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. 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 *Final Bay Area to Central Valley High-Speed Train (HST) Program Environmental Impact Report/Environmental Impact Statement (EIR/EIS)* (Authority and FRA [2008] 2010) as revised in the Bay Area to Central Valley HST Revised Final Program EIR (Authority 2010). The cumulative impacts of the HST System as a whole are summarized under each resource topic below.

3.19.1 Laws, Regulations, and Orders

3.19.1.1 National Environmental Policy Act

Pursuant to 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 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 and relevant plans for consideration of cumulative impacts. 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 will contribute to the cumulative impact on a particular resource. 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. Identify the resource areas where the proposed project and other past, present, and reasonably foreseeable projects could, together, cause cumulative effect.
- Determine whether the proposed project's incremental contribution to the significant cumulative impacts identified for each resource area is cumulatively considerable under CEQA, and whether its contribution would be significant under NEPA. 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. The project's unmitigated contribution to the cumulative impact is determined (without implementation of mitigation measures identified for the project in this EIR/EIS).
- Identify reasonable, feasible options for avoiding or mitigating the project's contribution to significant cumulative impacts.

3.19.3 Cumulative Projects and Growth Forecasts

This section discusses the historical context of the study area and how development trends in the past have influenced the environmental character of the study area. This section also discusses projected development trends and describes how future urbanization is projected change the character of the study area to the year 2035. The cumulative project list (see Section 3.19.3.3) includes projects identified in municipal capital improvement programs and other long-range plans or in the permitting/entitlement process.

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 2011]).

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 comprised 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 will 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 will 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 will 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 will 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.

The Cumulative Project List discussed in the following section identifies the known projects that will 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 cumulative project list represents 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 over 100 major capital or new development projects by jurisdiction for the study area counties and cities and their potential for contributing to cumulative impacts. The tables include mixed-use 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 more than 120 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 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. In addition to consideration of the impacts under the cumulative condition, the cumulative impact analysis includes consideration of adjacent HST sections, the entire San Joaquin Valley Air Basin or development of the HST System as a whole, 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 will focus growth in urban areas and population centers.

Nevertheless, urban development will 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 differences in the cumulative impacts between the HST alternatives are generally minor, with no apparent discriminators among the alternatives, except as otherwise noted in the text below.

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 BMPs that will 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 following discussions describe, in order, the unmitigated construction impacts of the project, the unmitigated short and long-term impacts of the project, a summary of unmitigated NEPA/CEQA impacts, and the applicable mitigation. When the project would have an unmitigated impact, the significance of the mitigated contributions of the project is described after the mitigation measures.

Transportation

The study area for the transportation cumulative analysis includes Fresno, Kings, Tulare, and Kern counties. Because the transportation analysis addresses the HST alternatives and other 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.

Construction

Construction effects may be compounded if the planned projects listed in Appendix 3.19-A and Appendix 3.19-B occur at the same time as the HST alternatives and affect the same roads; this would contribute to incrementally more delays in traffic and detours for travel within the region. However, standard project coordination and planned construction phasing would reduce these temporary effects. Typical construction requirements for all projects that may constrict traffic include a construction transportation plan that ensures a minimal level of vehicle flow is allowed at all times. During design and construction of the HST alternatives, the Authority and FRA will implement design features, in close consultation with the pertinent city or county, to reduce associated transportation delays. Because traffic delays associated with project construction would be short-term and minimized by implementation of a construction transportation plan, the cumulative effect of the project on travel delay would have negligible intensity under NEPA and the project contribution to travel delay would not be cumulatively considerable under CEQA. In the context of the short-term nature of travel delay caused by construction of other reasonably foreseeable projects and the standard practice of coordinating and planning construction phasing, the cumulative contribution of the project to travel delays during construction would not be significant under NEPA.

Potential construction-related cumulative impacts on transportation would be similar for all HST alternatives. All of the alternatives require similar construction techniques, including temporary road closures and delays, but at different locations; avoidance and minimization measures to reduce these delays, as described in Sections 3.2.6 and 3.2.7, Transportation, would be applicable to all alternatives.

Short- and Long-Term Project Effects

Without implementation of the HST alternatives, vehicle miles traveled (VMT) in the study area would reach approximately 79.9 million VMT daily by 2035; however, with the implementation of the HST alternatives, 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 action 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 broad range of transportation modes improves accessibility to the state's urban centers from the Central Valley beyond what would occur by only widening freeways.

Locally, even without implementation of the HST alternatives, up to 107 of the 226 intersections and 33 of the 134 roadway segments within the three station study areas would operate at unacceptable LOS (E or F) by 2035. The HST project in conjunction with other planned projects in these three station areas would result in cumulative impacts due to increased traffic associated with people traveling to and from stations, as described in Section 3.2.5, Transportation. Implementation of the HST alternatives would be expected to reduce already unacceptable LOS levels by at least 4 seconds at up to 51 intersections in either the morning or afternoon peak hour and increase the volume-to-capacity ratio on 13 roadway segments by 2035. The project would reduce LOS from acceptable levels to unacceptable levels at 10 intersections in either the morning or afternoon peak hour and 5 roadway segments. Therefore, due to the reduction in LOS, the project's cumulative effect would have substantial intensity under NEPA. In the context of the number of intersections and roadway segments that would operate at an unacceptable LOS with past, present, and reasonably foreseeable future projects, the cumulative impact of the project would be significant under NEPA. The contribution of the project to traffic congestion would be cumulatively considerable under CEQA.

Potential project cumulative impacts on transportation would be similar for all HST alternatives because the regional nature of the analysis and because benefits would be realized at a regional level. However, specific local impacts, such as road closures and crossings, would also be similar among alternatives because all HST alternatives affect similar transportation facilities.

As described in the 2005 Statewide Program EIR/EIS and the 2008 Bay Area to Central Valley Program EIR/EIS, implementation of the HST System as a whole could benefit intercity highways. The HST System could also increase local traffic near some HST stations, such as the Transbay Transit Center (San Francisco to San Jose Section) and Buena Vista Station Area (Palmdale to Los Angeles Section), resulting in decreases in level of service.

Summary of NEPA/CEQA Impacts

Potential cumulative impacts on transportation would be similar for all HST alternatives, as described above. The cumulative construction impacts would not be significant under NEPA. The HST project, with the project design features identified in Section 3.2, would not have a cumulatively considerable contribution to construction-related traffic impacts under CEQA.

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. However, 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—contributing to operating conditions below LOS D. This would be a significant impact under NEPA and a cumulatively considerable contribution to local traffic congestion under CEQA.

Mitigation Measures

With implementation of the mitigation measures for transportation that are provided in Section 3.2.7, Transportation, which would reduce potential HST impacts, the contribution of the HST alternatives to cumulative local transportation impacts would not be significant under NEPA and less than cumulatively considerable under CEQA. No additional mitigation is needed to address cumulative impacts.

Air Quality and Global Climate Change

The study area for cumulative air quality impacts is the San Joaquin Valley Air Basin (SJVAB)[1] and the study area for greenhouse gas (GHG) emissions is the State of California. The SJVAB is in federal nonattainment for ozone and $PM_{2.5}$, federal maintenance for PM_{10} and CO (urban portion of Fresno and Kern County only), and state nonattainment for ozone, PM_{10}, and $PM_{2.5}$. As a result, the area is subject to stringent emissions requirements for ozone precursors (VOC and NO_x) and particulate matter. 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.

Regulatory agencies continue to pass more stringent criteria pollutant and GHG emission standards with the goal of reducing the amount of pollutant emissions in the atmosphere. Many of these regulations are not yet implemented but would be prior to the project planning horizon of 2035. Overall air quality has improved and is anticipated to continue to improve because of these regulations. However, 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 slow-moving traffic would continue to incrementally affect air quality.

The cumulative scenario is based upon build-out of the county general plans within the SJVAB and includes the reasonably foreseeable cumulative projects in Appendix 3.19-A and Appendix 3.19-B, as well as the emissions from the Fresno to Bakersfield and Merced to Fresno sections of the HST System.

Construction

The San Joaquin Valley Air Pollution Control District (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). Construction emissions of these pollutants associated with the HST alternatives would exceed these thresholds. In addition, construction of the Fresno to Bakersfield Section would overlap with the construction period for the Merced to Fresno Section. The combined unmitigated regional pollutant emissions of the two sections from 2013 to 2022 would also exceed the thresholds for NO_x, VOC, PM_{10} and $PM_{2.5}$, as shown in Table 3.19-1. Portions of the San Jose to Merced and Bakersfield to Palmdale sections of the HST would also be constructed within the SJVAB. It is possible that the schedule for construction of these two sections could overlap with

[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).

construction of the Merced to Fresno and Fresno to Bakersfield sections, contributing to the cumulative emissions totals of HST construction in the SJVAB.

There would be localized HST project HAPs emissions within the 5,200-foot localized air analysis buffer near the HST station areas over the anticipated 4-year construction period. Combined with other foreseeable construction project emissions that could occur within the station area during the same timeframe, these emissions could result in a cumulative impact of moderate intensity under NEPA, because state health risk thresholds would be exceeded. Because of the potential for construction and operations emissions associated with the cumulative condition, this would be a significant cumulative impact under NEPA. The project would have a cumulatively considerable contribution to the localized air quality impacts around the station areas.

Construction of reasonably foreseeable future projects in the SJVAB would be a significant cumulative air quality impact under NEPA and CEQA because the basin is not in attainment for ozone, PM_{10}, and $PM_{2.5}$ and construction of any project causes emissions of ozone precursors (NO_x and VOCs) and particulates. The SJVAPCD has developed plans to help bring concentrations of these pollutants into attainment; however, the HST construction emissions were not included in these plans. Because the unmitigated construction emissions for the Fresno to Bakersfield Section would exceed the SJVAPCD thresholds for NO_x, VOC, PM_{10}, and $PM_{2.5}$, the air quality effect would have substantial intensity under NEPA. Since the SJVAPCD attainment plans for these pollutants do not account for project construction emissions, this would be a significant cumulative impact under NEPA. The project would also have a cumulatively considerable contribution to the air quality impact associated with reasonably foreseeable projects in the SJVAB.

The transport of ballast construction materials from quarries outside the SJVAB to the project site may result in exceedance of NOx thresholds, for which emissions offsets would be purchased in the respective air district. Because the origin of materials and the transport routes and methods (e.g., train or truck) are dependent upon many variables, including economic factors, and are unknown at this time, analysis under the cumulative condition would be highly speculative.

Near and Long-Term Project Effects

Within the SJVAB, long-term operational emissions associated with growth and development in Fresno, Tulare, and Kern counties are expected to exceed the SJVAPCD CEQA significance thresholds, and impede the attainment of federal and state ozone and particulate matter air quality standards. As documented in its general plan EIR long-term operational emissions in Kings County are anticipated to be less than significant. Within San Joaquin, Stanislaus, Madera, and Merced counties, operational emissions associated with build-out of their general plans is unknown because these counties are in the process of updating their general plans and therefore, no current data is available. On a regional scale, past, present, and foreseeable projects due to population growth would contribute to congestion and worsen air quality, resulting in a significant cumulative impact under NEPA and CEQA.

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, it would result in a net benefit to regional air quality. Therefore, operation of the HST alternatives would have a beneficial contribution under NEPA and no cumulative impact under CEQA.

Operations at the HMF may emit hazardous air pollutants (HAPs). The health risk analysis performed for HMF emissions indicates that health impacts would be less than significant for receptors farther than 1,300 feet from the

What is a sensitive receptor?

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

facility. No past, present, or foreseeable future projects have been identified within a mile of the alternative HMF sites that would emit HAPs. Therefore, the project would not contribute to cumulative effects for HAPs.

Cumulative carbon monoxide (CO) impacts are accounted for in the CO hotspot analysis, presented in Section 3.3.5, Air Quality and Global Climate Change. The CALINE4 air dispersion modeling evaluation indicated that the cumulative CO emissions[2] from past, present, and reasonably foreseeable future projects would not exceed state and federal ambient air quality standards. Therefore, there would be no cumulative impact for this pollutant under NEPA or CEQA.

As described in the 2005 Statewide Program EIR/EIS and the 2008 Bay Area to Central Valley Program EIR/EIS, the HST System as a whole would have less than significant impacts on air quality. The HST System would reduce vehicle miles traveled and result in system-wide air quality benefits. Temporary short-term emissions increases associated with construction activities and localized air pollution increases associated with traffic near proposed HST stations would be substantially reduced by mitigation strategies and design practices.

Even with the more stringent regulations on GHG emissions expected in the future, the projected growth in the region would result in cumulative increases in GHG emissions. Increased GHG emissions from past, present, and reasonably foreseeable projects in the region would result in significant cumulative impacts on global climate change under NEPA and CEQA. The HST alternatives' 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 possibly 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 distinguish between energy sources. Therefore, there may be GHG emissions associated with the provisions of energy to the HST System. However, overall, the HST alternatives would decrease GHG emissions by reducing vehicle and aircraft trips and also would result in a net reduction in CO_2 emissions as described in Section 3.3.5, 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 alternatives would result in a net decrease in GHG emissions and would have a beneficial effect on global climate change under NEPA and no cumulative impact under CEQA.

All HST alternatives would have similar potential operations-related cumulative air quality impacts because impacts from each of the alternatives would be similar and would be of the same scale.

[2] The CO hot spot analysis is inherently a cumulative analysis, because it analyzes project CO concentrations added to the projected ambient CO concentrations.

Table 3.19-1
Construction Emissions for Combined HST Merced to Fresno and Fresno to Bakersfield Alignments for Years 2013–2022a (tons/year)

Activities	VOC	CO	NO_x	SO_2	PM_{10}[d]	$PM_{2.5}$[d]
SJVAPCD annual CEQA significance thresholds[b]	10	N/A	10	N/A	15	15
Annual General Conformity de minimis levels applicable to the SJVABc	10	100	10	100	100	100
Year 2013						
Exceeds SJVAPCD CEQA thresholds?	**Yes**	No	**Yes**	No	**Yes**	No
Exceeds General Conformity threshold?	**Yes**	No	**Yes**	No	No	No
Year 2014						
Exceeds SJVAPCD CEQA thresholds?	**Yes**	No	**Yes**	No	**Yes**	**Yes**
Exceeds General Conformity threshold?	**Yes**	**Yes**	**Yes**	No	No	No
Year 2015						
Exceeds SJVAPCD CEQA thresholds?	**Yes**	No	**Yes**	No	**Yes**	**Yes**
Exceeds General Conformity threshold?	**Yes**	**Yes**	**Yes**	No	No	No
Year 2016						
Exceeds SJVAPCD CEQA thresholds?	**Yes**	No	**Yes**	No	**Yes**	No
Exceeds General Conformity threshold?	**Yes**	No	**Yes**	No	No	No
Year 2017						
Exceeds SJVAPCD CEQA thresholds?	No	No	**Yes**	No	No	No
Exceeds General Conformity threshold?	No	No	**Yes**	No	No	No
Year 2018						
Exceeds SJVAPCD CEQA thresholds?	No	No	**Yes**	No	No	No
Exceeds General Conformity threshold?	No	No	**Yes**	No	No	No
Year 2019						
Exceeds SJVAPCD CEQA thresholds?	**Yes**	No	**Yes**	No	**Yes**	No
Exceeds General Conformity threshold?	**Yes**	No	**Yes**	No	No	No

Table 3.19-1

Construction Emissions for Combined HST Merced to Fresno and Fresno to Bakersfield Alignments for Years 2013–2022a (tons/year)

Activities	VOC	CO	NO_x	SO_2	PM_{10}[d]	$PM_{2.5}$[d]
Year 2020						
Exceeds SJVAPCD CEQA thresholds?	No	No	**Yes**	No	**Yes**	No
Exceeds General Conformity threshold?	No	No	**Yes**	No	No	No
Year 2021						
Exceeds SJVAPCD CEQA thresholds?	No	No	**Yes**	No	No	No
Exceeds General Conformity threshold?	No	No	**Yes**	No	No	No
Year 2022						
Exceeds SJVAPCD CEQA thresholds?	No	No	No	No	No	No
Exceeds General Conformity threshold?	No	No	No	No	No	No

Notes:
[a] The emissions presented here are unmitigated emissions for the construction of the Merced to Fresno and Fresno to Bakersfield alignment during 2013-2022 construction period in the San Joaquin Valley Ari Basin.
[b] The SJVAPCD has significance thresholds for NOx ROG/VOC, PM10, and PM2.5. The district currently does not have thresholds for CO or SOx. Section 3.3.11 summarizes the CEQA significance for these pollutants.
[c] The General Conformity de minimis thresholds for criteria pollutants are based on the SJVAB federal attainment status. The SJVAB is considered in extreme nonattainment for the ozone National Ambient Air Quality Standards (NAAQS), is a nonattainment area for PM2.5, and is a maintenance area for the CO and PM10 NAAQS. Although the SJVAB is in attainment for SOx, since SOx is a precursor for PM2.5, the PM2.5 General Conformity Rule de minimis thresholds was used.
[d] The SJVAPCD Regulation VIII requirements and dust control measures the Authority committed to in the Statewide Program EIR/EIS are included here for PM10 and PM2.5 emissions.

Acronyms:
CEQA = California Environmental Quality Act
CO = carbon monoxide
PM10 = particulate matter smaller than or equal to 10 microns in diameter
PM2.5 = particulate matter smaller than or equal to 2.5 microns in diameter
SJVAPCD = San Joaquin Valley Air Pollution Control District
SO2 = sulfur dioxide
VOC = volatile organic compound
N/A = not applicable

Summary of NEPA/CEQA Impacts

All HST alternatives would have similar cumulative impacts on air quality.

The construction-related cumulative effects of the HST alternatives and other past, present, and reasonably foreseeable projects on air quality would be significant under NEPA and the project would have a cumulative considerable contribution to air quality impacts under CEQA. Construction of the Fresno to Bakersfield alignment combined with the construction of the Merced to Fresno alignment would increase regional pollutant emissions and would exceed the SJVAPCD CEQA thresholds.

Operation of the Merced to Fresno and Fresno to Bakersfield sections 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, it would result in a net benefit to regional air quality. Therefore, operation of the HST alternatives would have a beneficial contribution under NEPA and no cumulative impact under CEQA.

The health risk analysis performed for HMF emissions indicates that health impacts would be less than significant for receptors farther than 1,300 feet from the facility. No past, present, or foreseeable future projects have been identified within a mile of the alternative HMF sites that would emit HAPs. Therefore, the project would not contribute to cumulative effects for HAPs.

Increased GHG emissions from past, present, and foreseeable projects in the region would result in significant cumulative impacts on global climate change under NEPA and CEQA. Because the HST alternatives would result in a net reduction in CO_2 emissions, the project would have a beneficial contribution under NEPA and a less than cumulatively considerable contribution under CEQA.

Mitigation

With implementation of standard design practices and mitigation measures for air quality provided in Sections 3.3.8 and 3.3.9, Air Quality and Global Climate Change, temporary construction emission impacts, would not contribute to air quality degradation or impede the region's ability to attain air quality standards. Because the Authority would provide offsets for the portions of the statewide HST project located within the SJVAB, the potential construction emissions would be mitigated. The Authority shall also fund (from all available sources) emissions offsets to net zero in every year for the duration of construction (2013 to 2022) for NO_x and VOC construction emissions (regardless of whether a threshold is exceeded in that year) and for all PM_{10} and $PM_{2.5}$ construction emissions. Therefore, cumulative impacts on air quality during construction would not be significant under NEPA and project construction would not have a cumulatively considerable contribution to air quality impacts under CEQA.

Noise and Vibration

The study area for the cumulative analysis of noise and vibration is 2,500 feet on either side of the centerline of the HST alternatives. This area was selected because the HST System could increase noise levels within this area. The study area for direct and indirect noise impacts related to the HST alternatives is described in Section 3.4, Noise and Vibration.

Concentrations of residences and other potentially 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. Measured day-night sound levels (L_{dn}) ranged from 45 dBA 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 and vibration effects that would be limited in duration. It is possible that multiple projects would temporarily be under construction at the same time in the cities of Fresno and Bakersfield. This could result in exceedance of significance thresholds for noise defined in Section 3.3.3, Noise and Vibration. Construction of these projects would typically occur during daytime hours or with the addition of noise control measures during nighttime hours. Potential vibration impacts could result from pile driving conducted close to buildings; in the event that proximate construction projects use pile driving at the same time, the cumulative effect could exceed thresholds. Therefore, during construction, cumulative noise and vibration impacts of HST alternatives and other past, present, and reasonably foreseeable projects would have a substantial intensity under NEPA. Additionally, because there could be other large construction projects occurring in Fresno and Bakersfield adjacent to the HST alternatives during the HST construction period, this impact would be significant under NEPA. Construction noise and vibration attributed to the project would be cumulatively considerable under CEQA.

All HST alternatives would have similar potential construction-related cumulative impacts with respect to noise and vibration because construction-related noise impacts from each of the alternatives would be similar and of the same scale.

Short- and Long-Term Project Effects

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 increase noise up to 7 dBA L_{dn} between 2010 and 2035 at noise-sensitive receivers. 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 alternatives would generate noise-level increases up to 28 dBA L_{dn} above projected 2035 noise levels. Past, present, and reasonably foreseeable projects would result in a significant noise impact adjacent to transportation corridors under NEPA and CEQA. The project contribution to this cumulative impact would have substantial intensity under NEPA. Because of the large number of sensitive receivers along transportation corridors this would be a significant impact under NEPA. The HST project contribution to the noise impact would be cumulatively considerable under CEQA.

What is a sensitive receiver?

A sensitive receiver for noise includes schools, churches, residences, hospitals, and libraries.

No other foreseeable projects are identified that would cause operational vibration impacts in the study area; therefore, no cumulative vibration impact would occur.

The HST System as a whole could have a potentially significant impact on noise and vibration. As described in the 2005 Final Program EIR/EIS and the 2008 Bay Area to Central Valley Program EIR/EIS, the HST System would create construction-related short-term noise impacts. The HST System would also create long-term noise impacts from the introduction of a new transportation system, including potential vibration impacts. On the other hand, the statewide HST System as a whole would also result in localized long-term noise reductions due to the construction of

separated grade crossings, such as the grade crossings proposed along the Caltrain corridor from San Francisco to San Jose.

All HST alternatives would have similar potential operations-related cumulative impacts with respect to noise and vibration because operation-related noise impacts from each of the alternatives would be similar and of the same scale.

Summary of NEPA/CEQA Impacts

All HST alternatives would have similar cumulative impacts on noise and vibration. 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 because construction-related noise and vibration would have substantial intensity, and other large projects could be constructed in Fresno and Bakersfield within the vicinity of the HST alternatives at the same time. Construction noise and vibration attributed to the project would be cumulatively considerable under CEQA because of the size of the HST construction project relative to other development that may occur adjacent to the HST alternatives.

Past, present, and reasonably foreseeable projects would result in a significant noise impact adjacent to transportation corridors under NEPA and CEQA. The project contribution to this cumulative impact would have substantial intensity under NEPA. Because of the large number of sensitive receivers along transportation corridors this would be a significant impact under NEPA. The project contribution to the noise impact would be cumulatively considerable under CEQA. No other foreseeable projects are identified that would cause operational vibration impacts in the study area; therefore, no cumulative vibration impacts would occur.

Mitigation

Mitigation measures for HST project construction noise and vibration impacts provided in Section 3.4.7, Noise and Vibration, would reduce the project 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.

Even with implementation of mitigation measure CUM-N&V-MM#1 below, the cumulative noise and vibration impacts of the HST alternatives would remain significant under NEPA, and cumulatively considerable under CEQA.

Additionally, during operations, even with implementation of mitigation measures for noise and vibration provided in Section 3.4.7, cumulative effects of operational noise would remain a significant impact under NEPA, and cumulatively considerable under CEQA.

CUM-N&V-MM#1: Coordination of construction activities. To minimize the potential cumulative effects of overlapping construction activities within the same area, HST construction activities would be coordinated with other nearby, concurrent construction projects to the extent feasible to keep noise and vibration levels below the thresholds defined in Section 3.4.3, Noise and Vibration.

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 and 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 will decay to a level below 2 milligauss (mG) at 200 feet. Average AC magnetic field levels within

homes are approximately 1 mG, and measured AC values range from 9 to 20 mG near appliances (see Section 3.5.1, Electromagnetic Fields and Electromagnetic Interference).

For radio-frequency interference the study area is 500 feet on either side of the centerline of the HST alternatives and around the perimeter of the alternative HMF sites. The potential for EMI would no longer exist for equipment beyond 500 feet from HST facilities.

There are no cumulative impacts related to EMF EMI because none of the identified past, present, or reasonably foreseeable projects have EMF and EMI impacts. Therefore, there would be no cumulative impacts under NEPA and CEQA during construction or operation of the HST.

As described in the 2005 Statewide Program EIR/EIS and the 2008 Bay Area to Central Valley Program EIR/EIS, the HST System as a whole could have potentially significant direct and indirect EMF and EMI impacts. However, with mitigation, these impacts would be reduced to less-than-significant levels.

Public Utilities and Energy

The cumulative study area for public utilities encompasses Fresno, Kings, Tulare, and Kern counties. 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 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 increased 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, SB X7-7 (2010) requires urban water purveyors to reduce customer water demand by 20% by 2020.

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

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 or extend these lines. Construction would be coordinated to avoid interruptions of utility service to hospitals and other critical users. As stated in Section 3.6, Public Utilities and Energy, the Authority will coordinate

with utility providers and regional developers to plan for the protection or relocation of utility crossings and facilities within the project study area, and will not disconnect a facility until the new facility is operational. During construction, the potential for accidental disruption of utility systems including overhead (e.g., telephone, cable television) and buried utility lines (e.g., water, wastewater, natural gas lines) is low due to established practices of utility identification. Because of the short duration of the planned interruptions, the interruption notification procedures, and the standard practices for utility identification, the cumulative construction impact on utilities would have no cumulative impact under NEPA and CEQA.

The potential construction-related cumulative impacts on utilities would be similar for all HST alternatives, because of established practices to identify affected utilities for safety and coordinate with service providers and notify customers.

Electricity Demand

The construction of the HST alternatives along with other past, present, and reasonably foreseeable projects would result in temporary increases in demand for energy. However, these incremental increases in demand under the cumulative condition are anticipated to be supplied by existing facilities and would not require the construction of additional energy-related infrastructure. Therefore, there would be no cumulative impact under NEPA and CEQA.

Potential construction-related cumulative impacts on electrical infrastructure and energy would be greatest for the Hanford West Bypass 1 and 2 Alternatives because construction of either of these alternatives would require relocation of two existing electrical substations. For the other HST alternatives, the cumulative impacts would not only be similar, but would also be less than those for the Hanford West Bypass 1 and 2 Alternatives.

Water Infrastructure and Resources

Construction activities associated with the HST alternatives in addition to other past, present, 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 will result in a net decrease in annual water consumption for the area impacted by construction of the track and facilities, 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 ac-ft/yr needed for construction compared to 12,048 ac-ft/yr current existing 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). In other words, current annual water usage for activities such as agricultural production that the project will displace is far greater than the water project construction will require annually in the same place. For this reason, the project construction will result in no cumulative impact to water infrastructure and resources.

Solid Waste/Recycling Facilities

Construction of the HST alternatives together with past, present, and reasonably foreseeable projects would result in contributions of solid waste and debris to regional landfills. Many of the nonhazardous solid waste landfills currently serving the study area are expected to reach their planned capacity before the year 2035. However, state regulations require local governments to manage solid waste reuse and disposal. Based on these requirements, additional landfill capacity is expected to be developed in the region in time to serve the construction of the cumulative projects. Additionally, as a standard construction practice for the HST, 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 to the extent practicable. 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. Because state law requires recycling of waste generated by construction, the cumulative impact of project construction on landfill capacity would be negligible under NEPA. Since state regulations will require expansion of landfill capacity in the region by the time project construction begins, the project would not have a significant impact on landfill capacity under NEPA and the project contribution would not be cumulatively considerable under CEQA. All HST alternatives would have similar construction-related cumulative impacts on solid waste/recycling facilities because solid waste generation and recycling demand would be similar for all the alternatives.

Short- and Long-Term Project Effects

Utilities

Operation of the HST alternatives together with past, present, and reasonably foreseeable projects would have a negligible cumulative impact on telecommunications, natural gas, and petroleum because the projected increase in demand for these utilities can be met by existing or planned supplies.

Potential operations-related cumulative impacts on public utilities would be similar for all HST alternatives because the demand for utilities services would be similar for all alignments.

Because the HST System as a whole would be located predominantly within existing transportation corridors, the potential system wide effects on utility operations would be minimized because utilities would be rerouted or encased to protect them from disruption and allow uninterrupted maintenance and operation. In locations where a proposed HST alignment would intersect or be in close proximity to existing utility corridors or facilities, the proposed HST design, including utility relocations and upgrades, would substantially limit impacts on utilities. Because the proposed HST System would not contribute significantly to statewide population growth, it is not expected to result in a significant increase in demand for public utility services. Thus, viewed on a system wide basis the effect on these services would not be a significant impact under NEPA and would not be cumulatively considerable under CEQA, as described in the 2005 Statewide Program EIR/EIS and the 2008 Bay Area to Central Valley Program EIR/EIS.

Electricity Demand

The energy supplied under the cumulative condition would be provided from the statewide energy grid. Residential development projects, as well as associated commercial and industrial development are required to apply for permits and undergo environmental review to ensure that the electricity demands of the project can be met. In addition, electricity providers perform regular demand projections that incorporate demand for planned development. New transmission and distribution lines would need to be built, or existing facilities would need to be upgraded, to serve the projected increased demand. Historically, new electricity generation has been in step with demand. Where supply insufficiencies have occurred, they have been the result of a number of interrelated factors and regulatory issues. Several power projects, including solar projects, are planned for the study area, as listed in Appendix 3.19-A. Although supplies for 2035 cannot be predicted with certainty, given the planning period available and the known demand from the project, energy providers have sufficient information to include the HST in their demand forecasts.

The electrical demand, inclusive of transmission losses, for the propulsion of the trains for the HST alternatives, for the operation of the trains at terminal stations, and in storage depots and maintenance facilities has been conservatively estimated to be 56,600 MBtus per day. The projected average summer power supply statewide in 2010 was forecast at 76,968 MW, or

6,303,017 MBtus per day, with an additional 92,000 MW planned to be available by 2030. Conservatively, the HST System electrical demand would be 0.9% of 2010 electrical production, and 0.4% of planned 2030 electrical production. 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 in their demand forecasts, which will inform future decision 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 of the HST alternatives and other past, present, and reasonably foreseeable projects on electrical infrastructure and energy demand during operation would not be a significant impact under NEPA and would be a less than significant impact under CEQA.

Potential operations-related cumulative impacts on electrical infrastructure and energy demand would be similar for all HST alternatives because all the alternatives would result in approximately the same number of miles traveled between stations and would have the same number of stations in operation.

As described in the 2005 Statewide Program EIR/EIS and the 2008 Bay Area to Central Valley Program EIR/EIS, the HST System as a whole would have a significant impact on statewide electricity demand. Construction-related energy consumption of the statewide HST System would result in non-recoverable energy costs; however, these costs would be recovered by the project's energy savings. Additionally, based on a refinement of the analysis conducted in the 2008 Bay Area to Central Valley Program EIR/EIS energy assessment, electricity consumption from the HST System would increase consumption by less than 1% of statewide consumption, as described in Section 3.6, Public Utilities and Energy. With mitigation, the HST System's effect on energy would not be a significant impact under NEPA and would be a less than significant impact under CEQA.

Water Infrastructure and Resources

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 (less than the water demand from 143 households or approximately 56 ac-ft/year), and less than 45,000 gallons of water per day for the HMF (equivalent to water demand from 128 households or approximately 50.4 ac-ft/year). The single largest use of water at the HMF site would be wash water for train cleaning. Most of this water would be recycled. Water use at the stations and HMF site would be less than 0.1% of the 7.4 billion gallons (approximately 22,710 ac-ft) of potable water needed each year to support the population increase predicted under the cumulative condition. As discussed in Appendix 3.6-B, Water Usage Analysis Technical Memorandum, operation and maintenance of the Fresno to Bakersfield Section will result in a net decrease of water usage over existing water usage in/at the project footprint to only 2% of the current water usage. Water usage will decrease at the track alignment and the HMF location, but increase in the Fresno, Kings/Tulare Regional, and Bakersfield station areas. Because the project would result in a net decrease in water usage, it would not contribute to the cumulative impact on water supply.

Potential operations-related cumulative impacts on water infrastructure and resources would be similar for all of the HST alternatives because the alternatives would result in similar demands for water supply (i.e., each alternative would have the same number of stations and one potential HMF).

For the HST System as a whole, effects of the extension of infrastructure and provision of water and wastewater services would not be a significant impact under NEPA and would be a less than significant under CEQA. For example, in the Merced to Fresno Section, the proposed stations and HMF facilities would not result in significant increases in water demand or significant impacts related to the provision of water or wastewater infrastructure.

Solid Waste/Recycling Facilities

Operation of the HST alternatives, together with past, present, and reasonably foreseeable projects, would result in the generation of solid waste and debris. As described above, additional landfill capacity will be developed in the region and regulatory requirements will reduce per capita solid waste generation within the timeframe to serve the projects developed under the cumulative condition. Therefore, operational effects of projects on solid waste/recycling under the cumulative condition would not be a significant impact under NEPA and would be a less than significant impact under CEQA.

Potential operations-related cumulative impacts on solid waste and recycling facilities would be similar for all the HST alternatives because all the alternatives would produce similar amounts of waste materials, as the number of stations and the potential HMF would be the same along the alignments

For the HST System as a whole, the operation of the HMF and stations would generate relatively small volumes of solid waste and would not place a substantial demand on landfill capacity. For example, the waste generated in the San Francisco to San Jose Section would be landfilled in a facility with sufficient permitted capacity to accommodate the project's solid waste disposal needs, and the implementation of that HST Section would not result in significant solid waste impacts. The effect on solid waste/recycling facilities from the HST System would have negligible intensity under NEPA and would not be cumulatively considerable under CEQA.

Summary of NEPA/CEQA Impacts

Potential cumulative impacts on public utilities and energy would be similar for all HST alternatives.

Construction of the HST project in combination with other past, present, and reasonably foreseeable future projects would not result in cumulative impacts to utilities, electricity demand, and water infrastructure and resources. Since state regulations will require expansion of landfill capacity in the region by the time project construction begins, the project would not have a significant impact on landfill capacity under NEPA and the project contribution would not be cumulatively considerable under CEQA.

Operation of the HST alternatives together with past, present, and reasonably foreseeable projects would have a negligible cumulative impact on telecommunications, natural gas, and petroleum because the projected increase in demand for these utilities can be met by existing or planned supplies.

Conservatively, the HST System electrical demand would be 0.9% of 2010 electrical production, and 0.4% of planned 2030 electrical production. 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 in their demand forecasts, which will inform future decisions regarding new infrastructure necessary to meet energy demand. Therefore, the cumulative impact of the HST alternatives and other past, present, and reasonably foreseeable projects on electrical infrastructure and energy demand during operation would not be a significant impact under NEPA and would be a less than significant impact under CEQA, and by definition, the HST project contribution to this impact would be less than the cumulatively considerable.

Operation and maintenance of the Fresno to Bakersfield Section will result in a net decrease of water usage over existing water usage in/at the project footprint to only 2% of the current water usage. Because the project would result in a net decrease in water usage, it would not contribute to the cumulative impact on water supply.

Operation of the HST alternatives, together with past, present, and reasonably foreseeable projects, would result in the generation of solid waste and debris. Additional landfill capacity will be developed in the region and regulatory requirements will reduce per capita solid waste generation within the timeframe to serve the projects developed under the cumulative condition. Therefore, operational effects of projects on solid waste/recycling under the cumulative condition would not be a significant impact under NEPA and would be a less than significant impact under CEQA.

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., 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

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 alternatives 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. Special-status plant species include little mouse tail, heartscale, and other special-status plant species that have potential to occur in the project footprint. Special-status wildlife species include, but are not limited to, vernal pool fairy shrimp, vernal pool tadpole shrimp, valley elderberry longhorn beetle, western spadefoot toad, blunt-nosed leopard lizard, Swainson's hawk, western burrowing owl,

Tipton kangaroo rat, and San Joaquin kit fox. These 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. The effect of construction of the HST project on special-status plant and wildlife species would have negligible intensity under NEPA because of the small area occupied by temporary construction sites. Because temporary construction sites would be located to avoid habitat of special status species to the extent possible, this would not be a significant impact under NEPA and the project contribution to this impact would not be cumulatively considerable under CEQA.

Habitats of Concern

Construction of the HST alternatives 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). The effect of construction of the HST project on habitats of concern would have negligible intensity under NEPA because of the small area occupied by temporary construction sites. Because temporary construction sites would be located to avoid habitats of concern to the extent possible, this would not be a significant impact under NEPA and the project contribution to this impact would not be cumulatively considerable under CEQA.

Wildlife Movement Corridors

Construction of the HST alternatives 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. However, construction staging areas 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, project construction activities would not contribute to cumulative impacts on wildlife movement corridors within the Tulare Basin.

Short- and Long-Term Project Effects

Potential cumulative impacts would be generally similar among the other HST alternatives because they would have equivalent types and degrees of impacts. However, project cumulative impacts on biological resources would be somewhat less for the Allensworth Bypass Alternative than for the corresponding segment of the BNSF Alternative, as described below.

Special-Status Plant and Wildlife Species

Special-status plant and wildlife species would be subject to substantial impacts under NEPA and significant impacts under CEQA resulting from the near- and long-term operation of the HST alternatives and other past, present, and foreseeable projects. Potential impacts on species include permanent habitat loss, habitat fragmentation, introduction of invasive species, and harassment due to increased noise and human disturbance. Because of the large area that would be permanently occupied by HST facilities, this impact would have substantial intensity under NEPA. 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 project impact would be significant under NEPA. The project contribution to the loss of special-status species would be cumulatively considerable under CEQA.

Habitats of Concern

The operation of the HST alternatives 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. Operational impacts could include permanent fragmentation, degradation, or conversion of habitats of concern including jurisdictional waters. The HST alternatives would have a cumulatively considerable contribution to these impacts because of the scarcity these types of habitat in the Tulare Basin. The Allensworth Bypass would substantially reduce effects on high-quality jurisdictional waters (i.e., vernal pools) compared to the corresponding segment of the BNSF Alternative. However, like the other HST alternatives, the Allensworth Bypass Alternative would have a cumulatively considerable contribution to adverse impacts on jurisdictional waters and special-status plant communities because these resources are fragmented and rare in the region. The project has been designed to minimize impacts to habitats of concern, particularly jurisdictional waters; therefore, the intensity of this impact is moderate under NEPA. Because habitats of concern are fragmented and rare in the region, the cumulative impact of the project would be significant under NEPA and the project contribution to the loss of habitats of concern would be cumulatively considerable under NEQA.

Wildlife Movement Corridors

Wildlife movement corridors may experience significant impacts under NEPA and CEQA as a result of operation of the HST project and past, present, and reasonably foreseeable projects in the Tulare Basin. 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 project section and other present and reasonably foreseeable projects in the Tulare Basin. Impacts could include the permanent blockage of corridors and/or linkages and disruption of wildlife due to increased lighting, noise, and motion. Because the HST is linear, spanning the entire southern San Joaquin Valley, its impact on wildlife movement corridors would have substantial intensity under NEPA. Given the context of the degradation of wildlife movement corridors in the Tulare Basin, the cumulative impact of the HST project would be significant under NEPA. The project's contribution to the impact on wildlife movement corridors would be cumulatively considerable under CEQA.

The HST System as a whole would have significant impacts on sensitive biological resources and wetlands. Segments of the HST System that would be located in new corridors could result in disturbance of sensitive habitats, as described in the 2005 Statewide Program EIR/EIS and the 2008 Bay Area to Central Valley Program EIR/EIS. The HST System could also pose a significant barrier to the movement of wildlife in areas where it severs wildlife movement corridors, such as those in the East Bay to Central Valley and the San Jose to Central Valley corridors. Additionally, the Merced to Fresno Section would contribute to the net loss of wetland habitats and blockage of wildlife movement corridors within the Central Valley.

Summary of NEPA/CEQA Impacts

When comparing HST alternatives, only the Allensworth Bypass Alternative and the corresponding segment of the BNSF Alternative would have substantial differences in potential cumulative impacts on biological resources. The BNSF Alternative would have a greater potential for cumulative impacts on biological resources, including high quality jurisdictional waters (i.e., vernal pools) than the Allensworth Bypass Alternative. Other HST alternatives would have cumulative biological resource impacts similar to those of the corresponding segment of the BNSF Alternative.

The cumulative construction and project effects of the Fresno to Bakersfield Section on biological resources would be significant under NEPA and CEQA because of the potential impacts on plant

and wildlife habitats, on habitats of concern, including jurisdictional waters, and wildlife movement corridors.

Mitigation

With the implementation of mitigation measures to avoid, minimize, and compensate for impacts on biological resources described in Section 3.7.7, Biological Resources and Wetlands, the HST alternatives effects on special status species and habitats of concern would not be significant under NEPA and would not be cumulatively considerable under CEQA because potential project impacts would be mitigated to less-than-significant levels for these resources. However, even with implementation of the mitigation measures and regardless of which HST alternatives are selected, the HST project would continue to have a significant impact on wildlife movement corridors under NEPA and CEQA because the project would create a partial barrier to wildlife movement across the Tulare Basin.

Hydrology and Water Resources

Issues addressed in hydrology and water resources include surface water, groundwater, hydrology, floodplains, water use, and water quality. The cumulative impact study area for hydrology and water resources is defined by 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 includes the upstream and downstream reaches of streams and rivers that cross through the study area. The South Valley Floor watershed defines the boundaries of the cumulative impact analysis for surface water. The study area for cumulative impacts on groundwater 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 the cumulative water use evaluation is the Tulare Lake Basin. The study area for direct and indirect impacts related to the project is described in Section 3.8.3, Hydrology and Water Resources.

Construction

Construction of the HST alternatives, in conjunction with construction activities associated with other past, present, and reasonably foreseeable projects, could alter existing drainage patterns, redirect stormwater runoff, and impact water quality by increasing the potential for erosion. Construction in a floodplain or floodway could temporarily impede or redirect flood flows because of the presence of construction equipment and materials in concentrated flow paths. Construction in areas with high groundwater could allow a direct path for construction-related contaminants to reach groundwater. Projects developed under the cumulative condition that are located near stream channels could have the greatest construction impacts. However, the HST alternatives and cumulative projects 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). Because of state requirements to minimize construction related impacts on water quality and floodplains, the effect of the HST project would have negligible intensity under NEPA. In the context of the requirements for all construction projects to obtain permits to minimize impacts to water flow and water quality, the cumulative impact to water quality and hydrology would not be significant under NEPA and the project impact would not be cumulatively considerable under CEQA.

Potential construction-related cumulative impacts on hydrology and water quality would be similar among all the HST alternatives because all alternative segments generally cross the same water bodies.

Short- and Long-Term Project Effects

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

Potential cumulative project impacts on hydrology and water resources would be similar among all HST alternatives because the amount of additional impervious surface would be similar and of the same scale among the alternatives.

The HST System as a whole, with implementation of mitigation measures, would have less-than-significant hydrology and water quality impacts under NEPA and CEQA. The construction of the HST System predominantly in existing transportation corridors would reduce the potential for adverse effects on water resources, and engineering and design practices would further reduce potential adverse impacts, as described in the 2005 Statewide Program EIR/EIS and the 2008 Bay Area to Central Valley Program EIR/EIS.

Surface Water and Groundwater Hydrology

The project, in conjunction with other planned projects, could result in changes to hydrology and to the connectivity of natural watercourses, including floodways, where the project crosses watercourses. However, potential cumulative impacts would be minimized because the project is subject to permit compliance and regulatory review, such as compliance with Title 23 of the California Code of Regulations (CVFPB flood protection), which are designed to minimize impacts from flooding and hydrologic changes.

The project, in conjunction with past, present, and reasonably foreseeable projects, would result in changes to existing drainage patterns and could result in increased stormwater runoff as a result of an increase in impervious surface area. Conversion of vacant undeveloped land to accommodate the population expected by 2035 would result in new areas of impervious surface. Similarly, the HST alternatives would result in an increase in impervious surface area caused by structures along the alignment and by structures and parking facilities at the Fresno, Kings/Tulare Regional, and Bakersfield HST stations and the HMF site. However, new development would comply with stormwater control ordinances and post-construction hydromodification requirements from National Pollutant Discharge Elimination System permits. Therefore, there would be no cumulative impact.

Guideway construction materials and soil compaction below the guideway would slightly divert the point of infiltration along rural portions of the guideway, and in urban areas the stormwater runoff would be incorporated into the urban stormwater system. In Fresno and Bakersfield much of the stormwater runoff is infiltrated. A stormwater detention basin would be provided at the Kings/Tulare Regional station to allow infiltration of stormwater runoff from impervious surfaces at the station.

Overall, the project's design and compliance with stormwater control measures would result in minor changes in stormwater runoff and impervious surfaces, as well as groundwater recharge. In combination with other reasonably foreseeable projects, these impacts would be negligible under NEPA. Therefore, there would be no cumulative impact to groundwater or surface water hydrology.

Floodplains

There are three issues to consider with regard to impacts on floodplains:

- Will flood flows be impeded by a project (such as the HST where it crosses a floodplain)?
- Will the local floodplain conveyance be reduced (such as from the construction of a large building that forces flow to go around it)?
- Will floodplain storage be reduced?

The majority of projects under the cumulative condition are linear projects that cross the floodplain. Blockage of flood flows by linear projects is not a cumulative issue, because the linear facility in a given floodplain that has the greatest restriction in flood water conveyance defines the flood flow for future facilities. In other words, from the perspective of cumulative impacts, the linear facility in a floodplain that has the fewest and/or smallest culverts will 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 will 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 the growth in Laton between the existing community and the HST alignment under the Laton Community Plan, may impact flood flows if flood protection measures are not incorporated into the new development. This could be exacerbated if inadequate drainage is provided through the HST alignment near the proposed new growth. Therefore, implementation of the HST project—along with other projects—could result in a cumulative increase in flood levels in an area larger than would have otherwise occurred considering an individual project only. However, the HST will incorporate adequate drainage; and 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 negligible.

Impacts from projects that could or will be constructed in the floodplain that reduce local conveyance will be local to the specific project area; these impacts will not interact with other projects that are not nearby. Projects that are near each other could have cumulative impacts when they reduce the conveyance in the same floodplain cross-section (e.g., two or more projects constructed across the floodplain).

The floodplains crossed by the Fresno to Bakersfield Section cover hundreds of square miles, and in a 100-year event, the water is typically from 1 to 3 feet deep. In a flood event, water flow is concentrated in defined channels, and the floodplain acts primarily as storage for the excess water, with very little flow because of the flat topography. The HST project, in combination with other past, present, and reasonably foreseeable projects, would reduce floodplain storage by approximately 0.1% or less.

Therefore, the HST project, in conjunction with other past, present, and reasonably foreseeable future projects, would result in a negligible cumulative impact to floodplains under NEPA or CEQA.

Water Use

Water demand in the Tulare Lake Basin is generally greater then readily available water supply. However, 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 facilities all emphasize long-term water management objectives to improve management of local water supply, augment supply, use water efficiency, and reduce demand (DWR 2009).

Future water demand for the Tulare Lake Basin has been estimated by DWR (DWR 2009) for three baseline scenarios that account for changes in water demand from urban development, natural resources restoration, and irrigated crop land and also accounts for state regulatory programs that improve water quality, protect fish and wildlife, and protect communities from flooding. Under these 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 (DWR 2009). 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 (DWR 2009). The majority of the scenarios predict a decrease in future water demand.

Under the future projections, an estimated 173,000 acres of agricultural land within Fresno, Kings, Tulare, and Kern counties would be converted to nonagricultural uses by 2035, of which 5,100 acres of farmland would be converted to nonagricultural uses by development planned or permitted within 2 miles of the Fresno to Bakersfield Section alternatives (see Chapter 3.14, Agricultural Lands). This conversion of land uses would result in a decrease in irrigation demand for water and an increase in demand for domestic/urban water. Also, depending on the HST alternative selected, the HST alternatives' would take out of production approximately 3,380 additional acres of farmland (a 2% increase compared to current projections), which would also result in a decrease in irrigated lands.

The HST project would cause water demand for operation and urban demand associated with the 2-3% population increase anticipated as a result of the HST project (compared to the No Project projections). The HST project would also reduce demand for irrigation water within the project footprint, offsetting project operation water use and water use associated with population increase. Therefore, the project would not contribute to the cumulative water demand in the Tulare Lake Basin.

Water Quality

Urban and agricultural runoff can carry dissolved or suspended residue of both natural and human land uses into natural water bodies. Stormwater and irrigation runoff enters streams directly as overland flow, and therefore, surrounding land uses affect surface water quality. 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 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 (see Section 3.8.4, Hydrology and Water Resources and Table 3.8-4).

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. The HST alternatives together with past, present, and reasonably foreseeable projects identified for the study area would potentially create new sources of runoff pollution and impervious surfaces that would contribute to cumulative impacts. Development under the cumulative condition could increase the amount of impervious surfaces and thereby increase runoff. Potential future uses could increase pollution of stormwater runoff by introducing new activities in the area. However, like the HST alternatives, other 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). These regulations are in place to make sure that new developments and infrastructure projects do not result in water quality standard violations. Therefore, there would be no cumulative impact on water quality.

Summary of NEPA/CEQA Impacts

All of the HST alternatives would have similar potential cumulative impacts on hydrology and water resources. Potential cumulative construction and project impacts resulting from changes to drainage, impervious surfaces, stormwater runoff, and water quality would be reduced through compliance with permits and the requirements of state and regional water quality control boards, as described above. Therefore, the cumulative impact of the HST alternatives and other past, present, and reasonably foreseeable future projects on hydrology and water resources would not be significant under NEPA and would be less than significant under CEQA.

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 region, because impacts (e.g., erosion and sedimentation) would affect areas around the region, and some seismic impacts (e.g., a large earthquake) originating in other areas of the region could affect the project. The study area for direct and indirect impacts related to the HST alternatives is described in Section 3.9.3, Geology, Soils, and Seismicity.

Construction

Because of the flat topography, generally competent soils, and groundwater typically at depths of 50 feet or more, only a limited number of environmental consequences relative to geology, soils, and seismicity are possible during construction. The risk areas are generally located near streams and river crossings where soils tend to be softer and groundwater is often closer to the ground surface. Potential construction impacts would be location-specific and are not cumulative among different projects in the same general vicinity.

Construction of facilities and infrastructure under the cumulative condition would require aggregate, ballast rock, concrete, and steel reinforcement. When considered in total, there would be a large demand for these and other construction materials. However, it is anticipated that sufficient materials would be available to meet this demand (see Section 3.9.1, Geology, Soils, and Seismicity.)

Potential construction-related cumulative impacts on geology, soils and seismicity would be similar among all HST alternatives because geologic conditions are generally similar throughout the study area.

Short- and Long-Term Project Effects

Geologic and seismic hazards exist in the study area and new development would expose people and structures to these conditions. For example, development of the HST alternatives in conjunction with other planned projects would incrementally increase the number of people and structures potentially subject to a seismic event. Structural components of the HST alternatives and the past, present, and reasonably foreseeable projects would be designed to meet or exceed engineering design requirements for railways, highways, and buildings. In addition, the HST

operations system would be designed to stop the train in the event of an earthquake. Because of design standards and operational safety features, the cumulative risk of the HST project to people and property from geologic and seismic hazards would have negligible intensity under NEPA. In the context of modern design standards for railways, highways, and buildings the cumulative risk from geologic and seismic hazards would not be significant under NEPA. The project contribution to risk of injury and property damage from exposure to geologic and seismic hazards would not be cumulatively considerable under CEQA.

Seismically induced dam failure could result in flooding in large areas of the south San Joaquin Valley (see Section 3.9.4, Geology, Soils, and Seismicity). The past, present, and reasonably foreseeable future projects could increase the number of people exposed to this flood risk. The risk of the HST project to people and property from flooding caused by dam failure would have negligible intensity under NEPA because the probability of a seismic event large enough to cause a catastrophic failure of any of the dams in the region is low. All of these dams are regularly monitored by the California Division of Safety of Dams (DSOD). DSOD is mandated by the California Water Code to protect people against loss of life and property from dam failure. DSOD engineers review and approve plans and specifications for the design of dams and oversee their construction to insure compliance with approved plans and specifications. In addition, DSOD engineers inspect over 1,200 dams on a yearly schedule to insure they are performing and being maintained in a safe manner. Inspection of the dams at Lake Isabella (administered by the USACE) have indicated that they are at risk of failure due to internal seepage. The USACE has lowered the water level of Lake Isabella to substantially reduce short-term risk and is developing a plan for repairing the dams to provide for long-term risk avoidance. Repairs to the dams at Lake Isabella are expected to be completed before 2020.

In light of this monitoring and subsequent operational and/or maintenance requirements imposed by DSOD and activities undertaken by the USACE at Lake Isabella to ensure dam safety, the cumulative risk to people and property from flooding associated with dam failure is not a significant impact under NEPA. The project contribution to risk of injury and property damage from exposure to flooding caused by dam failure would not be cumulatively considerable under CEQA.

Potential project cumulative impacts on geology, soils, and seismicity would be similar among all HST alternatives because geologic conditions and risks are similar throughout the region.

As described in the 2005 Statewide Program EIR/EIS and the 2008 Bay Area to Central Valley Program EIR/EIS, the HST System as a whole could have potentially significant impacts on geology and soils, which could be mitigated to less-than-significant levels with implementation of mitigation measures. Potentially significant impacts related to slope stability (in areas susceptible to slope failure) as well as impacts related to subsidence (if other concurrent construction projects in the area dewater from the same drainage basin) could occur. For example, areas with difficult excavations and potential slope stability concerns include the Patterson Pass and the UPRR crossings of the Diablo Range.

Summary of NEPA/CEQA Impacts

All HST alternatives would have similar potential cumulative contributions to impacts on geology, soils, and seismicity. 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 be less than significant 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 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 alternatives 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, compliance with regulations 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 impact would not be significant under NEPA and the project contribution to potential release of hazardous materials to the environment would not be cumulatively considerable under CEQA.

All HST alternatives would have similar potential construction-related cumulative impacts related to hazardous materials and wastes because the regional transportation, use, storage, and disposal of hazardous materials during construction would be similar.

Short- and Long-Term Project Effects

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 Fresno to Bakersfield Section. Households, industrial sites, and agricultural operations use hazardous materials and generate hazardous waste.

Potential project cumulative impacts on hazardous materials and wastes would be similar among all HST alternatives because the transportation and use of hazardous materials would be similar for each. 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. Together with past, present, and reasonably foreseeable projects, there would not be a cumulative hazards impact. 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.

As described in the 2005 Statewide Program EIR/EIS and the 2008 Bay Area to Central Valley Program EIR/EIS, the HST System as a whole would have less-than-significant impacts on hazardous materials and waste with the implementation of mitigation measures. While hazardous materials may be unearthed during project construction, such as at the Diridon station site (San Francisco to San Jose Section), any hazardous wastes encountered through ground-disturbing activities during construction would be handled and disposed of in accordance with regulatory requirements.

Summary of NEPA/CEQA Impacts

Potential cumulative impacts on hazardous materials and wastes would be similar among all HST alternatives during both construction and operation. Compliance with regulatory requirements would minimize the risk of releases and exposure to hazards and would reduce potential impacts from projects constructed and operated under the cumulative condition. Therefore, the cumulative impacts on hazardous materials of the HST alternatives and past, present, and reasonably foreseeable projects would not be significant under NEPA and would be less than significant 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 HST alternatives would be located in mostly rural areas with small- to medium-size populations in the urban centers. In rural areas, longer emergency response times would result from low-density road networks; from barriers formed by the UPRR, SR 99, SR 198, SR 43, and BNSF rights-of-way; and from fewer fire stations with lower staffing levels. Under the cumulative condition, the increased number of construction workers required to meet the needs of the growing population would result in an increased demand for emergency response services. However, this would occur over time, thus allowing local agencies to plan for the increased demand. Additionally, the combined construction of planned highway projects under the cumulative condition and the construction of any of the HST alternatives would require several

thousand construction workers per year. The localized temporary increase in population due to the influx of construction workers would temporarily increase the demand for fire protection, law enforcement, and other emergency response services. If all planned transportation projects are built simultaneously, emergency services may be overburdened, especially if current budget challenges persist. However, many of the other planned projects are currently on hold because of fiscal constraints, which postpones the need for some of the construction workers. Construction workers must follow strict OSHA and safety practices, thus reducing occurrences where there would be a need to rely on emergency services. Therefore, cumulative construction demand on emergency services would have negligible intensity under NEPA. In context of the safety requirements for construction projects and the short-term nature of construction, the cumulative impact of project construction on emergency services would not be significant under NEPA and the project contribution to demands on emergency services would not be cumulatively considerable under CEQA.

In Fresno, HST project construction could require temporary street closure in the downtown area and could result in increased response times by emergency services during construction. Because construction of the HST project would only result in a temporary increase in emergency response times, the impact would have negligible intensity under NEPA. In addition, because the Authority would develop a construction transportation plan with local jurisdictions to minimize project effects on emergency response times, the project in combination with other past, present, and reasonably foreseeable projects would not be a significant impact under NEPA. The project contribution to delays in emergency response times would not be cumulatively considerable under CEQA. All HST alternatives would have similar potential construction-related cumulative impacts on safety and security because all would have similar demands on emergency response systems and changes in access.

Short- and Long-Term Project Effects

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. A large number of proposed residential projects, many of which include commercial components, would substantially increase the population in Kern County and, to a lesser extent, the populations of Fresno, Kings, and Tulare counties. Future development would be required to pay impact fees that support capital costs for new or expanded government facilities including emergency service facilities per local jurisdiction regulations, and therefore, future services would be adequate. Any new or expanded government facilities would be designed and constructed to be consistent with local land use plans.

Additionally, project design features would limit the potential for train accidents; therefore, local response to accidents is not expected to be required, because incidents would be extremely rare. Because the HST stations would have onsite security patrols, no increased demand for police protection at these stations is anticipated. The stations themselves would introduce new passengers into the cities, which could increase the demand for fire and ambulance services. Development of an HMF alternative could also increase the demand for fire and ambulance services. Because the HMF would have control access with onsite security, no increased demand for police protection is anticipated. The potential increased demand for fire and ambulance service resulting from the HST stations and HMF combined with other past, present, and reasonably foreseeable projects could have moderate intensity under NEPA. In the context of budget constraints by cities and counties, this could be a significant impact under NEPA. The project contribution to cumulative impacts on emergency services could be cumulatively considerable under CEQA.

Increased travel safety would be a cumulative benefit with the HST alternatives and highway safety improvement projects. Both would improve overall safety in regional travel. The HST

alternatives would provide a transportation option that is safe during inclement weather and not subject to vehicular traffic accidents. In addition, the HST alternatives would reduce emergency response times by constructing new grade separations for the BNSF Railway and by reducing the volume of traffic on state highways, as some long-distance travelers would use the HST System instead of driving. Potential operations-related cumulative impacts on travel safety would be similar for all HST alternatives. None of the project alternatives encroaches 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 development near those airports. Therefore, past, present, and foreseeable future projects in combination with the HST project would not have a cumulative effect on the safety of people residing in the vicinity of an airport.

The HST System as a whole could result in less than significant impacts on safety and security, with implementation of mitigation measures, and would not be cumulatively considerable. Overall, the system could result in increased safety and security with the installation of grade separations at roadway crossings. For example, roadway separations along the Caltrain Corridor (San Francisco to San Jose Section) would improve safety in the study area. In other sections of the HST System, construction could result in traffic detours and longer emergency response times (e.g., at various locations along the Merced to Fresno Section). In addition, peak short-term demand for emergency services would increase during construction of the Fresno to Bakersfield Section. These impacts could be mitigated to less than cumulatively significant.

Summary of NEPA/CEQA Impacts

Potential cumulative impacts on safety and security would be similar for all HST alternatives. 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 alternatives, 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 from this population growth.

The HST stations themselves would introduce new passengers into the cities, which could increase the demand for fire and ambulance services. Development of an HMF alternative could also increase the demand for fire and ambulance services. The potential increased demand for fire and ambulance service resulting from the HST stations and HMF could be a significant impact under NEPA and CEQA. Overall, travel safety would increase, as both the operation of the HST alternatives and implementation of highway improvement projects would result in the construction of grade separations, could improve safety during inclement weather, and may reduce traffic on highways. Therefore, the cumulative condition would result in a beneficial impact to safety and security.

Mitigation

Mitigation provided in Section 3.11.7, Safety and Security, to monitor the response of local fire, rescue, and emergency service providers to incidents at HST stations and the HMF and provide a fair share cost of service, as well as coordinate with city and county law enforcement agencies and fire departments through the Fire and Life Safety Program would reduce potential cumulative impacts. Additionally, as required in the HST project design, project construction would be coordinated with local jurisdictions where road closures would be required to ensure that emergency response services are not disrupted. No additional mitigation is needed to address cumulative impacts.

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. Environmental justice is considered under NEPA; however, since there are no CEQA significance criteria for environmental justice, no CEQA determinations are provided.

Construction

Potential construction-related cumulative impacts on division and/or disruption of communities, economics, and environmental justice populations would be similar for all HST alternatives.

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 on the Central and Edison districts in the city of 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. The projects themselves would not displace any residents or divide or impact the community's character. However, there could be temporary increases in traffic, changes in traffic patterns, changes in access to community facilities, and construction noise and dust if the projects were constructed simultaneously with the HST project. Construction activities can hinder access and interaction among neighborhoods because of increased congestion, detours, and lane or road closures. If construction of the HST System in this area coincides with construction of the projects described above, the HST alternatives in combination with the reasonably foreseeable projects would result in a significant impact under NEPA and CEQA. The HST project contribution would be cumulatively considerable under CEQA.

Economic

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. Unemployment rates in the study area are typically higher than those for the state, and they 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).

Under the cumulative condition, numerous planned and potential projects would be necessary to accommodate the population growth by 2035. The growth would result in a cumulative economic impact, especially with respect to employment and unemployment rates. The addition of large construction projects, such as the Fresno to Bakersfield Section, would cumulatively stimulate local economies.

For example, it is estimated that approximately 22,200 one-year, full-time job equivalents would be created within Fresno, Kings, Tulare, and Kern counties over the entire construction period of the HST project. Direct jobs in the construction sector comprise around 33% of this total estimate—or 7,400 one-year, full-time job equivalents—while annual indirect and induced jobs created in the region comprise approximately 67% of this total, or 14,800. During the peak construction activity (2014–2017) approximately 3,900 workers would be needed annually (with approximately 1,300 direct jobs in the construction sector and 2,600 indirect and induced jobs in

other sectors).[3] Cumulative construction impacts to the economy would be beneficial under NEPA.

Environmental Justice

Populations within Fresno and Bakersfield are ethnically diverse, with high percentages of minority and low-income persons. Construction impacts, as described in Section 3.12.4, Socioeconomics, Communities, and Environmental Justice, Section 3.3.4, Air Quality and Global Climate Change, and Section 3.5.4, Noise and Vibration, could result in disproportionately high and adverse impacts on these minority and low-income communities if construction of the HST project coincides with construction of other present and reasonably foreseeable projects affecting these communities, as described above under Division and/or Disruption of Community. Therefore, cumulative environmental justice impacts would be significant under NEPA.

Short- and Long-Term Project Effects

Potential project cumulative impacts on division and/or disruption of community, economics, and environmental justice populations would be similar for all alternatives because the alternatives follow existing transportation corridors. Additionally, the scale of community divisions and property acquisitions would be similar for all alternatives.

Division and/or Disruption of Community

Transportation projects can bisect neighborhoods and reduce community cohesion. Existing railways in the study area are not a barrier to communities, because typically these communities have developed around these existing railways. HST alternatives would contribute to division of community impacts in northwest and northeast Bakersfield, as discussed in Section 3.12.4, Socioeconomics, Communities, and Environmental Justice. Although other projects under the cumulative scenario do not bisect these communities and are not anticipated to result in the further division of existing communities, the operation of the proposed HST alternatives would result in significant and unavoidable potential impacts. Therefore, the cumulative impacts to division of communities would be substantial under NEPA, and significant under CEQA; and the HST alternatives' contribution would be substantial under NEPA, and cumulatively considerable under CEQA.

The HST System as a whole would result in significant impacts associated with community and neighborhood cohesion and in substantial effects associated with property loss. These impacts and effects could occur in areas of the HST System that are not located within existing railroad rights-of-way due to the creation of new transportation corridors, as described in the 2005 Statewide Program EIR/EIS and the 2008 Bay Area to Central Valley Program EIR/EIS. For example, during construction, the HST System could result in impacts on community cohesion in the city and county of Fresno and in the city of Bakersfield.

Economic

The HST project in conjunction with other planned projects would result in large increases in the number of jobs and spending within the Fresno to Bakersfield Section. Combined with the anticipated new homes, roads, and infrastructure that are projected under the cumulative impact

[3] A 1-year full-time job equivalent is one person fully employed for 1 year. It is likely that many of these jobs created would be held by the same person for more than a single year. Therefore, the total annual employment during the heaviest period of construction is also presented to better identify the peak number of job openings created and the number of additional workers that will be needed in the region.

scenario, the economic benefits would be cumulatively substantial. Most businesses that would relocate under any of the HST alternatives would continue to benefit from the improved economy. Under the cumulative condition, cumulative impacts to the economy would be beneficial under NEPA.

As described in the 2005 Statewide Program EIR/EIS and the 2008 Bay Area to Central Valley Program EIR/EIS, the construction and operation of the HST System would have beneficial impacts on tax revenues and employment.

Environmental Justice

Populations along most of the Fresno to Bakersfield Section are ethnically diverse, with high percentages of minority and low-income persons. Any cumulative impacts in these areas (both negative and beneficial) would disproportionately impact minority and low-income communities, particularly in the urban areas surrounding the HST stations in the cities of Fresno and Bakersfield. For example, in the city of Fresno, construction of the HST station would result in an increase in the jobs in the study area and would have a beneficial economic impact on the community. On the other hand, noise and vibration impacts from operations would remain significant in many places after mitigation as described in Section 3.4.4, Noise and Vibration. A majority of these places where mitigation measures would not reduce impacts to a less than significant level would be in urban areas with environmental justice communities, including Fresno. Details of these environmental justice effects are detailed in Section 3.12.4, Socioeconomics, Communities and Environmental Justice. Therefore, cumulative environmental justice impacts would be significant under NEPA.

At the system wide level, implementation of the HST is not expected to result in disproportionately high and adverse effects on minority or low-income populations, as described in the 2005 Statewide Program EIR/EIS and the 2008 Bay Area to Central Valley Program EIR/EIS. System wide, adverse effects on communities of concern would not be appreciably more severe or greater in magnitude than the adverse effects on populations that are not communities of concern.

Summary of NEPA/CEQA Impacts

Potential cumulative socioeconomics, communities, and environmental justice for construction and operations impacts would be similar for the HST alternatives and their corresponding alignments.

As described above, under Division and/or Disruption of Community, construction of the HST project and other past, present, and reasonably foreseeable projects would result in a significant cumulative impact under NEPA in the Central and Edison districts of Fresno. The project contribution to this impact would be cumulatively considerable under CEQA.

The aggregate 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, would be substantially beneficial under NEPA.

Under the cumulative condition, HST project impacts on environmental justice populations would be significant under NEPA.

Mitigation

As noted in Section 3.12.6, Socioeconomics, Communities, and Environmental Justice, the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, fully compensates for any property acquisition, including housing of last resort. In addition, to

address cumulative construction impacts pertaining to the division and/or disruption of communities and environmental justice effects, the following mitigation measures would implemented.

CUM-SO-MM#1: Coordination of construction activities. To minimize the potential cumulative effects of overlapping construction activities within the same area, the Authority will consult with the City and County of Fresno and with the City of Bakersfield regarding the timing of construction of the HST alternatives.

CUM-SO-MM#2: Public outreach. For areas with potential overlapping construction schedules among major projects, the Authority will undertake environmental justice outreach regarding these construction schedules with targeted noticing, availability of Spanish-language materials and interpretation, and a communications liaison with environmental justice communities.

With implementation of the above mitigation measures, the cumulative division and/or disruption of communities and environmental justice impacts during construction would be reduced.

Station Planning, Land Use, and Development

The study area for the station planning and land use cumulative impacts analysis includes Fresno, Kings, Tulare, and Kern counties. In much of the rural area traversed by the Fresno to Bakersfield Section of the HST, the alignment would run parallel to the existing BNSF Railway. Land uses adjoining the north-south alignment in these rural areas are predominantly agricultural, with small areas of single-family residential and commercial uses also present. Non-rural land uses occur in Fresno, Hanford, Corcoran, Wasco, Shafter, and Bakersfield, 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 projects under the cumulative condition would result in temporary impacts related to increases in noise levels, dust, traffic congestion, visual changes, disruption of access to properties, and in some cases such as the HST project, temporary use of land for construction staging. The HST alternatives would contribute to these impacts on land uses adjacent to the project, and would also affect lands used for construction staging. Although these impacts to existing land uses would be temporary in duration and areas used for staging may be returned to their previous uses after construction is complete, the increased levels of noises, dust, and degradation of visual quality would result in substantial cumulative land use impacts under NEPA, and significant cumulative impacts under CEQA. The HST alternatives' contribution to would be substantial under NEPA and cumulatively considerable under CEQA.

Potential construction-related cumulative impacts on land use and development would be similar among all the alternatives because construction staging areas for all alternatives would be similar in size and location.

Short- and Long-Term Project Effects

By 2035, population in the counties of Fresno, Kings, Tulare, and Kern is projected to increase by 73% without the project. Development needed to accommodate this population growth is currently planned to occur 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 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. Future development under the cumulative condition , without the project, is anticipated to be implemented in compliance with local zoning and land use plans, and therefore, is anticipated to be compatible with existing and/or planned land uses.

The HST alternatives 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 alternatives would be a relatively small percent of the four-county study area (approximately 4,000 acres, or less than 0.01%), there is the potential for significant land use incompatibilities to occur.

Overall, the cumulative condition would result in substantial land use impacts under NEPA and significant land use impacts under CEQA because of changes in land use that could result from implementation of the HST alternatives. The HST alternatives' contribution to this impact would be substantial under NEPA, and cumulatively considerable under CEQA.

As described above, the potential operations-related cumulative impacts on land use and development would be greatest in portions of the BNSF that pass through agricultural lands, and are not located in the existing rail right-of-way, Hanford West Bypass 1 and Hanford West Bypass 2, Corcoran Bypass, Allensworth Bypass, and Wasco-Shafter Bypass alignments, because of potential conflicts with land use plans and resulting land use incompatibilities. Additionally, the Kings/Tulare Regional Station alternatives would not be consistent with current land uses and would result in greater land use incompatibilities.

The HST System as a whole could contribute to potentially significant impacts associated with sensitive land uses—including land uses in the Fresno to Bakersfield Section study area—as described in the 2005 Statewide Program EIR/EIS and the 2008 Bay Area to Central Valley Program EIR/EIS. Where the HST System would be located in a new rail corridor in residential areas and parks or require widening of existing corridors in residential and commercial business areas, it could have a cumulatively considerable contribution to impacts on neighborhoods and communities. Where the alignment would be located within an existing transportation right-of-way, such as in the San Francisco to San Jose and the Oakland to San Jose corridors, it would be highly compatible with existing land uses. In areas such as the East Bay to Central Valley, the HST alignments would have moderate land use compatibility due to the mix of land uses, including agricultural and residential lands. Implementation of segments of the HST System in new transportation corridors, such as the San Jose to Central Valley corridor, would have the greatest land use incompatibilities.

Summary of NEPA/CEQA Impacts

Potential construction-related cumulative impacts on land use and development would be similar for all alternatives. However, 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, Hanford West Bypass 1 and Hanford West Bypass 2, Corcoran Bypass, Allensworth Bypass, and Wasco-Shafter Bypass alignments, and the Kings/Tulare Regional Station alternatives.

Cumulative construction impacts from increased levels of noises, dust, and degradation of visual quality would result in substantial cumulative land use impacts under NEPA, and significant

cumulative impacts under CEQA. The HST alternatives' contribution to would be substantial under NEPA, and cumulatively considerable under CEQA.

The cumulative impact during operation would be substantial under NEPA, and would be significant under CEQA, because of the unplanned permanent conversion of land to transportation uses, and resulting land use incompatibilities. While the HST alternatives beneficially support densification of land uses around HST stations in downtown Fresno and Bakersfield; overall, the HST alternatives' contribution would be substantial under NEPA and cumulatively considerable under CEQA for the reasons described above.

Mitigation

Many related impacts in other resources have mitigation measures that work to also reduce the likelihood for impacts on land uses. For example, mitigation measures for transportation are found in Section 3.2, Transportation; Section 3.3, Air Quality and Global Climate Change; for community resources, in Section 3.12, Socioeconomics, Communities, and Environmental Justice; for parks in Section 3.15, Parks, Recreation, and Open Space; and for regional growth in Section 3.18, Regional Growth.

The Authority has considered avoidance and minimization measures that are consistent with commitments in the Program EIR/EIS documents. No additional measures have been identified to minimize or avoid significant land use impacts. The Authority would work with local governments to amend their plans to reduce the land use conflicts where appropriate.

Agricultural Lands

The cumulative impact study area for agricultural lands includes Fresno, Kings, Tulare, and Kern counties. These counties have been, and will 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 alternatives is described in Section 3.14, Agricultural Lands.

Construction Impacts

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 alternatives. Construction of other past, present, and reasonably foreseeable projects could also result in the temporary conversion of farmland for construction-related uses. The land temporarily used for construction of the HST project would be restored and returned to agricultural use after construction is completed. Therefore, project construction activities would not contribute to the cumulative impact of conversion of agricultural land.

Potential construction-related cumulative impacts on agricultural lands would be similar for all HST alternatives because construction staging areas for all alternatives would be similar in size and location.

Short- and Long-Term Project Effects

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 an additional 327,000 acres of farmland would be converted by 2050 (San Joaquin Valley Regional Planning Agencies 2009). Although conversion to urban uses is in many cases consistent with local plans and policies that identify areas for planned future growth, the project contribution to the loss of Important Farmland would be cumulatively considerable under any HST alternative, which would require the acquisition of up to approximately 3,380 acres of Important Farmland. The project effect of farmland conversion would be substantial under NEPA. In the context of the amount of agricultural land projected to be converted to nonagricultural uses, this would be a significant impact under NEPA.

The HST alternatives and other past, present, and reasonably foreseeable projects would have a less-than-significant cumulative impact related to Williamson Act conflicts. The majority of the cumulative projects are not under active Williamson Act contracts because they are within city spheres of influence and are planned for urbanization. Outside the sphere of influence of local jurisdictions, Williamson Act protections discourage the conversion of agricultural lands.

When comparing impacts among alternatives, the BNSF Alternative would have the greater potential for cumulative effects than the other alignment alternatives. The Hanford West Bypass 1 and 2, Corcoran Elevated, Corcoran Bypass, Allensworth Bypass, and Wasco-Shafter Bypass would convert less Important Farmland than the corresponding segments of the BNSF Alternative. No Important Farmland would be converted with any of the alternatives through the Bakersfield metropolitan area.

As described in the 2005 Statewide Program EIR/EIS and 2008 Bay Area to Central Valley Program EIR/EIS, the HST System as a whole would have a significant impact on agricultural lands, and therefore would contribute to a cumulatively significant impact. Impacts would result from direct conversion of agricultural lands to transportation uses, as well as indirect loss resulting from division of agricultural parcels. Impacts would be greatest in the Central Valley, such as along the Merced to Bakersfield Section, and least in the urbanized corridors, such as the San Francisco to San Jose Section.

Summary of NEPA/CEQA Impacts

The effects of the HST alternatives and other past, present, and reasonably foreseeable projects to agricultural lands would be a significant impact under NEPA and CEQA. Potential cumulative impacts on agricultural lands would be greater with the BNSF Alternative than any of the other alignment alternatives.

Mitigation

With implementation of mitigation measures provided in Section 3.14.7, Agricultural Lands, cumulative impacts would be reduced. However, the loss of farmland cannot be replaced; therefore, the HST alternatives' contribution to cumulative agricultural impacts would remain substantial and cumulatively considerable under NEPA and CEQA, respectively.

Parks, Recreation, and Open Space

The study area for the parks, recreation, and open space cumulative impacts analysis includes the cities of Fresno, Hanford, Corcoran, Wasco, Shafter, Bakersfield, and Fresno, Kings, Tulare, and Kern counties. 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

Construction of the HST alternatives and other past, present and reasonably foreseeable future projects in the study area could result in cumulative impacts on parks and recreation areas. Construction of projects under the cumulative condition that are located in close proximity to parks could generate noise, changes to visual character, and temporary park closures that could result in a significant cumulative impact under NEPA and CEQA.

Construction of the HST alternatives would have potential significant impacts on parks and recreation resources, such as the Kern River Parkway and Mill Creek Linear Park, resulting from temporary closure of some park areas during construction. The cumulative impact of this project with other transportation projects listed in Appendix 3.19-B in the vicinity could result in potential cumulative impacts from noise and visual changes to Kern River Parkway and Mill Creek Linear Park. Significant impacts from construction noise would also occur to the proposed Orchard Park and recreation areas associated with Bakersfield High School. The effect of HST construction on park use would be moderate under NEPA. Because construction noise and visual effects would be temporary and intermittent, this is not a significant impact under NEPA. The contribution to construction-related park impacts would be cumulatively considerable under CEQA.

Potential construction-related cumulative impacts on parks and recreation resources would be greater for the Corcoran Elevated and the BNSF Alternative than the Corcoran Bypass because both alternatives would have indirect impacts on Father Wyatt Park, whereas the Corcoran Bypass would not. The BNSF Alternative would have greater cumulative impacts than the Bakersfield South and Bakersfield Hybrid alternatives because it would have construction impacts on Bakersfield High School. All other HST alternatives would have similar cumulative impacts on parks and recreation resources to their corresponding alternatives.

Short- and Long-term Project Effects

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. To maintain the current quality of life, all of the communities will need to increase parkland 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. The HST project is projected to increase population by 2% to 3% above current projections for the region. It is anticipated that the developers of new residential projects would be required to donate parkland as a condition of the entitlement process. This additional demand on parks and recreational facilities would have moderate intensity under NEPA because a proportional increase in new parkland would be required by local agencies through the planning/permitting process for this new development. Therefore, the cumulative effect of additional demand on parks and recreational facilities resulting from project growth would not be a significant impact under NEPA. The project contribution to this impact would not be cumulatively considerable under CEQA.

As described in the 2005 Statewide Program EIR/EIS and 2008 Bay Area to Central Valley Program EIR/EIS, the HST System as a whole could have significant impacts on parks, recreation, and open space. The Statewide EIR/EIS identified measures to reduce these impacts but could not conclude that these impacts would be reduced to a level of less than cumulatively significant. Therefore, the HST System would result in impacts on parks, recreation, and open space that would be significant under NEPA and CEQA.

Summary of NEPA/CEQA Impacts

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. The HST project

is projected to increase population by 2% to 3% above current projections for the region. Because developers of new residential projects would be required to donate parkland as a condition of the entitlement process, the impact of increased demand on parks and recreation facilities would not be significant under NEPA and the project contribution would not be cumulatively considerable under CEQA.

Mitigation

No mitigation is required.

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 the agricultural areas, the corridor is visible in relatively long-distance views, whereas in urbanized areas, views toward the corridor are relatively close and are often obstructed by buildings and trees. Therefore, accounting for the existing terrain, predominant uses, and proposed elevated parts, the potential viewshed for the Fresno to Bakersfield Section is within 0.25 mile of the alignment centerline of the proposed HST alignment in urbanized areas, including all of Fresno and Bakersfield. In open landscape areas it 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 and the Greenhorn and Tehachapi mountains. The visual character 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. Under the cumulative condition, the character of the study area would continue to change with the development and expansion of urban cityscapes and scattered suburban development.

Construction

Development of cumulative projects in the vicinity of the Fresno to Bakersfield Section would result in construction activities that would create temporary visual changes from demolition, vegetation removal, construction staging areas, construction lighting, and general construction activities. All HST alternatives would noticeably affect the Fresno and Bakersfield downtown areas during construction. The BNSF Alternative would also affect the downtown areas of Corcoran, Wasco, and Shafter, and the Colonel Allensworth State Historic Park. Most of the staging sites would be located adjacent to the proposed HST alignment in areas that are generally rural or industrial in nature. Equipment and earthmoving activities are not visually intrusive in these types of settings. In urban areas, staging areas would be largest near the HST stations. While these cumulative projects would likely be constructed at various time periods and separated visually throughout the area, they could in some cases have overlapping construction schedules and be located in close proximity. The cumulative visual effect would have moderate intensity under NEPA. Because construction would be short-term, this impact would not be significant under NEPA. The project contribution to construction-related visual impacts would be cumulatively considerable under CEQA.

Potential cumulative construction-related impacts on visual resources would be similar among all HST alternatives because each alternative would reduce the visual quality of the affected landscapes as seen by high-sensitivity viewers.

Short- and Long-Term Project Effects

Planned projects in the city of Fresno include the Fresno freight rail alignment project, the widening of Ventura Boulevard, a new 3-million-gallon storage tank, the SR 99 Monterey Bridge replacement project, the C.A.R.T.S. Trucking Yard, and the SR 99 Cedar/North Avenue interchange upgrade. These cumulative projects would be located in industrial and highway-dominated settings of low existing visual quality. The HST 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 would not 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 viewshed. The cumulative visual impact of the HST project in Fresno would have negligible intensity because it would not change the overall visual character or quality of the visual setting. In context of the low existing visual quality and low viewer sensitivity, the cumulative visual impact in Fresno would not be significant under NEPA and the project contribution to this impact would not be cumulatively considerable under CEQA.

In the San Joaquin Rural/Agricultural Valley setting, the BNSF Alternative would pass within the boundaries of the approved Rosedale Ranch Specific Plan area, requiring modification of the plan, and resulting in adjacencies between the HST and high-sensitivity residential viewers within the plan area. This foreseeable future scenario would result in strong adverse visual effects on the adjacent high-sensitivity viewer groups that would have substantial intensity under NEPA. In the context of the size of the Rosedale Ranch development plan (1,655-acre residential, commercial, retail, institutional, and light industry development), this would be a significant impact under NEPA and the project contribution would be cumulatively considerable under CEQA.

The Wasco-Shafter Bypass Alternative would interact in similar ways with the Rosedale Ranch project, and the Orchard Park Specific Plan in Shafter. Strong declines in visual quality of the proposed residential setting, in combination with high sensitivity of residents, could result in a significant impact under NEPA and CEQA.

The Hanford West Bypass 1 and 2 alternatives would interact in similar ways with the approved Laton Community Plan update and Live Oak Master Plan. These alternatives would pass within 175 feet of parcels designated as low-density residential reserve under the Laton Community Plan update, and would bisect the western portion of the Live Oak Master Plan, through areas designated for residential use. The resulting close adjacency between the proposed HST alignments and the high-sensitivity residential viewers in the master plan area would result in a strong decline in visual quality as seen by these high-sensitivity/high exposure viewers, and represent an effect of substantial intensity under NEPA. Because the residential development plans in combination with the Hanford West Bypass 1 and 2 would change the agricultural character of the existing landscape, this would be a significant impact under NEPA. The HST project contribution to this impact would be cumulatively considerable under CEQA.

In the Bakersfield area, the BNSF, Bakersfield South, and Bakersfield Hybrid alternatives would pass through the proposed Bakersfield Commons project area. The Bakersfield Commons project is proposed in an area of vacant land, adjacent industrial uses, and existing suburban development. Because of the low visual quality of the proposed development site, the cumulative effect of the two projects in combination could be beneficial to existing viewers.

In Bakersfield, 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.

Potential cumulative impacts on aesthetics would be greatest for the Hanford West Bypass 1 and 2 Alternatives and the Wasco-Shafter Bypass Alternative compared to the corresponding segment of the BNSF Alternative, because these alignments bisect major development projects. The BNSF, Bakersfield South, and Bakersfield Hybrid alternatives would have beneficial visual effects in the city of Bakersfield. The Corcoran Elevated, Corcoran Bypass, and Allensworth Bypass alternatives would not have cumulative visual impacts.

As described in the 2005 Statewide Program EIR/EIS and 2008 Bay Area to Central Valley Program EIR/EIS, the HST System as a whole could have a potentially significant impact on aesthetics. The HST System would create short-term, construction-related visual changes and long-term visual changes from the introduction of 700 to 750 miles of a new transportation system that would be visible along many major highways and rail corridors in the state. For example, the loss of mature trees within the HST System footprint in several cities on the San Francisco peninsula would result in substantial changes in visual character. Changes in highly scenic areas, such as scenic open space and mountainous areas, would also be significant. For example, the potential stations at Pleasanton (I-680/Bernal Road), Pleasanton (BART), Livermore (I-580), Livermore (I-580 Greenville Road), Tracy (Downtown), Tracy (ACE), Union City (Shinn), and San Jose (Diridon) in the San Francisco to San Jose Section could have significant visual impacts.

Summary of NEPA/CEQA Impacts

Potential cumulative construction-related impacts on visual resources would be similar among all HST alternatives because each alternative would reduce the visual quality of the affected landscapes as seen by high-sensitivity viewers. Potential cumulative impacts on aesthetics would be greatest for the Hanford West Bypass 1 and 2 Alternatives and the Wasco-Shafter Bypass Alternative, as described above, due to interactions with multiple approved development projects.

The cumulative visual effect of project construction would have moderate intensity under NEPA. Because construction would be short-term, this impact would not be significant under NEPA. The project contribution to construction-related visual impacts would be cumulatively considerable under CEQA.

The cumulative development projects identified in the San Joaquin Valley Rural/Agricultural landscape 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 would be considered to represent a cumulatively considerable contribution to those individual project effects. Therefore, the cumulative 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.

Mitigation

Even with implementation of the mitigation measures provided in Section 3.16.6, Aesthetics and Visual Resources, to mitigate visual impacts, , cumulative impacts would remain significant in the Orchard Park Specific Plan area, the Rosedale Ranch project area, and the Bakersfield Commons project area until landscape screening matures in 10 years or more. The following mitigation measure would minimize this impact.

CUM-VQ-MM#3: Coordination on plan development. The Authority will coordinate with local jurisdictions to provide information about the project design so that the local plans and

proposed development projects that could be adversely affected by the HST alternatives, as described above, could be modified and potential visual impacts to high-sensitivity viewers could be reduced.

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 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 south 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 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 impacted by other foreseeable projects.

Construction

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. 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. 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. In addition, 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 substantial impacts under NEPA and significant impacts under CEQA. The HST alternatives' contribution to cumulative impacts would be substantial 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.

Short- and Long-Term Project Effects

Under the cumulative condition, cultural resources would continue to be affected in the Central Valley urban areas between 2010 and 2035 due to growth, changes in land use, and ground disturbance. Adverse effects on eligible resources could result in the neglect, abandonment, or removal of historic properties. A given project is not likely to be able to avoid or mitigate an impact to a less-than-significant level, especially in the case of a large-acreage project or a project that requires major ground disturbance (e.g., those projects listed in Appendix 3.19-A and Appendix 3.19-B). Development in the urban areas will 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. The significance of potential archaeological and paleontological resources cannot be determined at this time, and the cumulative impact on such resources cannot be determined. Therefore, due to the lack of information, under the cumulative condition, impacts on cultural resources are considered to be substantial under NEPA and significant under CEQA.

Future growth under the cumulative condition would result in urbanization of land that is outside of existing urbanized areas but within identified urban spheres of influence. Historical architectural resources could also be damaged or require removal from areas in and around the study area. Also, historic architectural resources may be affected by the introduction of noise and vibration or by the effect of the project on a resource's setting. Furthermore, local projects and the secondary effects of redevelopment pressures around the HST stations would potentially result in the removal of historic buildings in the downtowns of Fresno, Hanford, and Bakersfield from construction of the BNSF Alternative or Hanford West Bypass 1 and 2 Alternatives. 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. Although mitigation measures would be implemented to reduce the effects on potentially significant cultural resources, significant impacts could still occur.

Potential cumulative impacts on cultural resources would be greatest for the BNSF Alternative (in the vicinity of the City of Fresno) and the Hanford West Bypass 1 and 2 Alternatives, as described above; the other HST alternatives would have similar impacts on cultural resources.

As described in the 2005 Statewide Program EIR/EIS and the 2008 Bay Area to Central Valley Program EIR/EIS, the HST System as a whole could have a potentially significant impact on archaeological resources, historical structures, and paleontological resources. Potential impacts would likely occur in areas that cross formations with paleontological sensitivity, such as the Colma Formation (San Francisco to San Jose Section), and in areas where the HST System alignments use existing rail corridors, as these corridors and potential station locations in urban

centers typically are surrounded by historic structures and districts, such as the potential station locations in Redwood City, Palo Alto, and Mountain View.

Summary of NEPA/CEQA Impacts

Potential cumulative impacts on archaeological and paleontological resources would be similar for all HST alternatives. Potential cumulative impacts on historical architectural resources would be greatest for the BNSF Alternative because the majority of the architectural resources are located in the City of Fresno and the BNSF Alternative is the only alternative in this area, and the Hanford West Bypass 1 and 2 Alternatives; the other HST alternatives would have generally similar cumulative historical architectural resource impacts.

Continued urbanization and development projected under 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 substantial under NEPA and significant under CEQA. Construction and operation of the HST alternatives could contribute to similar impacts. Therefore, the HST alternatives' contribution to impacts would be substantial under NEPA and would be cumulatively considerable under CEQA.

Mitigation

The HST project will minimize cumulative impacts on cultural resources by adhering to federal, state, and local regulations and by providing guidance on the treatment of significant properties (as defined in CEQA Section 106 and regional evaluation criteria). Implementation of the mitigation measures for cultural resources discussed in Section 3.17.6 would minimize impacts, and thereby reduce cumulative impacts. Even with implementation of the mitigation measures for cultural resources provided in Section 3.17, Cultural and Paleontological Resources, the project contribution to cumulative impacts would remain substantial under NEPA and cumulatively considerable under CEQA.

Summary of Cumulative Impacts

Table 3.19-2 below summarizes the HST alternatives' contribution to potential cumulative impacts during construction and operation. The potential differences in impacts between the alternatives are listed, as well as mitigation. A summary of the HST systemwide impacts are also provided.

Table 3.19-2
Cumulative Impacts Summary

Resource	Construction Phase	Short- and Long-Term Project Effects	HST Alternatives (similar or distinct)[1]	Mitigation	HST System (Statewide)[2]
Transportation	N	B (regional level) M (local level)	Similar among alternatives	See measures in Section 3.2.7	Regional - Benefits Local- Cumulatively considerable contribution
Air Quality and Global Climate Change	M	B	Similar among alternatives	See measures in Section 3.3.7	Air Quality – Cumulatively considerable contribution (construction only) GHG – Benefits
Noise and Vibration	C	C	Similar among alternatives	See measures in Section 3.4.7 CUM-N&V-MM#1	Noise – Cumulatively considerable contribution Vibration – No cumulative impacts
Electromagnetic Fields and Electromagnetic Interference	NI	NI	Similar among alternatives	See measures in Section 3.5.7	Less than cumulatively considerable contribution
Public Utilities and Energy					
Utilities	NI	N	Similar among alternatives	None required	Less than cumulatively considerable contribution
Electrical Infrastructure and Energy	NI	N	Construction- Impacts are greater for the Hanford West Bypass 1 and 2 Alternatives Operation- Similar among alternatives	None required	Utilities- Less than cumulatively considerable contribution Energy- Beneficial
Water Infrastructure and Resources	NI	N	Similar among alternatives	None required	Less than cumulatively considerable contribution
Solid Waste/ Recycling Facilities	N	N	Similar among alternatives	None required	Less than cumulatively considerable contribution

Table 3.19-2
Cumulative Impacts Summary

Resource	Construction Phase	Short- and Long-Term Project Effects	HST Alternatives (similar or distinct)[1]	Mitigation	HST System (Statewide)[2]
Biological Resources and Wetlands	M	C	Allensworth Bypass Alternative would have less impacts than the corresponding segment of the BNSF Alternative	See measures in Section 3.7.7	Cumulatively considerable contribution
Hydrology and Water Resources	N	N	Similar among alternatives	None required	Less than cumulatively considerable contribution
Geology, Soils, and Seismicity	N	N	Similar among alternatives	None required	Less than cumulatively considerable contribution
Hazardous Materials and Wastes	N	NI	Similar among alternatives	See measures in Section 3.10.7	Less than cumulatively considerable contribution
Safety and Security	N	B	Similar among alternatives	See measures in Section 3.11.7	Less than cumulatively considerable contribution
Socioeconomics, Communities, and Environmental Justice					
Division and/or Disruption of Community	C	C	Similar among alternatives	See measures in Section 3.12.7	Cumulatively considerable contribution
Economic	B	B	Similar among alternatives	None required	Beneficial
Environmental Justice	C	C	Similar among alternatives	See measures in Section 3.12.7 CUM-SO-MM#1 CUM-SO-MM#2	Less than cumulatively considerable contribution

Table 3.19-2
Cumulative Impacts Summary

Resource	Construction Phase	Short- and Long-Term Project Effects	HST Alternatives (similar or distinct)[1]	Mitigation	HST System (Statewide)[2]
Station Planning, Land Use, and Development	M	C	Construction- similar among alternatives Operation- greater for portions of the BNSF that pass through agricultural lands and are not located in the existing rail right-of-way, Hanford West Bypass 1 and 2, Corcoran Bypass, Allensworth Bypass, and Wasco-Shafter Bypass alignments, and the Kings/Tulare Regional Station alternatives.	See measures in Section 3.13.7	Cumulatively considerable contribution
Agricultural Lands	N	C	Construction- similar among alternatives Operation-Impacts Corcoran Elevated, Corcoran Bypass, Allensworth Bypass, Bakersfield South, and Bakersfield Hybrid would have fewer impacts than the corresponding BNSF Alternative	See measures in Section 3.14.7	Cumulatively considerable contribution
Parks, Recreation, and Open Space	M	N	Construction- Impacts are greater for the Corcoran Elevated and the BNSF Alternative than with the Corcoran Bypass. Operations-Impacts are greater for the BNSF Alternative than for the Allensworth Bypass. Impacts are greater for BNSF Alternative than for Bakersfield South and Bakersfield Hybrid alternatives.	See measures in Section 3.15.7	Less than cumulatively considerable contribution

Table 3.19-2
Cumulative Impacts Summary

Resource	Construction Phase	Short- and Long-Term Project Effects	HST Alternatives (similar or distinct)[1]	Mitigation	HST System (Statewide)[2]
Aesthetics and Visual Quality	M	M	Operations impacts are greater for the Hanford West Bypass 1 and 2 Alternatives and the Wasco-Shafter Bypass Alternative	See measures in Section 3.16.7 CUM-VQ-MM#1	Cumulatively considerable contribution
Cultural and Paleontological Resources	C	C	Archaeological and paleontological resources –similar among alternatives; historical architectural resources –impacts are greater for the BNSF Alternative in the Fresno area, and the Hanford West Bypass 1 and 2 Alternatives	See measures in See Section 3.17.7	Cumulatively considerable contribution

Notes:
[1] The table identifies where HST Alternatives vary between construction and project impacts.
[2] HST System (Statewide) determinations are based on the 2005 Statewide Program EIR/EIS.

Acronyms:
B = Beneficial Impact
NI = No Impact
N = Negligible or Not Cumulatively Considerable Impact
M = Cumulatively Considerable Impact -- Fully Mitigated
C = Cumulatively Considerable Impact -- Not Fully Mitigated