions associated with operation of the HST stations would not exceed the threshold of significance established by the SJVAPCD; therefore, it is unlikely that the operation of the station and associated local traffic increases would contribute to the cumulative impact of CO, PM_{10} and $PM_{2.5}$ emissions. Therefore, local criteria pollutant emissions during operation of the HST project would not result in a cumulatively considerable impact.

Mitigation

No mitigation is required beyond that presented in Section 3.3.9, Mitigation Measures.

Noise and Vibration

The study area for the cumulative analysis of noise is 2,500 feet and vibration is 275 feet on either side of the centerline of the HST alternatives. This study area was determined based on typical screening distances defined by the Federal Railroad Administration (FRA) and project-specific conditions (FRA 2005). If receivers are located outside of this analysis area, FRA has determined that noise and vibration impacts would be unlikely. The study area for direct and indirect noise impacts related to the HST alternatives is described in Section 3.4, Noise and Vibration.

[4] The CO hot spot analysis is inherently a cumulative analysis, because it analyzes project and other future traffic that would increase CO concentrations which are added to the ambient CO concentrations.

Concentrations of residences and other potential noise- and vibration-sensitive receivers exist in the cities of Fresno, Hanford, Corcoran, Wasco, Shafter, and Bakersfield. Outside of these urban and suburban areas, land is mostly agricultural, with scattered sensitive receivers. Existing measured day-night sound levels (L_{dn}) ranged from 45 dBA (A-weighted decibels) to 84 dBA along the alternatives; L_{dn} levels along the alternatives vary depending on community activity and traffic. Sources of existing vibration along the alternatives include freight trains, Amtrak passenger trains, and truck and automobile traffic on highways.

Construction

Construction of the HST alternatives in conjunction with other past, present, and reasonably foreseeable projects would result in noise effects that would be limited in duration. It is possible that multiple projects in urban areas that are in close proximity to HST alternatives, such as projects developed under the Fulton Corridor Specific Plan (FC05), the City of Corcoran Police Station (KI10), the North Shafter Sewer Project (WS02), and Baker Street Village Redevelopment Project (B08), would be under construction at the same time as the HST project. Together with the HST project, construction of these projects could result in exceedance of significance thresholds for noise defined in Section 3.3.3, Noise and Vibration, at sensitive receivers. This would be a significant cumulative impact under NEPA and CEQA. The HST project contribution to this cumulative construction noise impact would be significant under NEPA and cumulatively considerable under CEQA.

The HST alternatives that extend through predominantly rural agricultural areas would contribute to fewer cumulative construction noise impacts than alternatives that traverse urban areas because there are fewer existing and reasonably anticipated additional sensitive receivers based on the reasonably foreseeable future projects in rural areas. Although there would be a greater likelihood for noise impacts in rural areas because of the lower ambient noise levels compared to the noise levels in urban areas, the number of severely affected noise receivers is higher in the urban areas, compared to the rural areas which have a lower population density. No specific projects have been proposed in the rural areas of the HST project with construction schedules that overlap the HST project; however, it is possible that future construction of commercial, industrial, or infrastructure projects in these rural areas could overlap with HST project construction. If overlapping construction occurs, depending on the scope and siting of the construction activities, it could result in a significant cumulative impact under NEPA or CEQA. The HST project contribution to this cumulative construction noise impact would be significant under NEPA and cumulatively considerable under CEQA.

Construction of elevated sections of the HST is likely to require pile driving. It is possible that other projects in urban areas that are in close proximity to elevated sections of HST alternatives would also require pile driving. This is most likely to occur in Bakersfield where the alternative HST alignments are elevated throughout the community, with future projects such as the Baker Street Village Redevelopment Project, and transportation projects such as the Oak Street Bridge repair (B07) and the Centennial Corridor (B09). Construction of the HST project concurrently with these future projects could result in exceedance of significance thresholds for vibration defined in Section 3.3.3, Noise and Vibration, at adjacent sensitive receivers. This would be a significant cumulative impact under NEPA and CEQA. The HST project contribution to this cumulative construction vibration impact would be significant under NEPA and cumulatively considerable under CEQA.

Operations

The HST System would create long-term noise impacts from the introduction of a new transportation system. As described in Section 3.4.4, Noise and Vibration, existing ambient noise levels at measurement sites in the study area range from 45 to 84 dBA L_{dn}. Future noise levels

are expected to increase along roadways and the BNSF Railway as increased traffic and an increased number and length of freight trains are anticipated in the region. Traffic volumes from past, present, and reasonably foreseeable future roadway projects in combination with traffic related to the HST alternatives are projected to result in increased noise levels up to 7 dBA L_{dn} between 2010 and 2035 at noise-sensitive receivers as described in Section 3.4, Noise and Vibration. Projects such as the Fresno Freight Alignment project in Fresno (F09), Houston Avenue widening project in Hanford (K11, K12), Orange Avenue realignment in Corcoran (C02), Poso Drive reconstruction in Wasco (W11), and the SR 178 widening project near Bakersfield (B13–B15) could contribute to cumulative increases in traffic volumes, which would increase noise levels. Anticipated increases in the number and length of freight trains would result in a maximum increase of 3 dBA L_{dn} in future railroad noise exposure at noise-sensitive receivers. The HST project would generate noise-level increases up to 28 dBA L_{dn} above projected 2035 ambient noise levels. Together with past, present, and reasonably foreseeable projects the increased noise levels adjacent to transportation corridors would have a substantial intensity under NEPA. Because of the large number of sensitive receivers along transportation corridors this would be a significant cumulative impact under NEPA and CEQA. The incremental contribution of the HST project to the significant cumulative noise impact would be significant under NEPA and cumulatively considerable under CEQA.

The HST alternatives that extend through predominantly rural agricultural lands would generally have less of a contribution to severe noise impacts than alternatives that traverse urban areas because the number of sensitive receivers severely impacted (i.e., receivers where impacts are not fully mitigated) by the HST project would be greater in urban areas.

Several planned transportation projects listed in Appendix 3.19-B could have the potential to increase vibration levels in the study area. These transportation projects include the Amtrak double track project, Kings Park project, and BNSF Railway double track project in Fresno, Corcoran, Shafter, and Bakersfield. Combined vibration impacts from these projects could result in significant cumulative vibration impacts under both NEPA and CEQA on properties adjacent to the BNSF tracks in these communities. The vibration contribution from the HST project would be minimal since there would be no significant vibration impacts created by the project. Therefore, the contribution of the HST project to the potentially significant cumulative vibration impacts would not be significant under NEPA and would not be cumulatively considerable under CEQA.

Summary of NEPA/CEQA Impacts

The HST alternatives, combined with other large projects that may be constructed concurrently and within the vicinity of the HST alternatives, could result in cumulative construction-related noise and vibration impacts of substantial intensity. The cumulative noise and vibration impacts of the HST alternatives and other past, present, and reasonably foreseeable projects during construction would be significant under NEPA and CEQA. The incremental contribution of the HST project to this significant impact would be significant under NEPA and cumulatively considerable under CEQA. As described above, the HST alternatives that extend through predominantly rural agricultural areas would contribute to fewer cumulative construction noise and vibration impacts than alternatives that traverse urban areas.

Operation of past, present, and reasonably foreseeable projects, together with the HST project, would result in significant cumulative noise and vibration impacts adjacent to transportation corridors under NEPA and CEQA because of the large number of sensitive receivers along these corridors. The contribution of the HST project to this cumulative noise impact would have substantial intensity under NEPA. The project's incremental contribution to the significant cumulative noise impact would be significant under NEPA and cumulatively considerable under CEQA. The HST alternatives that extend through predominantly rural agricultural areas would cause substantially fewer severe noise and vibration impacts than alternatives that traverse urban

areas, as described above. However, for vibration, the HST alternatives' contribution to cumulative vibration impacts would not be significant under NEPA and would not be cumulatively considerable under CEQA.

Mitigation

Mitigation measures for HST Alternatives construction noise and vibration impacts provided in Section 3.4.7, Noise and Vibration, would reduce the project's contribution to cumulative construction noise impacts. In addition, the following mitigation measure would minimize the potential cumulative effects of overlapping construction activities within the same area. However, even with implementation of mitigation measure CUM-N&V-MM#1 below, the project's contribution to cumulative noise and vibration impacts would remain significant under NEPA, and cumulatively considerable under CEQA.

Additionally, during operations, even with implementation of mitigation measures for noise provided in Section 3.4.7, Mitigation Measures, the project's contribution to cumulative effects of operational noise would remain a significant impact under NEPA and cumulatively considerable under CEQA. This contribution would result because there would be some sensitive receptors near the HST alignment for whom additional mitigation is not practical because construction of a sound barrier is not economically feasible and there is no practical amount of sound insulation that can be added to the structure to reduce interior noise levels to acceptable standards.

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 HST construction schedule and would allow for adjustment of construction schedules for adjacent projects or projects in close proximity to the HST alignment, to the extent feasible.

Electromagnetic Fields and Electromagnetic Interference

The study area for the cumulative analysis of electromagnetic fields (EMF) and electromagnetic interference (EMI) is 200 feet on either side of the centerline of the HST alternatives and HST transmission supply lines, as well as 200 feet around the perimeter of the alternative HMF sites. This study area was selected because computer modeling shows that the EMF level associated with HST facilities would decrease to a level below 2 milligauss (mG) at 200 feet (Authority 2011). Based on the Electromagnetic Field Footprint Report (Authority 2010) prepared for the proposed project, 2 mG is used as a screening level for potential disturbance to unshielded sensitive equipment. In addition, early epidemiological studies have shown that 2 mG is the lowest level of chronic, long-term magnetic field exposure with no statistical association with a disease outcome (Savitz et al. 1988; Severson et al. 1988).

As discussed in Section 3.5, Electromagnetic Fields and Electromagnetic Interference, existing standards for human exposure to EMF would not be reached within the mainline right-of-way of the HST, let alone impacting people outside the right-of-way. Because the past, present, or foreseeable future projects in the study area are construction projects with the same types of impacts that would result from construction of the HST project, and because these projects would not result in the types of activities that may cause general EMF or EMI interferences during operation, no projects have been identified that approach the standards for human exposure to EMF. Therefore, those projects in combination with the HST project would not result in cumulative EMF impacts to humans.

As discussed in Section 3.5, radio systems used for the project would comply with standards that have been established to prevent interference with other neighboring communications systems.

These standards are listed in Appendix 2-D. Other past, present, and foreseeable future projects using electromagnetic communications systems must also comply with these standards. Therefore, those projects in combination with the HST project would not result in cumulative EMI impacts to communications equipment.

Locating the HST on the Bakersfield South or Bakersfield Hybrid alignments would cause significant electromagnetic interference to sensitive equipment at Mercy Hospital in Bakersfield. This impact would be mitigated by providing radio frequency shielding to the equipment (EMI/EMF MM#1). There are no other past, present, or foreseeable future projects in the study area that would cause cumulative electromagnetic interference to this equipment.

Public Utilities and Energy

The cumulative study area for public utilities except water infrastructure encompasses Fresno, Kings, Tulare, and Kern counties. The cumulative study area for water infrastructure and resources includes the Tulare Lake Basin, described in Section 3.8, Hydrology and Water Resources. The cumulative study area for energy encompasses the State of California. The study area for direct and indirect impacts related to the HST alternatives is described in Section 3.6, Public Utilities and Energy.

With the projected 2035 population and employment growth in the Central Valley, including numerous planned subdivisions and commercial developments, there would be an increased demand for utilities and energy. Under the cumulative condition, approximately 578,000 new households could be added to the study area by 2035. Assuming an annual consumption of 11,040 kilowatt hours per household (DOE 2008), 6,380 megawatts (MW) of new power would be required in the study area. Peak and base period electricity demand in the region would increase, and would require additional energy generation and transmission capacity.

The addition of these new households would require approximately 7.3 billion gallons of potable water each year, assuming 127,400 gallons for each household annually (American Water Works Association 2010). Commercial and industrial development would also generate water demand, which would be projected by water providers and approved through a permitting process. Proportionate increases in wastewater treatment would also be required. As with many communities throughout 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 (SB X7-7) requires urban water purveyors to reduce customer water demand by 20% by 2020 through increases in water efficiency.

California is expected to continue its solid waste diversion policies to further reduce the per capita need for landfill capacity in the future. In particular, AB 341 establishes a goal of reaching a statewide diversion rate of 75% by 2020. California's Green Building Standards (California Code of Regulations, Title 24, Part 11, Sections 4.408 [residential construction] and 5.408 [commercial construction]) include provisions for recycling and/or salvaging for reuse of a minimum of 50% of the non-hazardous construction and demolition debris from construction projects.

Construction

Cumulative construction-related impacts to utilities, electrical demand, water infrastructure and resources, and solid waste/recycling facilities are described below.

Utilities

Construction of the HST alternatives along with past, present, and reasonably foreseeable projects may require the temporary shutdown of utility lines to safely move, extend, or connect to these lines. Relocation, extension, expansion, and connection of utilities as a result of

development is virtually 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 within the project study area. This coordination would take place throughout project construction. The Authority and all other developments in the San Joaquin Valley, such as construction of the Centennial Corridor project (B09), would adhere to standard practices for provision and relocation of utilities. That includes location and marking of utilities prior to construction, design and relocation of utilities, where necessary, under the supervision of the utility provider prior to the initiation of project construction, and planning and notification of any short duration 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 HST interruptions, the interruption notification procedures, and the standard practices for utility identification, the cumulative construction impact on utilities would not be significant under NEPA and would not be cumulatively considerable under CEQA.

Electricity Demand

The construction of the HST project along with other past, present, and reasonably foreseeable projects would result in temporary increases in demand for energy. Although construction of the planned and potential projects listed in Appendix 3.19-A and 3.19-B such as Westlake Development Project (F22) and the Northwest Fresno Walmart Project (FC01), in combination with the HST alternatives, would result in incremental increases in electricity demand, the energy used would not require significant additional capacity or significantly 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 HST project, would not use substantial amounts of electricity from the statewide grid, but would primarily rely on fossil fuels to operate construction equipment and vehicles. The SJVAPCD requires 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. These procedures ensure efficient use of fossil fuels. Therefore, the cumulative construction electricity demand impacts would not be significant under NEPA and would not be considerable under CEQA.

Water Infrastructure and Resources

Construction activities associated with the HST project and reasonably foreseeable projects would use water to prepare concrete, increase the water content of soil to optimize compaction, control dust, and re-seed disturbed areas. Construction of the Fresno to Bakersfield Section of the HST System will result in a net decrease in annual water consumption for the area impacts by construction when annualized over a 5-year construction period. It is estimated that the water usage during the construction of the project will be only 7% (788 acre-feet/year needed for construction compared with 12,048 acre-feet/year current water usage) of the existing water usage on an annual basis for the project footprint (see Appendix 3.6-B, Water Usage Analysis Technical Memorandum). Because construction water demand is intermittent, limited, and of short duration, it would not drive the need for additional water infrastructure. Because the construction water demand would not result in the development of additional water facilities, construction of foreseeable future projects, including the HST project, would not result in a cumulative impact to water infrastructure and resources.

Solid Waste/Recycling Facilities

Construction of the HST project together with past, present, and reasonably foreseeable projects would result in contributions of solid waste and debris to regional landfills. Vegetation removal, grading, and demolition of existing structures during construction would generate solid waste. At a minimum, 50% of the construction materials generated are required by State law to be diverted from landfills (CalRecycle 2012). As a standard construction practice for the HST project,

the contractor would divert construction and demolition waste from landfills by reusing or recycling to aid with implementing the Local Government Construction and Demolition (C&D) Guide [Senate Bill 1374] and to meet solid waste diversion goals. The contractor would either segregate and recycle the waste at a certified recycling facility or contract with an authorized agent to collect mixed (not segregated) waste and dispose of it at a certified recycling facility.

While many of the nonhazardous solid waste landfills currently serving the study area are expected to reach their planned capacity before the year 2035, state regulations such as AB 939 require local governments to manage solid waste reuse and disposal and additional landfill capacity is expected to be developed in the region to meet future demand. The expansion of existing facilities and construction of new facilities would be addressed under separate environmental review completed for those projects. Because state law requires recycling of waste generated by construction, and the general provisions of the Authority's construction contracts require such recycling of construction waste, landfill capacity is anticipated to be sufficient for the combined demand. Consequently, the cumulative impact of construction on landfill capacity would not be significant under NEPA and would not be cumulatively considerable under CEQA.

Operations

Cumulative operations-related impacts to utilities, electrical demand, water infrastructure and resources, and solid waste/recycling facilities are described below.

Utilities

The HST project would require wastewater treatment for the Fresno, Kings/Tulare, and Bakersfield stations and the HMF. Sewage treatment capacity in the Fresno-Clovis Metropolitan Area is not sufficient to meet future growth projections to 2025 (City of Fresno 2002). Sewage Treatment Plan No. 3 in Bakersfield was doubled in capacity in 2010; however, the ability of the city's treatment facilities to meet future demand depends on the patterns of growth in the city. The City of Hanford has adequate sewer treatment capacity to meet future demand through 2035 but requires improvements to its sewer lines to meet demand currently planned for the eastern edge of the city. Based on the existing treatment capacity and distribution systems of these municipalities, there would be a cumulative impact on wastewater treatment facilities caused by the HST project and other past, present, and foreseeable future projects. As discussed in Section 3.6, Public Utilities and Energy, HST facilities would use from 0.1% to about 1% of the existing capacity of any of these municipal systems; therefore, the contribution of the HST facilities to this cumulative impact would not be significant under NEPA and would not be cumulatively considerable under CEQA.

Electricity Demand

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 2035) are limited to 10 years using decadal 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, historically, new electricity generation has been in step with demand (Weare 2003). As indicated in Section 3.6, the projected average summer power supply statewide in 2010 was forecast at 76,968 MW, or 6,303,017 million British thermal units (MBtu) per day. California's population is projected to exceed 49 million by 2025 and 53 million by 2030, requiring an additional 92,000 MW of peak summer capacity in 2030 to meet demand with an adequate reserve margin (Electric Power Group, LLC 2004).

Residential, commercial, and industrial development projects are required to obtain permits and undergo environmental review, in part to ensure that the electricity demands of the project can

be met. In addition, electricity providers perform regular near-term demand projections that incorporate anticipated demand from planned development and 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, several power-production projects, including solar farms, are proposed within the study area and are listed in Appendix 3.19-A.

The electrical demand of the HST alternatives has been conservatively estimated to be 56,600 million British thermal units (MBtu) per day (this includes transmission losses, propulsion of the trains for the HST alternatives, operation of the trains at terminal stations, and storage depots and maintenance facilities). Therefore, the HST System electrical demand would be 0.9% of 2010 electrical production, and 0.4% of planned 2030 electrical production (California Energy Commission 2004). Although electricity supplies for 2035 are uncertain, given the available planning period and the known demand from the project, energy providers have sufficient information to include the HST project and other projects listed as part of this cumulative scenario in their demand forecasts, which would inform future decisions regarding new infrastructure necessary to meet energy demand. In addition, to enhance the benefits of the HST, the Authority has set a goal of procuring renewable electricity to provide power for HST operations. Therefore, the cumulative impact on electrical infrastructure and energy demand during operation would not be a significant impact under NEPA and would not be cumulatively considerable under CEQA.

Water Infrastructure and Resources

Water demand in the Tulare Lake Basin is generally greater than readily available water supply. Recent changes in water management include improvements in storing water during dry years, on-farm water management and irrigation systems, water exchange agreements, water optimization techniques, water transfers and the use of 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 (DWR 2009).

Future water demand in the Tulare Lake Basin has been estimated by the California Department of Water Resources (DWR) for three baseline scenarios that account for changes in water demand from urban development, natural resources restoration, and irrigated crop land. These scenarios also account for state regulatory programs that improve water quality, protect fish and wildlife, and protect communities from flooding (DWR 2009). Under the DWR projections, urban and natural resource restoration water uses would increase and agricultural water use would decrease. The increases in urban demand would primarily be from population growth within the Tulare Lake Basin. Increases in natural resource restoration would be associated with changes in the allocation of water for the improvement of river and other environmental conditions. The reduction in agricultural water demand is anticipated to result from reductions in the amount of irrigated lands and improved agricultural water conservation techniques. Overall, estimates by DWR show a range of possible future trends in water demand in the Tulare Lake Basin, which vary depending upon several factors, including how climate change is factored into the model. The majority of the scenarios predict a decrease in future water demand (DWR 2009). As explained below, the HST project will have a net decrease in demand compared with current uses.

Water demand for the HST project is associated with water use at the HST stations and HMF. As described in Section 3.6, Public Utilities and Energy, operation of the HST would require less than 50,000 gallons of water per day for each of the proposed HST stations and less than 45,000 gallons of water per day for the HMF. As discussed in Appendix 3.6-B, Water Usage Analysis Technical Memorandum, operation and maintenance of the Fresno to Bakersfield Section would result in a net decrease of water usage. Depending on the HST alternative selected, the

HST project would remove approximately 3,541 acres of farmland from agricultural production for construction and operation of the Fresno to Bakersfield Section, which would result in a decrease in agricultural water demand. The HST project would also cause an indirect increase in urban water demand associated with the 2-3% population increase from induced growth effects anticipated as a result of the project (as compared to the No Project projections).

The proposed Fresno and Bakersfield stations would be supplied with treated municipal water from the City of Fresno Water Division and the California Water Service Company, respectively. For the proposed Kings/Tulare Regional Station–East Alternative location, the majority of the affected area (99.9%) is within agricultural use and served by agricultural water districts. For the Kings/Tulare Regional Station–West Alternative location, the majority of the area is undeveloped and served by the City of Hanford. The Kings/Tulare Regional Station could be served either by the City of Hanford or by a well installed on the station site. The proposed HMF alternatives would be served by a well or wells installed at the facility. Urban water management plans for both the City of Fresno and the affected Bakersfield District have estimated that an adequate supply to meet the projected water demand is available for projected future growth, including those projects considered under the cumulative scenario (Fresno, 2012; California Water Service Company, 2011). Similarly, City of Hanford Urban Water Management Plan anticipates sufficient capacity for the planning horizon (2035) (Hanford, 2011).

The HST alternatives would reduce demand for irrigation water within the project footprint, offsetting project operation water use and partially offsetting water use associated with population increase. Therefore, the project would not contribute to cumulative water demand in the Tulare Lake Basin.

Solid Waste Disposal/Recycling Facilities

Operation of the HST project , together with past, present, and reasonably foreseeable projects, would result in the generation of solid waste and debris. Under Resource Conservation and Recovery Act and the California Integrated Waste Management Act of 1989 (AB 939), county or municipal solid waste disposal facilities are required to plan for non-hazardous solid waste facility expansions as well as 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 HST project. Therefore, operational effects of projects on solid waste disposal/recycling under the cumulative condition would not be a significant impact under NEPA and would not be cumulatively considerable under CEQA.

Summary of NEPA/CEQA Impacts

Construction of the HST project in combination with other past, present, and reasonably foreseeable future projects would not result in significant cumulative impacts under NEPA and would result in less than significant impacts under CEQA to utilities, electricity demand, water infrastructure and resources, and solid waste disposal/recycling.

Operation of the HST project together with past, present, and reasonably foreseeable projects would not result in significant cumulative impacts under NEPA and would result in less than significant impacts under CEQA to electricity demand and solid waste disposal/recycling. Future cumulative demand for wastewater treatment could result in a significant cumulative impact under NEPA and CEQA; however, the incremental contribution of the HST facilities to this cumulative impact would be negligible under NEPA and would not be cumulatively considerable under CEQA. The HST alternatives would reduce water demand within the project footprint, offsetting project operation water use and partially offsetting water use associated with regional growth. Therefore, there would not be a contribution from the project to a cumulative impact and the cumulative impact would not be significant under NEPA.

Cumulative operations impacts on groundwater levels would be significant under NEPA and CEQA because regional groundwater withdrawals would exceed groundwater recharge. The incremental contribution of the HST project to this significant cumulative impact would not be significant under NEPA and would not be cumulatively considerable under CEQA because project-related groundwater pumping would represent a very small proportion (less than 0.002%) of the regional use.

Mitigation

No mitigation is required.

Biological Resources

The study area for the biological resources cumulative impact analysis considers the habitats and features of the Tulare Basin. For wetlands, the study area includes the Upper Dry, Upper Kaweah, Upper Tule, Upper Deer-Upper White, Upper Poso, and Middle Kern-Upper Tehachapi-Grapevine subbasins within the Tulare-Buena Vista lakes watershed (HUC 18030003–18030009, USDA/NRCS). The Tulare Basin includes Fresno, Kern, Kings, Madera, San Luis Obispo, and Tulare counties (EPA 2010). The study area for direct and indirect impacts related to the HST alternatives is described in Section 3.7, Biological Resources.

Historically, the Tulare Basin was a vast, ecologically rich landscape that contained a diverse assemblage of habitats covering over 2.5 million acres. The basin supported abundant terrestrial and aquatic wildlife and plant species. The major rivers and creeks that emptied into the basin (i.e., the Kings, Tule, Kaweah, White, and Kern rivers and Cross and Poso creeks) directly fed large seasonal lakes (Tulare, Buena Vista, Kern, and Goose lakes). After European settlement, the natural landscape was converted into agricultural land, rural residential areas, and urban areas, which has reduced and fragmented the available wildlife habitat and limited the movement of wildlife between the remaining habitat areas. Also, growth in the metropolitan areas of Fresno and Bakersfield has substantially increased human population and disturbance to the surrounding natural communities.

Existing development trends affecting biological resources are expected to continue and potentially further degrade some natural systems because development, such as new residential communities, agriculture production, and transportation infrastructure, would convert undeveloped habitat to other uses. In addition, the developments would degrade remaining habitat through pollution, noise, and dust, and would threaten species with mortality from vehicle strikes and habitat fragmentation and degrade or remove jurisdictional waters.

Construction

Construction-related impacts to special-status plant and wildlife species, habitats of concern, and wildlife movement corridors are described below. All HST alternatives would have similar potential construction-related cumulative impacts on biological resources because each alternative would generally impact similar biological resources, although at somewhat different intensities, as discussed below.

Special-Status Plant and Wildlife Species

Construction of the HST project in combination with other past, present, and reasonably foreseeable projects may result in the loss of special-status plant and wildlife species within the Tulare Basin at temporary construction sites such as laydown and staging areas. Future projects within this region that are expected to contribute to the cumulative impacts associated with construction of the HST project include, but are not limited to, the Corcoran Irrigation District Solar Project and Generation Facilities (KI08), and the Smyrna and Goose Lake Solar

Developments (KE01 and KE02). Additionally, the construction of the adjacent HST sections, Merced to Fresno to the north, and Bakersfield to Palmdale to the south, would contribute to the net loss of special-status plant and wildlife species. These projects, including the HST project, are located in areas containing similar habitat requirements for special-status plants and wildlife species; in particular they are located in areas of vernal pool swales and desert washes which provide suitable habitat for vernal pool fairy shrimp, vernal pool tadpole shrimp, western burrowing owl, coast horned lizard, heartscale, alkali goldfields, and spinescale scrub, which are known to occur in the area. Other special-status plant species such as little mouse tail, and other special-status wildlife species such as valley elderberry longhorn beetle, western spadefoot toad, blunt-nosed leopard lizard, Swainson's hawk, Tipton kangaroo rat, and San Joaquin kit fox have potential to occur in the construction footprint of the HST project and the footprints of other cumulative projects. Impacts could include the temporary loss of wetlands, hydrological changes to wetlands, and loss of habitat for special-status species. Construction activities may result in the "take" of individuals in the form of mortality, injury, or harassment due to trampling, noise, dust, motion disturbance, or temporary destruction and degradation of suitable habitat. These impacts are considered cumulatively significant under NEPA and CEQA.

The effect of construction of the HST project on special-status plant and wildlife species would have negligible intensity under NEPA because temporary construction sites would be located to avoid habitat of special-status species to the extent possible, and other minimization and mitigation measures listed in Section 3.7.7, Biological Resources and Wetlands, would be implemented. Construction impacts would not be a significant impact under NEPA and the project's incremental contribution to this cumulative impact would not be cumulatively considerable under CEQA.

Habitats of Concern

Construction of the HST project in combination with other past, present, and foreseeable projects may result in the temporary destruction or degradation of special-status plant communities; impede implementation of recovery plans; temporarily place fill or increase erosion, siltation, and runoff in jurisdictional waters (i.e., seasonal wetlands, vernal pools); and remove or modify protected trees (i.e., native oaks). Cumulative impacts to jurisdictional wetlands and waters may be caused by the combined construction of numerous transportation and development projects. These projects include, but are not limited to the Fresno Freight Rail Alignment Project in Fresno County which crosses the Kings River, Murphy Slough, and several unnamed canals and ditches; SR 99 in Kingsburg which crosses the Kings River, the Goose Lake Solar Project, the Smyrna Solar Project, the Corcoran Irrigation District Solar Project, and the Corcoran Irrigation District Solar Generation Facilities Project, which would impact jurisdictional wetlands. Additionally, construction of the adjacent HST sections, Merced to Fresno to the north, and Bakersfield to Palmdale to the south, would contribute to the net loss of wetlands and other habitats of concern in the cumulative study area. Cumulative impacts to recovery plans, such as the *Recovery Plan for Upland Species of the San Joaquin Valley, California*, as well as the additional removal of protected trees as a result of past, present, and foreseeable projects, including those listed above, would be cumulatively significant. Impacts to jurisdictional waters and recovery plans would be cumulatively significant. The effect of construction of the HST project on habitats of concern would have negligible intensity under NEPA because temporary construction sites would be located to avoid habitats of concern to the extent possible and other minimization and mitigation measures listed in Section 3.7.7, Biological Resources and Wetlands, would be implemented. Construction impacts would not be significant impact under NEPA and the project's incremental contribution to this impact would not be cumulatively considerable under CEQA.

Wildlife Movement Corridors

Construction of the HST project as well as other past, present, and foreseeable projects could result in the placement of wildlife movement barriers or increased lighting, noise, and activity within and near construction staging areas. Other foreseeable projects that would contribute to this impact include, but are not limited to, the construction of the Fresno Freight Rail Alignment Project which extends through Fresno County, the 7th Standard Road widening project, the State Rail Plan, and the West Beltway Project in the city of Bakersfield. These projects would contribute to construction impacts on wildlife movement corridors. Additionally, the construction of adjacent HST sections, Merced to Fresno to the north, and Bakersfield to Palmdale to the south, would contribute to limiting wildlife movement. These cumulative impacts would be significant under NEPA and cumulatively considerable under CEQA. However, construction staging areas for HST alternatives, would not be expected to impede wildlife movement as they would be temporary and limited in size. In addition, construction staging areas would be returned to their previous use after construction is completed. Therefore, construction activities for the HST project would not make a significant contribution to cumulative impacts on wildlife movement corridors within the Tulare Basin under NEPA and the HST project incremental contribution to this cumulative impact would not be cumulatively considerable under CEQA.

Operations

Operations-related impacts to special-status plant and wildlife species, habitats of concern, and wildlife movement corridors are described below. Potential contribution to cumulative impacts would be generally similar among the HST alternatives because they would have equivalent types and degrees of impacts, based on the locations of potential habitat for special-status species and habitats of concern. An exception to this is the Allensworth Bypass Alternative which would have fewer impacts on high-quality jurisdictional waters (i.e., vernal pools) compared to the corresponding segment of the BNSF Alternative.

Special-Status Plant and Wildlife Species

Potential impacts on special-status species from operation of the HST project and other past, present, and foreseeable projects include permanent habitat loss, habitat fragmentation, introduction of invasive species, and harassment due to increased noise and human disturbance. Planned and potential development projects and transportation projects such as the Corcoran Irrigation District Solar Project and Generation Facilities and the Smyrna and Goose Lake Solar Developments, would contribute to significant impacts on special-status species because these projects together with the HST project, could impact habitat with potential for special-status plant and wildlife species presence. Additionally, the adjacent HST sections, Merced to Fresno to the north and Bakersfield to Palmdale to the south, would contribute to the net loss of special-status plant and wildlife species. Cumulative operations impacts on special-status plant and wildlife species would be significant under NEPA and CEQA. Because of the large area that would be permanently occupied by HST facilities, impacts to special-status plant and wildlife species would be substantial as a result of permanent habitat conversion and loss. Mitigation measures for the HST project include preconstruction surveys, avoidance, habitat restoration, and offsite habitat preservation, enhancement and compensation, which would reduce the project's contribution to this impact. In the context of the loss of special-status plant and wildlife species from past, present, and reasonably foreseeable agricultural and urban development in the Tulare Basin, the contribution of the HST project to these significant cumulative impacts would be cumulatively considerable before mitigation. However, mitigation for the project includes restoration, enhancement, and preservation of jurisdictional waters and riparian habitats to the extent that there will be no net loss of aquatic resources, functions, and services. These habitats are important for many special-status plant and wildlife species. Also, project mitigation includes preservation of habitat occupied by special-status plant and wildlife species. This preservation in

combination with the restoration, enhancement, and preservation of jurisdictional waters will improve biological resources in the region over existing conditions. For these reasons, the HST project will not contribute to cumulative impacts on special-status plant and wildlife species.

Habitats of Concern

Several projects planned within the Tulare Basin in combination with the HST project would have cumulative impacts on habitats of concern before mitigation. These projects include, but are not limited to: Goose Lake Solar (KE02), Smyrna Solar (KE01), Kettleman Photovoltaic Solar Farm Project (KI17), Avenal Park Photovoltaic Solar Farm (KI18), and the Sun City Project (KI19). Additionally, the adjoining HST sections, Merced to Fresno to the north and Bakersfield to Palmdale to the south, would contribute to the net loss of wetlands and other habitats of concern in the basin. Operational impacts of these projects in association with the HST project could include permanent fragmentation, degradation, or conversion of habitats of concern including jurisdictional waters, as well as loss of wetlands, and hydrological changes to wetlands, loss of special-status plant communities, loss of recovery plan areas and the removal or modification of protected trees. The operation of the HST project before mitigation, in combination with other past, present, and foreseeable projects, would result in a significant impact under NEPA and CEQA to habitats of concern within the Tulare Basin. However, mitigation for the project includes restoration, enhancement, and preservation of jurisdictional waters and riparian habitats to the extent that there will be no net loss of aquatic resources, functions, and services. These habitats are important for many special-status plant and wildlife species. Also, project mitigation includes preservation of habitat occupied by special-status plant and wildlife species. This preservation in combination with the restoration, enhancement, and preservation of jurisdictional waters will improve biological resources in the region over existing conditions. For these reasons, the HST project will not contribute to cumulative impacts on habitats of concern.

Wildlife Movement Corridors

Past projects have significantly degraded the ability of wildlife to freely move across natural habitats, and wildlife movement would be further limited with the Fresno to Bakersfield HST Section and other past, present, and reasonably foreseeable projects in the Tulare Basin. Planned and potential projects which could reduce the ability of wildlife to move freely across natural habitats include the BNSF Railway double tracking in Kern County (KE04 and KE05), the State Rail Plan, the West Beltway (B04 and B05) and Centennial Corridor (B09) highway projects in the city of Bakersfield, the Fresno Freight Rail Alignment Project (F09), which extends through Fresno County, and the 7th Standard Road widening in Bakersfield (KE07 and KE08). Additionally, the adjacent HST sections, Merced to Fresno to the north and Bakersfield to Palmdale to the south, would contribute to disruption of wildlife movement corridors. Impacts from these projects could include the disruption of wildlife due to increased lighting, noise, and motion. These cumulative impacts would be significant under NEPA and CEQA. Because the HST is linear, spanning the entire southern San Joaquin Valley, its impact on wildlife movement corridors would have substantial intensity under NEPA and would be cumulatively considerable under CEQA before mitigation. However, in addition to integrating wildlife crossings into project design to address wildlife migration corridors where the HST alignment is at-grade, project mitigation also includes preservation of habitat occupied by special-status plant and wildlife species, much of which is within wildlife movement corridors. For these reasons, the contribution of the HST project to cumulative impacts would not be significant under NEPA and would not be cumulatively considerable under CEQA.

Summary of NEPA/CEQA Impacts

Construction of past, present, and reasonably foreseeable projects, together with the HST project, would result in significant cumulative impacts to biological resources under NEPA and

CEQA. Construction impacts associated with the HST project would be temporary, construction sites would be located to avoid biological resources to the extent possible, and other minimization and mitigation measures would be implemented; therefore, the project contribution would not be significant under NEPA and would not be cumulatively considerable under CEQA.

Operations of past, present, and reasonably foreseeable projects, together with the HST project, would result in significant cumulative impacts to biological resources under NEPA and CEQA. The contribution of the Fresno to Bakersfield Section to biological resource impacts would not be significant under NEPA and would not be cumulatively considerable under CEQA because of mitigation measures to restore, enhance, and preserve jurisdictional waters and riparian habitats, and mitigation measures to preserve other habitat occupied by special-status plant and wildlife species. Habitat preservation in combination with restoration, enhancement, and preservation of jurisdictional waters will improve biological resources in the region over existing conditions.

Mitigation

No mitigation is required beyond that presented in Section 3.7.7, Mitigation Measures.

Hydrology and Water Resources

Issues addressed in hydrology and water resources include surface water, groundwater, floodplains, and water quality. The cumulative impact study area for hydrology and water resources is inclusive of the city of Fresno to the north, the city of Bakersfield to the south, the California Aqueduct to the west, and the Sierra Nevada foothills to the east. The cumulative impact study area for surface water (and surface water quality) includes the upstream and downstream reaches of streams and rivers that cross through the study area. The study area for cumulative impacts on groundwater (and groundwater quality) consists of the five groundwater subbasins crossed by the Fresno to Bakersfield Section. The study area for the cumulative floodplain evaluation consists of the 100-year floodplains crossed by the Fresno to Bakersfield Section and the land adjacent to these floodplains. The study area for direct and indirect impacts related to the project is described in Section 3.8.3, Hydrology and Water Resources.

The cumulative impact analysis for hydrology and water quality is based on the planned and potential project lists (Appendix 3.19-A and 3.19-B) as well as plans/projections of groundwater pumping and urban development. Projections of groundwater pumping are contained in the California Water Plan (DWR 2009, DWR 2013) and in urban water master plans developed by the cities, counties, and water supply districts (e.g., Fresno 2012, California Water Service Company 2011, Hanford 2011) in the study area. Projections of increasing urbanization and changes to land use are described in Section 3.18, Regional Growth.

Construction

Past, present, and reasonably foreseeable projects that could affect hydrology and water resources near the HST alternatives as a result of construction activities include transportation projects with new or altered river or creek crossings such as the Fresno Freight Rail Alignment Project (F09) at the Kings River; the BNSF Railway Corcoran to Allensworth double tracking project (T36) at the Tule River and Deer Creek; the Centennial Corridor (B09) and Oak Street and 24th Street Expansion (B11) at the Kern River; projects at or near floodplains, such as the build-

out of the Laton Community Plan update; and other projects in areas with perched or shallow groundwater.[5]

Construction of the HST alternatives, in conjunction with construction activities associated with other past, present, and reasonably foreseeable projects, could directly affect rivers and creeks by excavation and placement of fill or could indirectly affect rivers and creeks by increasing the amount of stormwater runoff through removal of natural vegetation or through activities that result in an increase in directly connected impervious surfaces[6]. Construction activities such as grading and establishing construction staging areas could alter drainage patterns, redirect stormwater runoff, and affect water quality by increasing erosion. Construction in floodplains or floodways could temporarily impede or redirect flood flows because of the presence of construction equipment and other materials in concentrated flow paths. Construction in areas with high groundwater could allow a direct path for construction-related contaminants to reach groundwater, particularly in areas with perched groundwater. Projects developed under the cumulative condition that are located near stream channels, such as transportation projects that cross rivers and creeks (see projects listed above), could have the greatest construction impacts. However, the HST project and the cumulative projects considered in this evaluation would be subject to regulations and permits required by the Clean Water Act, Central Valley Regional Water Quality Control Board, and Central Valley Flood Protection Board to minimize construction impacts on water quality from drainage and stormwater runoff and on Central Valley Flood Protection Board designated floodways (see Section 3.8.6, Hydrology and Water Resources). In the context of the requirements for all construction projects to obtain permits to minimize impacts to water flow and water quality, BMPs designed to reduce and minimize water quality impacts to the environment (see Section 3.8.6, Project Design Features) would be implemented and the cumulative impact to water quality and hydrology from the HST project and other reasonably foreseeable construction activities would not be significant under NEPA and would not be cumulatively considerable under CEQA.

Operations

Past, present, and reasonably foreseeable projects near the HST alternatives that could affect hydrology and water resources include transportation projects with new or altered river or creek crossings (e.g., Fresno Freight Rail Alignment Project at the Kings River, BNSF Railway Corcoran to Allensworth double tracking project at the Tule River and Deer Creek, Centennial Corridor, and Oak Street and 24th Street Expansion at the Kern River) and projects within or near floodplains (e.g., build-out of the Laton Community Plan update). Other conditions such as increasing urbanization and changes to land use described in Section 3.18, Regional Growth, would result in effects to groundwater and surface water resources.

Operation of the HST project in conjunction with other past, present, and reasonably foreseeable future projects, could result in land use changes that affect surface and groundwater resources, floodplains, water use, and water quality. Cumulative impacts for each of these resource areas are discussed below.

[5] Most areas near the alignment alternatives have relatively deep groundwater. For example, groundwater is approximately 60 to 70 feet below ground surface in areas south of Fresno (e.g., near the proposed C.A.R.T.S. Trucking Yard project) (DWR 2010). It is unlikely that ground disturbing activities could cause a direct connection to groundwater at that depth.

[6] Directly connected impervious area is considered the portion of impervious area with a direct hydraulic connection to a storm sewer or a waterbody via continuous paved surfaces, gutters, drain pipes, or other conventional conveyance and detention structures that do not reduce runoff volume.

Surface Water and Groundwater Resources

The HST project in conjunction with other planned projects, could result in changes to the connectivity of natural water bodies, particularly at locations where the project crosses watercourses upstream or downstream of other nearby crossings. However, potential cumulative impacts would be minimized because the project and other planned projects would be subject to permit compliance and regulatory review, such as compliance with Clean Water Act (CWA) Section 404, which is designed to minimize impacts from channel alterations. BMPs would be implemented during project operations in accordance with permit conditions. In combination with other reasonably foreseeable projects, cumulative impacts to surface water and groundwater would not be significant under NEPA and would not be cumulatively considerable under CEQA.

The HST project in conjunction with past, present, and reasonably foreseeable projects, would result in increases in impervious surface area, which could increase stormwater runoff and change drainage patterns. Approximately 173,000 acres of new development are estimated to be needed to support population increases expected by 2035 (see Section 3.19.3.2) in Fresno, Kings, Tulare, and Kern counties—corresponding to approximately 1.3% of the four-county region and a portion of this new development would include impervious surfaces. The actual amount of future impervious surface is expected to vary by land use, with low density residential (6 or less units per acre) having a percent imperviousness of less than 50%, high density residential (>20 units/acre) greater than 70% imperviousness, and commercial and industrial generally greater than 80% (Washburn et al. 2010). However, not all of the impervious area would be directly connected. Also, the impact to water resources due to increases in directly connected impervious surfaces tends to be local, on a watershed or sub-basin scale, not regional. Cumulative effects to stream morphology due to increases in directly connected impervious area would also occur on watershed or sub-basin scale.

The HST project would result in an increase in impervious surface area, from structures along the alignment as well as structures and parking facilities at the Fresno, Kings/Tulare Regional, and Bakersfield HST stations and the HMF site. However, new development (including the HST project and other reasonably foreseeable future projects) would comply with stormwater control ordinances and post-construction hydromodification requirements from National Pollutant Discharge Elimination System permits. Stormwater ordinances and hydromodification requirements are intended to promote stormwater infiltration and reduce peak stormwater runoff. In addition, stormwater BMPs and low impact development (LID) would be used to promote infiltration and detention and reduce directly connected impervious areas at HST facilities. For stations located in already urbanized areas such as Fresno and Bakersfield any increases in impervious area would be minimal since the stations are located in areas with a high degree of imperviousness. Overall, the project's design and compliance with stormwater control measures would result in minor changes in stormwater runoff from impervious surfaces. In combination with other reasonably foreseeable projects, cumulative impacts would not be significant under NEPA and would not be cumulatively considerable under CEQA.

Groundwater levels in portions of the San Joaquin Valley are substantially reduced from historical levels as a result of past groundwater withdrawals (i.e., groundwater use in excess of recharge). Increased groundwater extraction and infiltration have also resulted in changes to groundwater quality. Therefore, groundwater withdrawals from past actions and future groundwater withdrawals to meet agricultural demand (DWR 2013), urban demand, as well as potential groundwater demand from the HST project and other planned projects would result in cumulative impacts that would be significant under NEPA and CEQA. The contribution from the HST project would be small compared to regional groundwater use. Agricultural and municipal water use accounts for more than 4 million acre-feet per year of groundwater extraction within the Tulare Lake basin. The HST project would account for a maximum of about 68 acre-feet per year of potential direct groundwater use, comprising 50 acre-feet per year for the HMF and 18 acre-feet

per year for the Kings/Tulare Regional Station in Kings County (see Table 3.8-16). This small amount of groundwater extraction would not be expected to affect nearby wells. As described in Section 3.8, Hydrology and Water Resources, extraction of 50 acre-feet per year for the HMF would only draw down the groundwater table 6 inches at a distance of 100 feet from the pumping well. Therefore, the incremental contribution from the HST project would not be significant under NEPA and would not be cumulatively considerable under CEQA.

Floodplains

Many projects under the cumulative condition are linear transportation projects that cross floodplains, such as the existing BNSF Railway and the future Fresno Freight Rail Alignment and Gregg Double Track projects at the Kings River or the Centennial Corridor project at the Kern River. Blockage of flood flows by multiple linear projects is not a cumulative issue because the linear facility in the floodplain that has the greatest restriction in flood water conveyance defines the flood flow for future facilities. The linear facility in a floodplain that has the fewest and/or smallest culverts would dictate the flow of floodwaters independent of all other linear facilities in the same floodplain that have greater conveyance capacity. Through project design, the capacity of the flood conveyance features for the HST project would be equal to or greater than the flood conveyance capacity of existing linear facilities such as SR 43 and the BNSF Railway.

Non-linear projects, such as projected residential and commercial development near Laton from build-out under the Laton Community Plan, may impact flood flow volume or rates at the HST alignment due to increases in impervious area located relatively close to the HST alignment. This could be exacerbated if inadequate drainage is provided through the HST alignment near the proposed new growth areas. Therefore, implementation of the HST project—along with other projects—could result in a cumulative increase in flood levels. However, the HST project would incorporate adequate drainage that would account for local future growth; given the size of the floodplains in the study area, it is expected that the increases beyond those caused by the HST project would be minor. Therefore, the HST project's incremental contribution to impacts to floodplains would not be significant under NEPA and would not be cumulatively considerable under CEQA.

Surface Water and Groundwater Quality

Stormwater and irrigation runoff enters streams directly as overland flow, and therefore, surrounding land uses affect surface water quality. Urban and agricultural runoff can carry dissolved or suspended residue into surface water bodies. Pollutant sources in urban areas primarily include parking lots and streets, industrial uses, rooftops, exposed earth at construction sites, and landscaped areas. Pollutant sources in rural and agricultural areas primarily include agricultural fields and operations. Pollutants in runoff can include sediment, oil and grease, hydrocarbons (e.g., fuels, solvents), heavy metals, organic fertilizers and pesticides, pathogens, nutrients, and debris. Several surface water bodies in the study area have been identified as impaired by pollutant levels under Section 303(d) of the CWA. Total Maximum Daily Loads (TMDLs) are established or in progress for only a few pollutants (see Section 3.8.4, Hydrology and Water Resources and Table 3.8-4).

Groundwater quality can also be affected by surface water, soil, and sediment quality. Water infiltration in agricultural areas can result in elevated concentrations of nitrates or other fertilizers, agricultural pesticides, or other leachable pollutants. Similarly, stormwater quality can affect groundwater quality through infiltration, particularly in areas with shallow groundwater.

Some of the foreseeable projects identified for the study area (e.g., dairy expansion, new urban development) could create new sources of runoff pollution under the cumulative condition that could affect surface water or groundwater. The HST project together with past, present, and

reasonably foreseeable projects would potentially create new sources of contamination that would contribute to cumulative impacts by introducing new activities in the area. However, the HST project and other future projects would be subject to regulations and permits required by the State Water Resources Control Board and Central Valley Regional Water Quality Control Board to minimize impacts on water quality (e.g., the statewide Industrial General Permit, Order No. 97-09-DWQ). The intent of these regulations is to prevent new developments and infrastructure projects from violating water quality standards. The HST project, as well as other future projects, would implement BMPs designed to reduce and minimize water quality impacts to the environment, as required by regulations. Therefore, The HST project in combination with other past, present, and reasonably foreseeable projects would not cause a cumulative surface water and groundwater quality impact under NEPA or a cumulatively considerable impact under CEQA.

Summary of NEPA/CEQA Impacts

Potential cumulative construction and operation impacts resulting from changes to drainage, impervious surfaces, stormwater runoff, floodplains, and surface water and groundwater quality would be reduced through implementation of BMPs and other design features, as required by federal and state law. Therefore, the cumulative impact of the HST project and other past, present, and reasonably foreseeable future projects on hydrology and water resources (e.g., surface water connectivity, changes to local drainage patterns as a result of impervious surfaces, and surface water and groundwater quality) would not be significant under NEPA or CEQA.

Cumulative operations impacts on groundwater levels would be significant under NEPA and CEQA because regional groundwater withdrawals would exceed groundwater recharge. The incremental contribution of the HST project to this significant cumulative impact would not be significant under NEPA and would not be cumulatively considerable under CEQA because project-related groundwater pumping would represent a very small proportion (less than 0.002%) of the regional use.

Mitigation

No mitigation is required.

Geology, Soils, and Seismicity

The study area for the cumulative analysis of geology, soils, and seismicity is the San Joaquin Valley. Some geologic and seismic hazards, such as soil failures (e.g., adequacy of load-bearing soils), settlement, corrosivity, shrink-swell, erosion, and earthquake-induced liquefaction risks, are limited to the project site level and are not cumulatively additive across projects; therefore, these issues are not analyzed below. However, other issues such as seismicity, faulting, and dam failure inundation are cumulatively additive across projects and are therefore analyzed below. Impacts to these resources are assessed at a broader regional level, which defines the study area.

Construction

Construction of development projects and infrastructure/transportation projects listed in Appendices 3.19-A and 3.19-B would require aggregate, ballast rock, concrete, and steel reinforcement; however, not all of these materials would originate from within the study area. Implementation of the Bay Delta Conservation Plan, for example, would use up to approximately 19 million tons of aggregate materials sourced from the Sacramento Valley (DWR et al., 2013). When the HST project is considered along with other foreseeable future projects, there would be a large demand for aggregates and other construction materials. As discussed in Section 3.9.1, the HST project would use approximately 0.6% of the currently permitted aggregate resources in

the region. In addition, new aggregate resources are being developed in the region, including the Sanger-Centerville Aggregate Operation Expansion and the Kings River Sand and Gravel Quarry (listed in Appendix 3.19-A), which would further increase permitted aggregate resources in the region. It is anticipated that sufficient materials would be available to meet the demands of the project in combination with other proposed projects in the area. Potential cumulative effects to aggregate supplies would have negligible intensity under NEPA. In the context of the amount of aggregate resources in the region, the cumulative impact would not be significant under NEPA and would not be cumulatively considerable under CEQA.

Operations

Geologic hazards pertaining to soft or loose soils, soil settlement, high shrink-swell, corrosive soils, slope failure, and seismicity effects would be addressed individually by each project developed under the cumulative scenario, as well as by the HST Alternatives. This project-specific analysis is required because these hazards are specific to each project site and relative to specific design features of a given project. Such geologic issues are typically addressed through compliance with design standards and building code requirements on a project-by-project basis (as described for the HST project in Section 3.9.6). Project impacts pertaining to these issues would not combine with impacts related to other projects to result in cumulative impacts. Therefore, cumulative geologic and seismic hazards would not be significant under NEPA and would not be cumulatively considerable under CEQA for operations.

Seismically induced dam failure could result in flooding in large areas of the south San Joaquin Valley, which would be considered a secondary seismic hazard (see Section 3.9.4, Geology, Soils, and Seismicity). A seismically induced dam failure on one or more of the dams in the study area would be an unlikely event because the seismic event would need to be large enough to cause catastrophic damage to the dam structure. In addition, because of DWR's dam safety program, the potential risk of inundation due to dam failure is considered to be small. While projects developed under the cumulative scenario (listed in Appendices 3.19-A and 3.19-B) and the HST project would be located in the San Joaquin Valley (much of which is within areas potentially subject to inundation due to catastrophic dam failure), a seismically induced dam failure would be a very unlikely event, having a negligible intensity under NEPA. In the context of the dam safety program, cumulative impacts involving dam failure inundation would not be significant under NEPA and would not be cumulatively considerable under CEQA.

Summary of NEPA/CEQA Impacts

Potential geology, soils, and seismicity impacts from projects constructed and operated under the cumulative condition would be reduced through implementation of standard engineering design measures and BMPs. Therefore, the cumulative effects of the HST alternatives and other past, present, and reasonably foreseeable future projects on the geologic, soil, and seismic conditions would not be significant under NEPA, and the impacts would not be cumulatively considerable under CEQA.

Mitigation

No mitigation is required.

Hazardous Materials and Wastes

The study area for the cumulative analysis of hazardous materials and waste extends 1 mile on either side of the alternative alignments and encompasses the potential station and HMF areas where project impacts from hazardous materials would be greatest. The study area for direct and indirect impacts related to the HST alternatives is described in Section 3.10.3, Hazardous Materials and Wastes.

Historically, the Fresno to Bakersfield Section has had numerous industrial and agricultural zones, large industrial and agricultural facilities, major transportation routes, and distribution systems including petroleum pipelines. The lack of regulation regarding hazardous material transport, use, and disposal before the Resource Conservation and Recovery Act was enacted resulted in areas of environmental contamination. Documentation of these hazardous waste sites, regulatory oversight, and cleanup efforts began in the early 1980s under the Comprehensive Environmental Response, Compensation, and Liability Act. Enterprises that use, store, transport, or dispose of reportable quantities of hazardous materials or petroleum products are now required to comply with federal, state, and local regulations for safe handling of these materials. These regulations are designed to minimize the risk of exposure or release of hazardous materials.

Construction

Construction of the HST project and past, present, and reasonably foreseeable projects would temporarily increase the regional transportation, use, storage, and disposal of hazardous materials and petroleum products (such as diesel fuel, lubricants, paints and solvents, and cement products containing strong basic or acidic chemicals). This increase would contribute incrementally to the regional transportation, use, storage, and disposal of hazardous materials. While hazardous materials handling may increase during construction and in some cases be located within 0.25 mile of an existing or proposed school, compliance with federal, state, and local regulations related to the transport, handling, and disposal of hazardous waste would reduce potential cumulative effects to negligible intensity under NEPA. In the context of the short-term and intermittent use of hazardous materials and generation of hazardous waste from construction, the cumulative impact would not be significant under NEPA and would not be cumulatively considerable under CEQA.

Operations

By 2035, the population in the counties of Fresno, Kings, Tulare, and Kern is anticipated to increase by approximately 73%. Under the cumulative condition, the increased population in the region would contribute incrementally to the transportation, storage, use, and disposal of hazardous substances within the study area. Households, industrial sites, and agricultural operations use hazardous materials and generate hazardous waste. The HST alternatives, including the potential HMF sites, would incrementally increase use of hazardous materials because the facilities would use, store, and dispose of small quantities of hazardous materials and petroleum products on a regular basis. Project operations would comply with regulatory requirements to minimize the risk of exposure to or release of hazardous materials. The transportation, storage, use, and disposal of hazardous substances would be subject to federal, state, and local regulations which would address the potential hazards associated with the respective uses at each site. Because the HST project and other cumulative projects would be or have been subject to legally required controls and/or mitigation measures, such as a Storm Water Pollution Prevention Plan or Hazardous Material Business Plan, the hazardous waste impacts of these projects would not be cumulatively significant under NEPA and would not be cumulatively considerable under CEQA. Additionally, development of future projects and the HST alternatives could result in incidental improvement in environmental quality because of the discovery and required remediation of existing soil and water contamination.

Summary of NEPA/CEQA Impacts

Compliance with regulatory requirements would minimize the risk of release and exposure to hazards and would reduce potential impacts from projects constructed and operated under the cumulative condition. Therefore, the cumulative hazardous materials impacts of the HST project and past, present, and reasonably foreseeable projects would not be significant under NEPA and would not be cumulatively considerable under CEQA.

Mitigation

No mitigation is required.

Safety and Security

This section addresses issues pertaining to increased demand for emergency response services and travel safety, including roadway connectivity for provision of emergency services. The study area for the cumulative analysis of safety and security includes the transportation system and fire protection, law enforcement, and other emergency response service areas in Fresno, Kings, Tulare, and Kern counties and in the cities of Fresno, Hanford, Corcoran, Wasco, Shafter, and Bakersfield. This study area allows a review of other projects under the cumulative condition that would affect emergency response and evacuation routes because of impacts on roadway connectivity and emergency service providers. The study area for direct and indirect impacts related to the HST alternatives is described in Section 3.11, Safety and Security.

As described in Section 3.11, Safety and Security, response time goals for fire departments within the study area range from 5 to 15 minutes, 80 to 90% of the time, depending on location; rural areas generally have an increased response time. Law enforcement response times range from 6 to 9 minutes.

Construction

The construction of the HST project along with other planned development and transportation projects such as the Kerman Walmart Project (F23), the Fresno Veterans Home (FC04), the Clovis-Herndon Shopping Center (F05), the Orchard Walk Specific Plan, the Afinar (T27), the Tejon Mountain Village (KE27), the HST Merced to Fresno and Bakersfield to Palmdale sections, the I-5 to Junction SR 33/SR 180 project (F04), SR 198 project (KI07 and KI08), SR 99 project (T05), and the SR 180 East project (F21) 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. Similar to the HST project, the cumulative projects identified in Appendixes 3.19-A and 3.19-B would be required to follow strict Occupational Safety and Health Administration and safety practices, implement standard construction and safety plans, construction transportation plans, and traffic control plans, as needed, thus reducing the need for emergency services. An example of this is the construction of the SR 168 freeway in Fresno in the 1990s. That project resulted in a substantial temporary increase in construction workers in Fresno, but did not result in a substantial increase in demand for emergency response services. Therefore, cumulative construction demand on emergency services would not be significant under NEPA and would not be cumulatively considerable under CEQA.

Operations

Accommodating the population growth expected by 2035 would result in a cumulative increase in demand for fire protection, law enforcement, and other emergency response services. The operation of the HST project along with a large number of proposed residential projects and mixed-use residential and commercial development, such as the Friant Ranch Specific Plan (F02), the Southeast Growth Area, the Villagio Project (KI01), the Orchard Walk Specific Plan (T02), the Village at Willow Creek Specific Plan (T03), the Saco Ranch Commercial Center (KE19), the Tejon Mountain Village (KE27), and the Live Oak Master Plan/Live Oak Residential Project (KI06) would contribute to increased demand for emergency services. New or expanded development would be designed and constructed to be consistent with local land use plans and would comply with agencies' approval conditions, including impact fees to pay for additional emergency services required to maintain service standards. The HST project would reduce emergency response times

by constructing new grade separations for the BNSF Railway and by reducing the volume of traffic on state highways compared to the future conditions without the HST project, as some long-distance travelers would use the HST System instead of driving. The HST project would include standard design features and operating and emergency response plans. The Authority would coordinate with city and county law enforcement agencies and fire departments through the Fire and Life Safety Program for emergency response in case of an accident or other emergency. In addition, the Authority would monitor response of local fire, rescue, and emergency service providers to incidents at stations and the HMF and provide a fair share cost of additional emergency response services, as required. Therefore, the impact of the HST project in combination with past, present, and foreseeable projects on emergency services would not be significant under NEPA and would not be cumulatively considerable under CEQA.

Increased travel safety would be a cumulative benefit with the HST project and transportation improvement projects identified in Appendix 3.19-B. Both would improve overall safety in regional travel. The HST project would provide a transportation option that is safe during inclement weather and not subject to vehicular traffic accidents. None of the project alternatives or other cumulative projects encroach on areas covered by airport land use compatibility plans. It is unlikely that future development projects would affect municipal airports because land management plans limit developments near those airports. Therefore, cumulative travel safety impacts would not be significant under NEPA and would not be cumulatively considerable under CEQA.

Summary of NEPA/CEQA Impacts

Cumulative construction demand on emergency services and emergency response times would not be a significant impact under NEPA and would be less than significant under CEQA. Demand for emergency services as a result of projected population increases, including those associated with the HST project, would be provided by impact fees that support capital costs for new or expanded government facilities. Therefore, there would be no cumulative impact on emergency services under the cumulative scenario.

Cumulative operations demand on emergency services resulting from the HST project along with other planned and potential development and transportation projects would not be significant under NEPA and would not be cumulatively considerable under CEQA. Overall, travel safety would increase, as both the operation of the HST project and implementation of other transportation projects would result in the construction of grade separations, and could improve safety during inclement weather. Therefore, the cumulative condition would result in a beneficial impact to safety and security.

Mitigation

No mitigation is required beyond that presented in Section 3.11.7, Mitigation Measures.

Socioeconomics, Communities, and Environmental Justice

The study area for the socioeconomics, communities, and environmental justice cumulative impacts analysis includes the cities of Fresno, Hanford, Corcoran, Wasco, Shafter, and Bakersfield, and the unincorporated areas of Fresno, Kings, Tulare, and Kern counties in the immediate vicinity of the Fresno to Bakersfield HST alternatives. The study area for direct and indirect impacts related to the HST alternatives is described in Section 3.12.3, Socioeconomics, Communities, and Environmental Justice as the area within a 0.5-mile radius from the centerline of the project alignment and from each station location. This study area encompasses all direct and indirect impacts associated with socioeconomics, communities, and environmental justice (e.g., noise, air quality, visual).

Section 3.12.3, Methods for Evaluating Impacts, provides more details on the socioeconomics, communities, and environmental justice cumulative impact analysis. FRA is required to conduct an environmental justice analysis for the project and does this analysis as part of the NEPA process; however, since there are no CEQA significance criteria for environmental justice, no CEQA determinations are provided for environmental justice. Additionally, economic and social changes resulting from the project are not treated as significant effects on the environment under CEQA per Section 15064(e) of the CEQA Guidelines; therefore, CEQA determinations are not provided for social and economic impacts. However, both NEPA and CEQA determinations are provided for division and/or disruption of communities.

Construction

Construction-related cumulative impacts on division and/or disruption of communities, economics, and environmental justice populations are described below.

Division and/or Disruption of Community

Construction of projects under the cumulative condition in the vicinity of the Fresno to Bakersfield Section would contribute to cumulative impacts associated with the division and/or disruption of communities in the cities of Fresno, Hanford, Corcoran, Wasco, Shafter, and Bakersfield, as well as unincorporated communities in Kings and Kern counties. In Fresno, the widening of Ventura Boulevard, the construction of a 3-million-gallon water storage tank, and the reconstruction of the SR 99 Monterey Bridge are all planned within 1 mile of each other in the Central and Edison districts of Fresno. Construction of the projects themselves would not displace any residents or impact the community's character. However, there could be temporary increases in traffic, changes in traffic patterns and access to community facilities, and construction noise and dust if the projects were constructed simultaneously with the HST project. In addition, division and/or disruption of communities could result from construction of the HST project and other cumulative projects such as:

- Reconstruction and widening of roads, including Excelsior Avenue (KI01), 13th Avenue (KI04 and KI05), SR 198 (KI07 and KI08), 10th Avenue KI10), and 10½ Avenue (KI15) in and around Hanford;
- Double tracking of the BNSF Railway (T36) and Orange Avenue realignment in Corcoran (C02);
- Construction of the BNSF Railway double tracking and roadway improvements and widening, including Palm Avenue (W03), Poso Drive (W11), Beech Street (S05), Mannel Avenue (S04), Lerdo Highway (S07-S09), and 7th Standard Road (KE07 and KE08) in the cities of Wasco, Shafter, and unincorporated communities nearby such as Crome;
- Construction of the Centennial Corridor Project (B09), the widening of Rosedale Highway (KE15) and 24th Street (B12), the double tracking of the BNSF Railway, the Mill Creek Linear Park (B07), and the Baker Street Village Redevelopment Project (B08) in Bakersfield.

Construction activities associated with these projects could hinder access and interaction among neighborhoods because of increased congestion, detours, and lane or road closures. Construction of the HST project, which may coincide with construction of the projects described above, would result in a significant cumulative impact under NEPA and CEQA. The incremental contribution of the HST project to this cumulative impact would be significant under NEPA and cumulatively considerable under CEQA.

Economics

The study area is located in California's San Joaquin Valley, which is known for its agricultural production. Although the agricultural sector is not the largest employer, it accounts for one in six jobs. The largest employers are the service and government sectors, which together account for 50% of all industry jobs in the study area. The unemployment rates across the four-county region are among the highest in the state. As of October 2010, unemployment rates were 15.7%, 15.0%, 15.9%, and 14.4%, respectively, for Fresno, Kings, Tulare, and Kern counties (CEDD 2010). Throughout the region, many county and city governments are encountering potential budget deficits and funding constraints, resulting in reduced government and public services.

Under the cumulative condition, numerous planned and potential projects would be developed to accommodate the population increases in Fresno, Kings, Tulare, and Kern counties projected for 2035. These projects would generate many jobs in construction, as well as indirect and induced jobs. Construction and associated construction spending, particularly for the HST project, would result in beneficial impacts on employment and sales tax revenues in the region (see Section 3.12, Property and Sales Tax Revenue Changes). For example, HST project spending on construction equipment and materials for the entire Fresno to Bakersfield Section is estimated to generate about $10 million in sales tax revenue, which would increase local government revenues (see Section 3.12, Impact SO #4 – Construction-Related Sales Tax Revenue Gains). Any indirect impacts from short-term reductions in property tax revenues from sale of properties for project construction would be temporary. Construction of the cumulative projects, such as the Southeast Growth Area, the Orchard Park Specific Plan, and the Centennial Corridor (B09), along with the HST project would employ workers in the regional labor force. Specifically, the HST Fresno to Bakersfield Section is estimated to create approximately 22,000 one-year, full-time job equivalents within Fresno, Kings, Tulare, and Kern counties over the entire construction period. The increased demand for workers and spending in the region due to these large construction projects would cumulatively stimulate local economies. Because of the high unemployment rates in the region and the loss of construction jobs during the recession, the existing regional labor force is anticipated to be sufficient to fill the demand for these jobs. The construction of the HST project and other past, present, and reasonably foreseeable projects would result in a cumulatively beneficial impact on the regional economy under NEPA and the contribution of the HST project would be beneficial.

Environmental Justice

Within the study area, there is a high percentage of the population that self-reports as minority and low-income. Construction impacts, such as those as described in Section 3.12.5, Environmental Consequences (Socioeconomics, Communities, and Environmental Justice); Section 3.4.5, Environmental Consequences (Noise and Vibration); and Section 3.16.5, Environmental Consequences (Aesthetics and Visual Resources), could result in disproportionately high and adverse impacts on these minority and low-income communities where construction of the HST project coincides with construction of other past, present and reasonably foreseeable projects, especially in the urbanized areas of Fresno, Corcoran, Wasco, Shafter, and Bakersfield. The HST project in combination with the projects in these cities, such as the reconstruction and widening of roads, (described above under Division and/or Disruption of Community), the double tracking of the BNSF Railway, and construction of the Centennial Corridor Project and widening of Rosedale Highway, would exacerbate disproportionate adverse impacts on environmental justice communities. Therefore, cumulative environmental justice impacts would be significant under NEPA.

Much of the populated study area that would be affected by construction period impacts contains environmental justice communities. As a result, the HST project located near the densely populated urban areas of Fresno, Corcoran, Wasco, Shafter, and Bakersfield, including the BNSF,

Corcoran Bypass, Bakersfield South, and Bakersfield Hybrid alternatives would result in disproportionately high and adverse cumulative effects on these populations.

Operations

Cumulative operational impacts on division and/or disruption of community, economics, and environmental justice populations are described below.

Division and/or Disruption of Community

Linear infrastructure, such as transportation projects, can bisect neighborhoods and reduce community cohesion. For the purposes of this analysis, existing railways in the study area are not considered to be a barrier to communities, because typically these communities developed around the railways. Generally, when a new project is developed along an existing transportation corridor, it would not create a new divide to existing communities because it would not introduce a new barrier; however, it could affect social relationships by widening an existing community division, displacing homes and businesses, changing access patterns, and introducing a new source of periodic noise and an incongruous visual element into the community. A community can also be affected by the displacement of important facilities, such as schools and churches.

Under the cumulative scenario several communities could experience division and/or disruption. On the east of Hanford, the reconstruction and widening of roads including Excelsior Avenue, SR 198, 10th Avenue, and 10½ Avenue could result in division of existing communities. The Orange Avenue realignment in Corcoran and the 7th Standard Road widening in Crome could also contribute to community division and disruption. In Bakersfield, the Centennial Corridor Project, the widening of Rosedale Highway and 24th Street, and the double tracking of the BNSF Railway would result in division and disruption of communities. The HST project would also contribute to division of rural communities east of Hanford, northeast of Corcoran, and in Crome between Shafter and Bakersfield, as well as in Bakersfield's urban communities as a result of the high numbers of residential, business, and community facility displacements that would occur. Therefore, the cumulative impacts to division of communities would be significant under NEPA and CEQA; and the contribution of the HST project would be significant under NEPA and cumulatively considerable under CEQA.

Economics

Operation and maintenance of the HST project in conjunction with other planned projects would result in increases in employment and spending within the study area. As described in sub-section 3.12.3.1 under Property and Sales Tax Revenue, some reductions in property and sales tax revenues would occur in the short-term as a result of land acquisition and the need to relocate residences and businesses; however, the long-term impact would be beneficial because project spending is estimated to generate $1.5 million annually in sales tax revenues throughout the region. Businesses located along the project, including those that would be relocated under the HST project, may receive benefits associated with economic stimulation from construction and operation of the project. Combined with the anticipated new homes, roads, and infrastructure that are projected under the cumulative impact scenario, the economic benefits would be cumulatively significant. Additionally, approximately 2,000 direct jobs would be created to operate and maintain the HST project. These direct jobs would lead to more indirect and induced jobs as a result of the improved connectivity to the rest of the state. Overall, the HST project would increase total employment in 2035 by 3.2% compared to the No Project Alternative. As discussed earlier, the regional workforce is anticipated to fill most of these new jobs and there would be no need to expand existing public services or add government facilities. Under the cumulative condition, cumulative impacts to the economy would be beneficial under NEPA and the contribution of the HST project would be beneficial.

Environmental Justice

Cumulative impacts such as division of communities, displacements of businesses and residences, increased noise and traffic levels, would occur primarily in urban areas which are disproportionately minority and low-income. For example, in the cities of Fresno and Bakersfield, construction of the HST stations would result in an increase in employment in the study area and would have beneficial economic impacts on the community. On the other hand, there are cumulatively considerable noise impacts, and a majority of these impacts would be in urban areas with high concentrations of environmental justice communities, including Fresno, Corcoran, Wasco, Shafter, and Bakersfield. These environmental justice effects are detailed in Section 3.12.5, Socioeconomics, Communities and Environmental Justice. Under the cumulative scenario, the impacts to community disruption and division described above occur in several communities with environmental justice populations and could result in disproportionately high and adverse impacts on those populations. These include the BNSF Railway expansion and Orange Avenue realignment in Corcoran, several roadway widening projects such as Palm Avenue, Poso Drive, Beech Street, Mannel Avenue, Lerdo Highway, and 7th Standard Road in the communities of Wasco, Shafter, and Crome. In Bakersfield, the project occurring in areas with environmental justice populations is the Centennial Corridor Project. Therefore, cumulative environmental justice impacts would be significant under NEPA.

Summary of NEPA/CEQA Impacts

Potential cumulative socioeconomics, communities, and environmental justice impacts would be similar among the HST alternatives,. Construction and operation of the HST project and other past, present, and reasonably foreseeable projects would result in a significant cumulative impact under NEPA and CEQA due to division and/or disruption of communities in the cities of Fresno, Hanford, Corcoran, Wasco, Shafter, and Bakersfield, as well as unincorporated communities in Kings and Kern counties. The project's incremental contribution to this impact would be significant under NEPA and cumulatively considerable under CEQA. The combined economic impacts resulting from construction and operation of the HST project in conjunction with other planned projects, including the other sections of the HST System to the north and south, would be substantially beneficial under NEPA and the project's cumulative contribution would be beneficial. Implementation of the HST project and other past, present, and reasonably foreseeable projects would result in cumulative impacts on environmental justice populations that would be significant under NEPA and the cumulative contribution of the HST project to this impact would be significant.

Mitigation

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 HST construction schedule and allow for adjustment of construction schedules for adjacent projects or projects in close proximity to the HST alignment, to the extent feasible, in order to limit the overlap of community disruption.

CUM-SO-MM#2: Public outreach. For areas with potentially overlapping construction schedules for the HST and other projects, the Authority would continue to undertake environmental justice outreach prior to construction, as described in *Mitigation Measure SO-6: Continue outreach to disproportionately and negatively impacted environmental justice communities of concern*. The Authority would obtain feedback from the affected neighborhoods regarding these project construction schedules to address community concerns.

Even with implementation of these mitigation measures the contribution of the project to the cumulative impact of division and/or disruption of communities would remain significant under NEPA and cumulatively considerable under CEQA. Similarly, the project's contribution to significant cumulative environmental justice impacts would remain significant under NEPA.

Station Planning, Land Use, and Development

The study area for the station planning and land use cumulative impacts analysis includes the cities of Fresno, Hanford, Corcoran, Wasco, Shafter, and Bakersfield and Fresno, Kings, Tulare, and Kern counties. Land uses adjoining the HST alternative alignments in rural areas are predominantly agricultural, with small areas of single-family residential and commercial uses also present. Non-rural land uses occur in the cities in the study area and these land uses include commercial, industrial, and residential. The study area for direct and indirect impacts related to the HST alternatives is described in Section 3.13.3, Station Planning, Land Use, and Development.

Construction

Construction of the HST project along with other cumulative projects such as the Fresno Freight Rail Alignment Project (F09), Ventura Boulevard Widening (FC18), Live Oak Master Plan/Live Oak Residential Project, Centennial Corridor (B09), and the HST Merced to Fresno and Bakersfield to Palmdale sections could result in temporary use of land for construction staging, laydown, and fabrication. . Because lands used for temporary construction would be acquired from willing landowners and restored to their previous condition at the end of the construction period, long-term land uses would not change, adjacent land uses would not change, and there would not be a substantial change in the long-term pattern or intensity of land use incompatible with adjacent land uses. For these reasons, the effect of the temporary use of land for construction of past, present, and foreseeable future projects would not result in a cumulative impact under NEPA or CEQA.

Operations

By 2035, population in the counties of Fresno, Kings, Tulare, and Kern is projected to increase by 73%. Development needed to accommodate this population growth is currently planned largely on the outer fringes of existing cities (as described in the city and county general plans) and would result in land use changes, particularly from agricultural uses to urbanized uses. Additionally, planned changes in transportation systems, including projects described above, would affect land uses either directly through acquisition of properties, or indirectly by providing new or improved access to areas. Under the cumulative condition, roadway improvements provided for in RTPs would typically reduce congestion and shorten travel times through 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 recent sustainable communities strategies or alternative development strategies requirements established pursuant to SB 375 (2008) may result in different trends. In order to meet the SB 375 targets for reduced greenhouse gas emissions from automobiles and light trucks, future RTPs may encourage more compact development patterns. The HST project would also beneficially support densification of land uses around HST stations in urban areas.

Although future development under the cumulative condition would generally be implemented in compliance with local zoning and land use plans, several proposed or planned projects, including the HST project, the Merced to Fresno and Bakersfield to Palmdale sections of the HST, SR 198 (KI07), BNSF Railway double tracking, 7th Standard Road widening to I-5 (KE06), and Centennial Corridor (B09), could result in significant cumulative land use changes compared to the existing intensity of land uses as well as uses incompatible with adjacent land uses. Therefore, the

cumulative land use impacts would be significant under NEPA and cumulatively considerable CEQA.

The HST project could significantly contribute to long-term impacts on land uses. The HST project would result in the permanent conversion of land to transportation uses, which in many locations would be incompatible with existing land uses. Although the amount of land affected by the conversion of uses under the HST project would be a relatively small percentage of the four-county study area (up to approximately 4,100 acres, or less than 0.01%), there is the potential for significant land use incompatibilities to occur. Therefore, the incremental contribution of the project to cumulative land use impacts would be significant under NEPA and cumulatively considerable under CEQA.

Summary of NEPA/CEQA Impacts

Project-specific mitigation measures, regulations, and best practices pertaining to construction equipment emissions, dust, traffic, noise and vibration, and lighting and glare would reduce potential project construction impacts to land uses. In addition, these impacts would be temporary in duration. Therefore, the cumulative construction period impacts to land use would not be significant under NEPA and would be less than significant under CEQA.

The cumulative impact during operations would be significant under NEPA and CEQA, because of the permanent conversion of land to transportation uses and resulting land use incompatibilities. While the HST project would beneficially support densification of land uses around HST stations in Downtown Fresno and Bakersfield, the intensification of land uses in rural areas and adjacent to the Kings/Tulare Regional Station alternatives would result in a significant cumulative impact under NEPA and would be cumulatively considerable under CEQA.

Potential operations-related cumulative impacts would be greater for portions of the BNSF that pass through agricultural lands and are not located in the existing rail right-of-way, as well as the Hanford West Bypass 1 and 2, Hanford West Bypass 1 and 2 Modified, Corcoran Bypass, Allensworth Bypass, and Wasco-Shafter Bypass alternatives.

Mitigation

Even with implementation of mitigation measures identified for the HST Alternatives in Section 3.13.3, Station Planning, Land Use, and Development, the HST Alternatives' contribution to cumulative land use impacts would remain significant under NEPA and cumulatively considerable under CEQA. No additional feasible mitigation measures can be implemented to minimize or avoid significant land use impacts because the Authority and FRA cannot regulate local jurisdictions' land use plans and have already committed to working with those jurisdictions on land use planning in areas near stations (see Section 3.13.6, Project Design Features).

Agricultural Lands

The cumulative impact study area for agricultural lands includes Fresno, Kings, Tulare, and Kern counties as farmland data typically describes resources at the county level. These counties have been, and would continue to be, important agricultural areas in California. Fresno, Kern, Tulare, and Kings counties rank first, second, third, and eighth, respectively, among California's top agricultural counties, as measured by the gross value of agricultural production (CDFA 2010). Farming and related agricultural industries are major employers in these counties and are vital to their economies. The study area for direct and indirect impacts related to the HST project is described in Section 3.14, Agricultural Lands, as the area of disturbance associated with the project construction footprint and the area within 100 feet of the track centerline.

Approximately 1% of the Important Farmland and Grazing Land was converted to nonagricultural uses in Fresno, Kings, Tulare, and Kern counties between 2000 and 2008 (75,779 total acres in all four counties). This trend is expected to continue in the future because more urbanization would continue to occur under the cumulative condition. The eight San Joaquin Valley counties that participated in the San Joaquin Valley Blueprint planning process developed a scenario for conversion of farmland to nonagricultural uses by 2050 based on current land-use development patterns. Given continuation of these patterns, it estimated that up to 181,700 acres of Prime Farmland and Farmland of Statewide Importance (approximately 5.7% of the current total amount of Prime Farmland and Farmland of Statewide Importance) would be converted by 2050 in the four-county study area (San Joaquin Valley Regional Planning Agencies 2009).

The cumulative impact analysis for agriculture is based on the cumulative project list (Appendix 3.19-A and 3-19-B), the Merced to Fresno and Bakersfield to Palmdale sections of the HST System, and growth projections (see Section 3.18, Regional Growth).

Construction

Construction of other past, present, and reasonably foreseeable projects that are located in areas designated as Important Farmland, such as portions of the BNSF Railway double-tracking projects or the Orchard Park Specific Plan in the City of Shafter, may result in the temporary conversion of farmland to construction-related uses if staging activities are located on farmland. Approximately 1,538 acres of Important Farmland would be leased for temporary use as laydown areas, staging areas, and concrete prefabrication yards during construction of the HST project. The land temporarily used for construction would be restored and returned to agricultural use after construction is completed (impacts from permanent loss of agricultural lands are described under operations below). Therefore, cumulative impacts from construction activities to agricultural lands would not be significant under NEPA and would not be cumulatively considerable under CEQA.

Operations

Construction of other past, present, and reasonably foreseeable projects such as the Rockwell Pond Commercial Project in Fresno, the Live Oak Residential Project in Hanford, the South I Street Industrial Park Specific Plan in Tulare, and the Maricopa Sun Solar Project in Kern County, would result in the conversion of Important Farmland to non-agricultural uses. In addition, the HST project would require the acquisition of up to approximately 3,541 acres of Important Farmland. The conversion of Important Farmland to non-agricultural uses resulting from the HST project and other past, present, and foreseeable projects would be a significant cumulative impact under NEPA and CEQA. The incremental contribution of the HST project to the cumulatively significant effect of farmland conversion would be significant under NEPA and cumulatively considerable under CEQA.

The HST project and other past, present, and reasonably foreseeable projects would have a significant cumulative impact on land protected under the Williamson Act. The Authority would mitigate project impacts to Williamson Act lands by putting agricultural lands currently not under contract into an agricultural conservation easement at a 1 to 1 ratio. Therefore, the project's incremental contribution to the cumulatively significant effect of Williamson Act conflicts would not be significant under NEPA and would not be cumulatively considerable under CEQA.

Summary of NEPA/CEQA Impacts

The conversion of agricultural lands during construction for staging areas would be temporary and cumulative impacts from construction activities would not be significant under NEPA and would be less than significant under CEQA.

The operational effects of the HST project and other past, present, and reasonably foreseeable projects to agricultural lands would be a significant impact under NEPA and CEQA due to the amount of Important Farmland that would be permanently converted to non-agricultural uses. The HST project requires the acquisition of up to approximately 3,541 acres of Important Farmland and the project's incremental contribution to farmland conversion would be significant under NEPA and cumulatively considerable under CEQA.

Mitigation

Even with implementation of mitigation measures provided in Section 3.14.7, Agricultural Lands, the HST alternatives' contribution to cumulative agricultural impacts would remain significant under NEPA and cumulatively considerable under CEQA because new farmland cannot be created. No additional mitigation is available.

Parks, Recreation, and Open Space

The study area for parks, recreational facilities, and open space (parkland) cumulative impacts is defined as the area within 1,000 feet on either side of the HST alignment, and 0.5 mile around the HMFs, station areas, and support facilities (e.g., power substations). These distances encompass potential impacts to parks, recreation areas, and open space from noise, air quality, and aesthetic effects from the HST Alternatives. The study area for direct and indirect impacts related to the HST alternatives is described in Section 3.15.3, Parks, Recreation, and Open Space.

Construction

Park resources within the study area are listed in Tables 3.15-2, 3.15-3, 3.15-4, and 3.15-5 in Section 3.15, Parks, Recreation, and Open Space. Of these facilities, the park resources described below could be affected by the HST Alternatives and other reasonably foreseeable future projects. Cumulative impacts could occur where staging and/or construction activities are located within park land or impacts could result from increased noise, construction dust and emissions, and degradation of views, all of which could affect users.

Chukchansi Park in the city of Fresno could be cumulatively indirectly affected by the Fresno to Bakersfield Section as well as the Merced to Fresno Section of the HST System (F01), the Fresno Freight Rail Alignment Project (F09), and the Ventura Boulevard Widening (FC18). Because of the existing urban nature of the facility, these impacts would not substantially affect normal park use.

Father Wyatt Park in Corcoran could be affected by the HST Alternatives as well as Whitely Avenue improvements (C03). Trees located along the northern and western edges of park would shield views of the construction areas for these projects; therefore, impacts to visual quality would not be substantially affected.

Pixley National Wildlife Refuge (Tulare County) would be affected by the BNSF Alternative and the BNSF Railway Corcoran to Allensworth double tracking (T36). Because SR 43 is located between the Pixley National Wildlife Refuge and the anticipated construction activities, impacts to the refuge would be limited. Additionally, Colonel Allensworth State Historic Park (Tulare County) would be affected by the BNSF Alternative and BNSF Railway Corcoran to Allensworth double tracking project (T36). Although construction activities would be located near the park's historic structures, construction activities would be located more than 1,500 feet away from areas of the park with extended visitation periods, such as the visitor's center and campground, and would not have substantial impacts to use of these areas.

Town Square, Stringham Park, and Kirschenmann Park in Shafter would be affected by the BNSF Alternative as well as the BNSF Railway Wasco to Una double tracking (T36), Shafter Avenue Reconstruction (S01), Richland Drive Improvements (S04), and Lerdo Highway improvements

(S06, S07, S08 and S09). The HST project would incorporate air quality and noise and vibration mitigation measures to minimize construction period impacts to users of park resources. The additional roadway improvement projects would also implement similar measures and best management practices to minimize their project impacts. Because of the existing urban nature of these facilities, cumulative construction activities would not substantially affect normal park use.

The Kern River Parkway in Bakersfield would be affected by the BNSF, Bakersfield South, and Bakersfield Hybrid alternatives as well as the Centennial Corridor (B09) and reconstruction of Truxtun Avenue and Stine Road (B10). The HST Alternatives would pass over the Kern River Parkway on an elevated guideway. Construction activities within the Parkway (which includes the HST Alternatives and Centennial Corridor) would require temporary closures of some areas, but a detour for the multi-use pathway would be provided, allowing continued use of the facility during construction. The HST alternatives would incorporate Mitigation Measures PC-MM#1: *Provide Alternative Pedestrian and Bicycle Access During Temporary Closures of Portions of Park Property During Construction*, which would require that the Authority, before temporary closures of linear park facilities, ensure that connections to the affected portions of the park or nearby roadways are maintained and if a proposed linear park closure restricts connectivity, the Authority will provide alternative pedestrian and bicycle access via existing roadways or other public rights-of-way. By providing alternative routes and parks lands, impacts from temporary closures would not be significant.

For the reasons described above, construction-related impacts would not substantially affect park resources. Therefore, the cumulative construction-period impacts to parks would not be significant under NEPA and would not be cumulatively considerable under CEQA.

Operations

Under the cumulative condition, demand for and use of parks and recreation facilities is projected to continue to increase in proportion to the population growth in the study area. Cumulative impacts from degradation of existing facilities could occur if the supply of parkland does not keep pace with increases in demand. To maintain the current quality of life, communities in the study area would need to increase park and recreation facilities to serve the population forecast for 2035. Based on the National Recreation and Park Association standards (Lancaster 1990), approximately 17,900 acres of new parkland would be required to accommodate the 2035 population increase of 1.79 million people in the four-county region. In addition, the HST project is projected to increase population by 2% to 3% above current projections for the region. For example, cumulative projects that are located in close proximity to parks and recreation facilities include the Fulton Corridor Specific Plan EIR (FC05) in Fresno, the Laton Community Plan Update EIR (F16), and the Bakersfield Commons EIR (B03), Mill Creek Linear Park Plan (B07) and Baker Street Village Redevelopment Project (B07) in Bakersfield (see Appendix 3.19-A). These projects could create additional demand for parks and recreation facilities and degrade existing parks by bringing new residents to the area. However, because an increase in new parkland proportional to the demand generated by such projects would be required by local agencies through the planning/permitting process for these new developments, cumulative impacts would not be significant under NEPA and would be less than significant under CEQA.

Cumulative impacts to parks could occur through the permanent acquisition of parklands for projects. The BNSF Alternative is the only HST alternative that would result in the permanent acquisition of parkland (9.0 acres). The BNSF Alternative would require the acquisition of 1.7 acres of land at Colonel Allensworth State Historic Park (ASHP) and 7.3 acres of land from Allensworth Ecological Reserve. While the BNSF Railway Corcoran to Allensworth double tracking (T36) project would potentially be aligned very close to the eastern boundary of Colonel Allensworth State Historic Park, it is not anticipated that construction of that project would require acquisition of parklands because the HST Alternatives would be located between the park

and the double tracking project. Since there are no foreseeable projects that would overlap with the HST project and acquire additional parklands, this would not be a cumulative impact.

Cumulative impacts to parks could occur if operations of past, present, and foreseeable future projects in combination with the HST project would have noise, air quality, or visual impacts that degrade the user's experience. Parks and school district play areas within 200 feet would potentially experience the greatest effects because of the proximity of operations to park users. HST project operations would result in significant unavoidable impacts to Bakersfield High School under the BNSF Alternative, the Bakersfield Amtrak Station Playground, and Mill Creek Linear Park. There are no other foreseeable future projects in close enough proximity to these resources to cause cumulative impacts.

Summary of NEPA/CEQA Impacts

The cumulative construction period impacts to park and recreation resources would not be significant under NEPA and would be less than significant under CEQA.

During operation of the cumulative projects, the demand for and use of parks and recreation facilities is projected to continue to increase in proportion to the population growth in the study area. Because developers of new residential projects would be required to donate parkland or pay Quimby Act fees as a condition of the entitlement process, the impact of increased demand on parks and recreation facilities during the HST operation period would not be significant under NEPA and would be less than significant under CEQA.

Mitigation

No mitigation is required beyond that presented in Section 3.15.7, Mitigation Measures.

Aesthetics and Visual Quality

The study area for aesthetics and visual resources is the project's viewshed (i.e., the area that could potentially have views of the project features and the area potentially viewed from the project). In agricultural areas, the HST corridor is potentially visible from long-distance views, whereas in urbanized areas, views of the HST corridor are generally only available closer to the corridor because intervening buildings and trees typically obstruct views. Therefore, accounting for the existing terrain, predominant land uses, and proposed elevated components of the HST, the potential viewshed for the Fresno to Bakersfield Section is within 0.25 mile of the alignment centerline in urbanized areas, including Fresno, Hanford, Corcoran, Wasco, Shafter, and Bakersfield. In open landscape areas, the potential viewshed is within 0.5 mile of the alignment centerline. The study area for direct and indirect impacts related to the HST alternatives is described in Section 3.16, Aesthetics and Visual Quality.

The Fresno to Bakersfield Section is located on mostly flat terrain, and includes agricultural and urbanized areas. The most significant visual resources in the project vicinity include parks and historically significant sites in the central areas of the cities of Fresno and Bakersfield; historic town centers in Corcoran, Wasco, and Shafter; orchards and open field crops in the rural San Joaquin Valley; the natural riparian character of Kings River, Tule River, Cross Creek, and Poso Creek; and views of the Sierra Nevada, Greenhorn and Tehachapi mountains. Over the past century, the visual character of most of the study area has been transformed from open lands with prairie, marshes, and woodland areas to a primarily agricultural region with open fields and orchards, along with urbanized areas. Under the cumulative condition, the character of the agricultural parts of the study area is anticipated to continue to change with the development and expansion of urban cityscapes and suburban development.

Construction

Development of cumulative projects, including oil and gas wells (i.e., Vintage Production California Oil and Gas Wells [WS03], California Department of Oil, Gas and Geothermal development Oil and Gas Well Development [WS05]), solar power generation plants (i.e., Corcoran Irrigation District Solar Projects [KI09], and Kettleman Photovoltaic Solar Farm Project [KI17]), roadway and highway improvement projects (e.g., SR 198 improvements [KI07] and Centennial Corridor improvements [B09]), and residential and commercial developments (e.g., Highway 43/198 Commercial center project [KI03]) in the vicinity of the Fresno to Bakersfield Section, would result in construction activities that would create temporary visual changes from demolition, vegetation removal, establishment of construction staging areas, and construction lighting. Even though construction activities would be temporary, due to the scale and proximity of cumulative projects listed in Appendix 3.19-A and 3.19-B, including the adjacent HST sections (the Merced to Fresno and Bakersfield to Palmdale sections), the combined impacts of the cumulative projects could be significant and could overlap with construction of the Fresno to Bakersfield Section in certain views. These construction-related cumulative impacts to visual resources could be significant under NEPA and cumulatively considerable under CEQA.

Most or all of the HST staging areas would be located adjacent to the proposed HST alignment in rural or industrial areas with low sensitivity due either to visual isolation from receptors, or low existing visual quality. In urban areas, staging sites would be largest near the HST stations, but would be located in rail-yard and industrial areas with low visual quality and sensitivity. Where visual isolation through siting is not feasible, staging areas would be screened as described in Section 3.16.7, Mitigation Measures. However, in the Bakersfield area, the construction activities of the HST project and the Centennial Corridor project would be conducted in proximity to concentrations of sensitive receptors, including viewers in the Kern River Parkway and residential viewers in Bakersfield, so the cumulative construction impacts of the two projects could represent an effect of substantial intensity. The incremental contribution of the HST project to this cumulative impact would be significant under NEPA and cumulatively considerable under CEQA. These cumulative impacts would be similar under all the HST alternatives in this section. It is not possible to substantially reduce the incremental contribution of the HST project to this cumulative visual impact because the HST viaduct over the Kern River is too high to shield from view.

Operations

Planned projects in the city of Fresno include the Fresno Freight Rail Alignment Project, the widening of Ventura Boulevard, a new 3-million-gallon water storage tank, the SR 99 Monterey Bridge replacement project, the C.A.R.T.S. Trucking Yard, the SR 99 Cedar/North Avenue interchange upgrade, and a biodiesel production facility. These cumulative projects would be located in industrial and highway-dominated settings of low existing visual quality. The HST project would be at-grade in the vicinity of these projects. The overall change in visual quality due to these projects in combination with the HST project would be small because these cumulative projects all occur within industrial and transportation infrastructure-dominated settings with low existing visual quality and low viewer sensitivity. In addition, the Fulton Corridor Specific Plan and Downtown Community Plan as well as the HST station in this area would have beneficial effects on the HST project viewshed, because they call for new planned residential and commercial development in currently blighted industrial or vacant areas. These improvements would be complementary to proposed streetscape improvements associated with HST station-area planning. As shown in Table 3.16-4, the visual impact of the HST project in Fresno would be beneficial because it would improve the overall visual character or quality of the visual setting. In the context of the low existing visual quality and low viewer sensitivity, the cumulative visual impact in Fresno would not be significant under NEPA and would not be cumulatively considerable under CEQA.

In rural Kern County, the BNSF and Wasco-Shafter alternatives would pass within the boundaries of the approved Rosedale Ranch Specific Plan area. Similarly, the Hanford West Bypass alternatives would be immediately adjacent to the residential development planned for the Live Oak Master Plan on the west side of Hanford. Implementation of the Rosedale Ranch Specific Plan and the Live Oak Master Plan would change the visual character of the viewsheds they occupy from pastoral to suburban, completely altering the line, form, color, and texture of the existing landscapes. This change would be a significant visual impact. Adding the HST project would incrementally increase the visual change of the viewshed from pastoral agriculture to urban. The visual impacts from the combination of the HST project and the Live Oak Master Plan and Rosedale Ranch Specific Plan would be a significant cumulative impact under NEPA, and the project's incremental contribution to this cumulative impact would be cumulatively considerable under CEQA.

In the suburban-industrial area of northern Bakersfield/Rosedale, the BNSF, Bakersfield South, and Bakersfield Hybrid alternatives would pass through the proposed Bakersfield Commons project site, a mixed-use development (within the Rosedale/Greenacres landscape unit) proposed in an area of vacant land, adjacent industrial uses, and existing suburban development. Because of the low existing visual quality of the proposed development site, the cumulative effect of the two projects in combination could be beneficial to existing viewers.

Two additional mixed-use projects, Mill Creek Linear Park and the Old Town Kern Redevelopment Project, are proposed near the proposed location of the HST station alternative sites in downtown Bakersfield. The cumulative impact of the mixed-use projects and the HST alternatives would result in beneficial impacts bringing moderately high visual quality to industrial areas of very low existing visual quality. On the other hand, portions of the Centennial Corridor Project in central Bakersfield would combine with the HST alternatives to increase impacts to views of and from high-sensitivity parks and open space (including the Kern River Parkway), as well as nearby residential areas. The combined visual effects of these projects on the Kern River Parkway would result in significant cumulative impacts under NEPA, and the project's contribution to this impact would be cumulatively considerable under CEQA.

Summary of NEPA/CEQA Impacts

The cumulative visual effect of HST construction activities in combination with other past, present, and reasonably foreseeable future projects would be significant under NEPA and CEQA in areas where multiple construction activities are located in close proximity. While construction activities would be temporary, in the Bakersfield area the HST alternatives would have a significant contribution under NEPA and a cumulatively considerable contribution under CEQA to visual impacts in combination with the Centennial Corridor Project. Potential cumulative construction impacts on aesthetics would be similar among the Bakersfield area alternatives.

The cumulative operations effects of the HST alternatives and other past, present, and reasonably foreseeable future projects on aesthetics and visual quality would be significant under NEPA and CEQA. The cumulative development projects identified in the Kern County/Bakersfield area could strongly reduce the visual quality within the study area on an individual project basis, as a result of changes to the landscapes that accompany the large-scale conversion of agricultural lands to urbanized lands or changes that are not visually compatible with existing/planned development. The HST alternatives' contribution to cumulative visual impacts would be significant under NEPA and cumulatively considerable under CEQA. Potential cumulative operations impacts on aesthetics would be similar among the alternatives as described above.

Mitigation

Even with implementation of the mitigation measures provided in Section 3.16.6, Aesthetics and Visual Resources, the contribution of the HST project to visual impacts would remain significant in the Orchard Park Specific Plan area, the Rosedale Ranch project area, and the Kern River Parkway until landscape screening matures in 10 years or more. While the following mitigation measure would minimize this impact, the contribution of the HST project to cumulative visual impacts would remain significant under NEPA and cumulatively considerable under CEQA.

CUM-VQ-MM#1: Consult with agencies on HST project design. Prior to construction, the Authority would consult with local city and county planning departments to provide information about the HST project design. This would allow for local plans and proposed development projects that could be adversely affected by the HST project to be modified and potential visual impacts to high-sensitivity viewers to be reduced, as determined feasible by project applicants/planning departments.

Cultural and Paleontological Resources

The geographic study area for the cumulative impact analysis for cultural resources was identified as the area of potential effects for both archaeological and architectural resources as well as the entire four-county area (i.e., Fresno, Kings, Tulare, and Kern counties), where other development, infrastructure and transportation projects are proposed as part of the cumulative condition. The geographic extent used for the cumulative analysis of paleontological resources consisted of the entire southern San Joaquin Valley. The study area for direct and indirect impacts related to the HST alternatives is described in Section 3.17, Cultural and Paleontological Resources.

Based on existing inventories, as well as the cultural history of the area, the southern San Joaquin Valley region (i.e., the Tulare and Buena Vista Lake areas) contains many known archaeological and paleontological resources that may be affected by development of the cumulative projects, including the HST alternatives. In addition, it is assumed that currently unidentified resources are also present within the study area. Because the importance of such resources cannot be determined at this time, the significance of cumulative impacts on archaeological and paleontological resources cannot be determined for projects developed under the cumulative condition.

Impacts on built environment and archaeological cultural resources tend to be individual in nature, and specific to the context of the resource and to the aspects of integrity that contribute to a resource's eligibility for listing in the State or National Register of Historic Places. Nevertheless, cultural resources are ubiquitous, and because their individual significance is unknown until analyzed, potential impacts on cultural resources caused by cumulative projects can collectively contribute to an incremental loss to the aggregate of cultural resources, often a nonrenewable resource, in the environment. In addition, implementation of multiple projects can result in cumulative impacts on particular resources, such as historic districts or landscapes that have hitherto not been recorded or discovered. The current project may contribute to the loss of, or have a deleterious effect on, resources such as districts or landscapes that are currently unknown or may be affected by other foreseeable projects.

Construction

Under the cumulative condition, cultural resources would continue to be affected in the San Joaquin Valley urbanizing areas due to growth, changes in land use, and other types of ground disturbance. Development in the urban areas would likely result in further unearthing of sensitive archaeological resources, disturbance of traditional cultural properties, disturbance and possible damage to paleontological resources, and removal of—or changes to—the historic character and

settings of historic resources. Prehistoric and historic archaeological sites would be affected during project construction activities. Prehistoric sites are common in riverbank and floodplain areas, and burial sites are sometimes encountered during ground-disturbing activities. It is likely that known and unknown archaeological resources could be disturbed and cultural resources damaged or destroyed during construction activities associated with the HST alternatives and other past, present, and reasonably foreseeable projects. Linear projects that require extensive excavation, such as the Merced to Fresno and Bakersfield to Palmdale sections of the HST, the Central Valley Independent Network Fiber Optic Communications Network Project, the Cawelo S5 Lateral to Conduit F Interconnection Pipeline, and the Caltrans SR 46 project have the potential to cause substantial adverse change to archaeological resources. As planning proceeds and in compliance with the Section 106 process, the Archaeological Treatment Plan (ATP) for the HST project would provide specific performance standards that ensure that impacts on any such resource, if identified, would be avoided, minimized, or resolved to the extent possible. However, significant and unavoidable losses of unique archaeological resources (as defined in Public Resources Code Section 21083.2) or a historical resource (as defined in Section 21083.2 of CEQA and Section 15064.5 of the state CEQA guidelines) could occur 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 cultural resources.

Historical architectural resources could also be damaged or require removal due to implementation of the projects under the cumulative condition. Local projects and the secondary effects of redevelopment pressures around the HST stations would potentially result in the removal of historical buildings in downtown Fresno and downtown Bakersfield. Adverse effects on eligible resources could result in the neglect, abandonment, or removal of historic properties, by such projects as the Merced-Fresno and Bakersfield to Palmdale HST sections. Other projects such as Caltrans projects in Bakersfield, the SR 99 interchange project, the Hageman Flyover project, and the widening of Rosedale Highway consist could also have similar impacts on the existing built environment as the HST. If these resources meet the definition of a historical resource or a historic resource (as defined in Section 106, 36 CFR 800), their modification or destruction would be significant. The HST alternatives could result in significant, unavoidable impacts on historic resources, as described in Section 3.17, Cultural and Paleontological Resources.

Therefore, construction of the HST in conjunction with past, present, and reasonably foreseeable projects under the cumulative condition could result in significant impacts under NEPA and be cumulatively considerable under CEQA. The HST alternatives' contribution to cumulative impacts would be significant under NEPA and cumulatively considerable under CEQA because of the potential for loss of resources.

Potential construction-related cumulative impacts on archaeological and paleontological resources would be similar for all HST alternatives because construction of any given alignment is equally likely to disturb significant resources. These similar impacts across all the HST alternatives are the result of the high probability of unknown archaeological and paleontological resources being affected by the project construction—regardless of the alternative implemented. Potential cumulative impacts on historic architectural resources would be greatest for the BNSF Alternative in Fresno, the Hanford West Bypass 1 and 2 alternatives, the Hanford West Bypass 1 and 2 modified alternatives, and the Bakersfield South and Bakersfield Hybrid alternatives in Bakersfield because these alignments would result in adverse effects to historic buildings.

Operations

The approach to address operational-related cumulative impacts differs in this Final EIR/EIS from the approach used in the Revised DEIR/Supplemental DEIS. In the Final EIR/EIS, operational-

related cumulative impacts address the tangible effects that may cause adverse changes or significant impacts on cultural resources and not future growth to the region. The HST project would not result in operations-related impacts to archaeological resources, traditional cultural properties, or paleontological resources, as described in Section 3.17, Cultural and Paleontological Resources. Therefore, cumulative impacts to these resources are not addressed.

Operations of the HST project in combination with future foreseeable projects such as the SR 99 widening in Fresno and Bakersfield, the Hageman Flyover in Bakersfield, the widening of the Rosedale Highway in Bakersfield and Centennial Corridor could result in noise and vibration impacts to historic architectural resources. Noise and vibration could diminish the contributing elements that convey the significance of the resources (e.g., if the experience using the property as a culturally relevant place is what contributes to the significance of the resource). As described under Impact CUL #5, Potential Adverse Effects on Historic Architectural Resources due to Operation Activities, noise and vibrations from operations of the HST are not anticipated to affect historic properties (National Historic Preservation Act, Section 106) or historical resources (CEQA). However, as planning proceeds and in compliance with the Section 106 process, the Built Environment Treatment Plan (BETP) for the HST project would provide specific performance standards that ensure that any such impacts, if identified, would be avoided, minimized, or resolved to the extent possible at the time the treatment measures are applied to the specific resource. Therefore, the contribution of the HST project to potential noise and vibration effects to historic resources or properties would not be significant under NEPA and would not be cumulatively considerable under CEQA.

Summary of NEPA/CEQA Impacts

Continued urbanization and development projected under construction-related activities of the cumulative condition could result in exposure and disruption of archaeological and paleontological resources and traditional cultural properties, and removal or damage to historic architectural resources. Therefore, the cumulative impact of the project and other past, present, and reasonably foreseeable projects on cultural resources would be significant under NEPA and CEQA. Construction of the HST project could contribute to similar impacts. Therefore, the HST alternatives' contribution to impacts would be significant under NEPA and would be cumulatively considerable under CEQA.

During construction, potential cumulative impacts on archaeological and paleontological resources would be similar for all HST alternatives. However, potential cumulative impacts on historic architectural resources would be greatest for the BNSF Alternative in the city of Fresno, the Hanford West Bypass 1 and 2 alternatives, and the Bakersfield South Alternative in Bakersfield; the other HST alternatives would have generally similar cumulative historic architectural resource impacts due to the comparable level of impacts across the remaining alternatives.

Operations-related impacts from the HST project and other past, present, and reasonably foreseeable projects could result in indirect significant cumulative impacts to historic architectural resources from noise and vibration associated with the operation of infrastructure projects once constructed. Because the HST project is not anticipated to result in such impacts and, if later identified, would reduce any such impacts through the BETP, the HST's contribution would not be significant under NEPA and would not be cumulatively considerable under CEQA.

Mitigation

Even with implementation of the mitigation measures for cultural resources provided in Section 3.17, Cultural and Paleontological Resources, the HST Alternatives' contribution to cumulative

impacts during construction would remain significant under NEPA and cumulatively considerable under CEQA. No additional mitigation is available.

Impacts of Mitigation

All of the above mitigation measures entail consultation with agencies, which would not have a direct effect on the environment. Potential indirect effects of consultation could be somewhat beneficial; by reducing the number of simultaneous construction projects which would occur within close proximity the amount of construction traffic, emissions per day, and noise levels may be reduced. The potential for secondary impacts caused by the implementation of archaeological treatment plans will be addressed through the implementation of Cul-MM#1 and Cul-MM#3.

Summary of Cumulative Impacts

Table 3.19-2 summarizes the HST alternatives' contribution to potential cumulative impacts during construction and operation. The major differences in impacts between the alternatives are listed for significant cumulative impacts to which the HST would have a significant contribution under NEPA and/or a cumulatively considerable contribution under CEQA, and cumulative mitigation measures are listed.

Table 3.19-2
Summary of Cumulative Impacts

Resource	Construction	Operations	Comparison of HST Alternatives' Contribution[1]	Cumulative Mitigation
Transportation	Not Significant	Beneficial (regional level) Not Significant (local level)	--	None required
Air Quality and Global Climate Change	Not Significant	Beneficial	--	None required
Noise and Vibration	Significant (Cumulatively Considerable)	Significant (Cumulatively Considerable)	Construction – The number of severely impacted noise receivers would be higher for HST alternatives that extend through urban areas Operations – Alternatives with fewer severe noise impacts: Hanford East Alternative, Corcoran Elevated Alternative, Allensworth Bypass Alternative, Wasco-Shafter Bypass Alternative, and Bakersfield North Alternative	CUM-N&V-MM#1
Electromagnetic Fields and Electromagnetic Interference	No Impact	No Impact	--	--
Public Utilities	Not Significant	No Impact	--	--
Energy	Not Significant	Not Significant	--	None required

Table 3.19-2
Summary of Cumulative Impacts

Resource	Construction	Operations	Comparison of HST Alternatives' Contribution[1]	Cumulative Mitigation
Water Infrastructure and Resources	No Impact	No Impact	--	None required
Solid Waste/ Recycling Facilities	Not Significant	Not Significant	--	None required
Biological Resources	Not Significant	Not Significant	--	None required
Hydrology and Water Resources	Not Significant	Not Significant	--	None required
Geology, Soils, and Seismicity	Not Significant	Not Significant	--	None required
Hazardous Materials and Wastes	Not Significant	Not Significant	--	None required
Safety and Security	Not Significant	Not Significant / Beneficial (travel safety)	--	None required
Socioeconomics, Communities, and Environmental Justice				
Division and/or Disruption of Community	Significant (Cumulatively Considerable)	Significant (Cumulatively Considerable)	Similar among alternatives	No additional mitigation available
Economic	Beneficial	Beneficial	--	--
Environmental Justice	Significant	Significant	Construction and Operations – Similar among alternatives	CUM-SO-MM#1 CUM-SO-MM#2
Station Planning, Land Use, and Development	Not Significant	Significant (Cumulatively Considerable)	Operations – Greater for Hanford West Bypass 1 and 2, Hanford West Bypass 1 and 2 Modified, Corcoran Bypass, Allensworth Bypass, and Wasco-Shafter Bypass	No additional mitigation available
Agricultural Lands	Not Significant	Significant (Cumulatively Considerable)	Operations – Greater for the BNSF Alternative than the corresponding alternatives	No additional mitigation available
Parks, Recreation, and Open Space	Not Significant	Not Significant	--	None required

Table 3.19-2
Summary of Cumulative Impacts

Resource	Construction	Operations	Comparison of HST Alternatives' Contribution[1]	Cumulative Mitigation
Aesthetics and Visual Quality	Significant (Cumulatively Considerable) Bakersfield area	Significant (Cumulatively Considerable) Kern County/ Bakersfield area	Construction and Operations – Similar among alternatives	CUM-VQ-MM#1
Cultural and Paleontological Resources	Significant (Cumulatively Considerable)	Significant (Not Cumulatively Considerable) Indirect impacts to historic architectural resources	Construction – Archaeological and paleontological resources – similar among alternatives; historical architectural resources – impacts greater for the BNSF Alternative in the Fresno area, and the Hanford West Bypass 1 and 2 alternatives	No additional mitigation available

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