3.6 Public Utilities and Energy

3.6.1 Introduction

This section describes the regulatory setting, affected environment, potential impacts and mitigation measures for public utilities and energy within the area potentially affected by the Merced to Fresno Section of the California HST System. The Statewide Program EIR/EIS (Authority and FRA 2005) concluded that the HST system alternative would not result in a significant effect on utilities and utility services when viewed on a systemwide basis. Project design elements that reduce effects include elevated guideways that avoid utilities, construction phasing to avoid interruptions of utility service, and identification of conflicts with utilities. The Statewide Program EIR/EIS also concluded that the systemwide energy demand would be potentially significant under CEQA. However, the current analysis represents various design, operation, and analysis refinements when compared to these early estimations. Project features that reduce energy consumption include designing the HST System with regenerative braking and implementing energy saving measures during construction. More information regarding public utilities and energy is provided in Section 3.2, Transportation; Section 3.5, Electromagnetic Fields and Electromagnetic Interference; Section 3.8, Hydrology and Water Resources; Section 3.10, Hazardous Materials and Wastes, Section 3.13, Local Growth, Station Planning, and Land Use; and Section 3.14, Agricultural Lands.

3.6.2 Laws, Regulations, and Orders

The following sections discuss federal, state, and local laws; regulations; and agency jurisdiction and management guidance that are relevant to this resource.

3.6.2.1 Federal

<u>The Power Plant and Industrial Fuel Use Act of 1978 [Executive Order 12185, 44 Federal Register Section 75093; Public Law 95-620]</u>

Section 403(b) of the Power Plant and Industrial Fuel Use Act encourages conservation of petroleum and natural gas by recipients of federal financial assistance.

<u>Norman Y. Mineta and Special Programs Improvement Act [Public Law 108-426]</u>

This act, established by the United States Department of Transportation, Pipeline and Hazardous Materials Safety Administration, regulates safe movement of hazardous materials to industry and consumers by all modes of transportation, including pipelines. The regulations require pipeline owners and operators to meet specific standards and qualifications, including participating in public safety programs that "notify an operator of proposed demolition, excavation, tunneling, or construction near or affecting a pipeline." This includes identifying pipelines that may be affected by such activities and identifying any hazards that may affect a pipeline. In California, pipeline safety is administered by the Office of the Fire Marshal.

<u>Federal Energy Regulatory Commission</u>

The Federal Energy Regulatory Commission (FERC) is an independent agency that regulates the interstate transmission of natural gas, oil, and electricity. FERC also regulates natural gas and hydropower projects. As part of that responsibility, FERC regulates the transmission and sale of natural gas for resale in interstate commerce, the transmission of oil by pipeline in interstate commerce, and the transmission and wholesale sales of electricity in interstate commerce. FERC also licenses and inspects private, municipal, and state hydroelectric projects; approves the siting and abandonment of interstate natural gas facilities, including pipelines, storage, and liquefied natural gas; oversees environmental matters related to natural gas and hydroelectricity projects and major electricity policy initiatives; and administers accounting and financial reporting regulations and conduct of regulated companies.

Corporate Average Fuel Economy

Corporate Average Fuel Economy standards are federal regulations that are set to reduce energy consumed by on-road motor vehicles. The National Highway Traffic Safety Administration regulates the standards and the EPA measures vehicle fuel efficiency. The standards specify minimum fuel consumption efficiency standards for new automobiles sold in the United States. The current standard is 27.5 miles per gallon (mpg) for passenger cars and 20.7 mpg for light-duty trucks. On May 19, 2009, President Obama presented a new national fuel economy program that adopts uniform federal standards to regulate both fuel economy and greenhouse gas emissions. The program covers model year 2012 to model year 2016 and ultimately requires an average fuel economy standard of 35.5 mpg in 2016 (39 mpg for cars and 30 mpg for trucks).

Executive Order 12186, Conservation of Petroleum and Natural Gas (December 17, 1979, 44 F.R. 75093)

This executive order encourages additional conservation of petroleum and natural gas by recipients of federal financial assistance.

3.6.2.2 State

California Code of Regulations, Title 24, Part 6, Energy Efficiency Standards

Title 24, Part 6 of the California Code of Regulations, Energy Efficiency Standards, promotes efficient energy use in new buildings constructed in California. The standards regulate energy consumed for heating, cooling, ventilation, water heating, and lighting. The standards are enforced through the local building permit process.

Renewable Portfolio Standard Program [Senate Bill 1078]

Requires retail sellers of electricity to increase their purchases of electricity generated by renewable sources and establishes a goal of having 20% of California's electricity generated by renewable sources by 2017. In 2010, the California Air Resources Board (CARB) extended this target for renewable energy resource use to 33% of total use by 2020 (CARB 2010). Increasing California's renewable supplies will diminish the state's heavy dependence on natural gas as a fuel for electric power generation.

Integrated Waste Management Act [Assembly Bill (AB) 939]

Mandates a reduction of waste being disposed and establishes an integrated framework for program implementation, solid waste planning, and solid waste facility and landfill compliance. The California Integrated Waste Management Board (CIWMB) oversees a disposal reporting system and facility and program planning. On January 1, 2010, all CIWMB duties and responsibilities, along with the Division of Recycling of the Department of Conservation, transferred to the new California Department of Resources Recycling and Recovery (CalRecycle), which is within the Natural Resources Agency.

Local Government Construction and Demolition (C&D) Guide [Senate Bill 1374]

Seeks to assist jurisdictions with diverting their C&D material, with a primary focus on the CalRecycle (formerly CIWMB) developing and adopting a model C&D diversion ordinance for voluntary use by California jurisdictions.

Protection of Underground Infrastructure [California Government Code, Section 4216]

Requires that an excavator must contact a regional notification center at least 2 days prior to excavation of any subsurface installations. The notification center will notify the utilities that may have buried lines within 1,000 feet of the excavation. Representatives of the utilities are required to mark the specific location of their facilities within the work area prior to the start of excavation. The construction contractor is required to probe and expose the underground facilities by hand prior to using power equipment.

Pavley Rule [AB 1493]

In California, the Pavley regulations for automobile efficiency are expected to reduce greenhouse gas emissions from California passenger vehicles by about 22% in 2012 and about 30% in 2016, all while improving fuel efficiency and reducing motorists' costs.

3.6.2.3 Local Jurisdictions Plans and Policies

The Merced to Fresno Section of the California HST System traverses several local government jurisdictions, including Merced, Madera, and Fresno counties; the cities of Atwater, Merced, Chowchilla, Madera, and Fresno; and the community of Le Grand. Table 3.6-1 lists county and city municipal plans and codes that were identified and considered in preparation of this analysis. Regional plans for the management of utilities or energy have not been prepared.

Table 3.6-1
Local Plans and Policies

Policy Title	Summary
Merced County	
Merced County Year 2000 General Plan (Merced County 1990)	Establishes that electrical, gas, crude oil, and communication transmission and distribution lines should parallel major roads or rail systems. Encourages construction of new transmission and distribution lines within existing utility easements and rights-of-way (Circulation, Goal 3, Objective 3A). Requires that permit reviews consider the effects on the capacity and distribution systems for water, sewer, and storm drains (Circulation, Goal 4, Objective 4A). Encourages the use of renewable energy resources for residential, commercial, industrial, and public building applications (Open Space and Conservation, Goal 2, Objective 2D).
Merced County Code, Title 9	Sets standards for refuse disposal and collection.
City of Atwater	
City of Atwater General Plan (City of Atwater 2000)	Encourages the incorporation of energy conservation features into new developments (Open Space and Conservation Element, Goal CO-7, Policy CO-7.1).
City of Atwater Municipal Code, Title 13	Provides a means by which city water supply and sewage disposal facilities may be constructed, extended, and expanded to provide service for new development within the city. Provides for the maximum possible beneficial public use of the city's sewage collection and treatment facilities, regulates the use of the city's water service, and promotes the efficient reuse of water. Provides for the testing, construction, repair, reconstruction, abandonment, and destruction of wells.
City of Merced	
Merced Vision 2015 General Plan (City of Merced 1997)	Indicates that adequate public utilities infrastructure should accompany new development (Public Services and facilities Goals, Policies, and Actions, Goal Area P-1). This includes effective storm drainage facilities that are integrated with other features, such as sidewalks, recreation facilities, and landscaping (Public Services and facilities Goals, Policies, and Actions, Goal Area P-5).
City of Merced Municipal Code, Title 15	Establishes the requirements for connecting to the city's water and sewer systems.

Policy Title	Summary
Madera County	
Madera County General Plan (Madera County 1995)	Uses the development review process so that adequate public facilities and services are available to serve new developments (Public Facilities and Services, Goal 3A, Policy 3A1). Promotes the efficient use of water and a reduced wastewater system (Wastewater Collection, Treatment, and Disposal, Goal 3D, Policy 3D2). Encourages project designs that maintain natural drainage and minimize drainage concentrations and impervious surfaces. Requires compliance with state and federal pollutant discharge requirements (Storm Drainage and Flood Control, Goal 3E, Policy 3E5-3E7). Promotes the maximum use of solid waste source reduction, recycling, composting, and environmentally safe transformation of wastes (Landfills, Transfer Stations, and Solid Waste Recycling, Goal 3F, Policy 3F2). New development is required to meet the applicable provisions of the *Madera County Integrated Waste Management Plan* (Landfills, Transfer Stations, and Solid Waste Recycling, Goal 3F, Policy 3F6). Facilitates the provision of adequate gas and electric, communication, and telecommunication services and facilities to efficiently serve existing and future needs while minimizing noise, electromagnetic, and visual impacts on existing and future residents (Utilities, Goal 3J, Policy 3J1).
Madera County Code, Title 13 and Title 14	Promotes good water utility practices, encourages economic and efficient development, protects groundwater quality, and establishes minimum standards of design, construction, and operation of water systems. Provides for sewage disposal methods and systems within the unincorporated areas of the county. Sets minimum standards for the construction of landfills, excavations, and related activities so as to prevent erosion, sedimentation, and other environmental damage.
City of Chowchilla	
City of Chowchilla 2040 General Plan Update, Public Review Draft (City of Chowchilla 2009)	The city designates adequate, appropriately located land for utility uses including electric substations and overhead and underground utility corridors (Public Facilities and Services Element).
City of Chowchilla Municipal Code, Title 13	Sets installation, replacement, and metering requirements for water service connections. Establishes standards for connection to the city's sewer system and the city's exclusive right to make connections.
City of Madera	
City of Madera Municipal Code, Title V	Sets standards for garbage, refuse, and recycling. Sets sewer connection requirements and wastewater treatment and collection regulations. Establishes acceptable water usage during operation and construction.
Fresno County	
Fresno County General Plan (Fresno County 2000)	Public facilities and services must be available to serve new development (Public Facilities and Services Element, Goal PF-A, Policy PF-A.1). Requires all new urban commercial and industrial developments to use underground utility lines onsite (Public Facilities and Services Element, Goal PF-J, Policy PF-J.3). The county approves new development only if there is adequate water to serve the development (Public Facilities and Services Element, Goal PF-C, Policy PF-C.12). Requires that all new development use water conservation technologies, and encourages the use of reclaimed water (Public Facilities and Services Element, Goal PF-C, Policy PF-C.36 and Policy PF-C.27). Promotes efficient water use and reduced wastewater system demand (Public Facilities and Services Element, Goal PF-D,

Policy Title	Summary
	Policy PF-D.5). Requires concurrent installation of drainage facilities with development (Public Facilities and Services Element, Goal PF-E, Policy PF-E.6). Implements policies for safe and efficient disposal or recycling of solid waste (Public Facilities and Services Element, Goal PF-F).
Fresno County Code, Title 8 and Title 14	To promote the general health, safety, and welfare of Fresno County citizens, bans the disposal of construction and demolition debris at the American Avenue and Coalinga Landfills. Sets well construction, pump installation, and well destruction standards. Establishes regulations governing the discharge of wastewater into wastewater treatment facilities operated by the County. Prohibits the commencement, conduct, or continuance of illicit discharges to the storm drain system within the county.
City of Fresno	
2025 City of Fresno General Plan and Related Environmental Impact Report No. 10130 (City of Fresno 2002)	Requires a determination that there is or there will be adequate trunk sewer capacity to serve proposed development (Public Facilities Element, Policy E-18-d). Effects of new development on the long-range water budget and the conclusions and recommendations of the Fresno Metropolitan Water Resource Management Plan are considered (Public Facilities Element, Policy E-22-I and E-22-l).
City of Fresno Municipal Code, Chapter 6	Encourages the diversion of commercial and C&D materials from landfill disposal. Sets standards for water service connections. Encourages reclamation and recycling of water. Requires prevention, control, and reduction of stormwater pollutants. Provides requirements for sewer connections.
Construction and Demolition Ordinance	Requires that C&D debris generated under a city-issued building, relocation, or demolition permit of 8 cubic yards or more of material by volume be either segregated and recycled by the permit holder at a certified recycling facility or collected unsegregated by an authorized collection agent or permit holder for disposal at a certified recycling facility (CalRecycle 2007).

3.6.3 Methods for Evaluating Impacts

3.6.3.1 Public Utilities and Energy Data Collection and Analysis

Utilities

Data provided by local utilities service providers within the study area describe the type, size, and location of existing and proposed utility infrastructure. Field survey information (gathered in November and December 2009 and in April and May 2010) augments the information provided by utility service providers. The locations of underground utilities (e.g., natural gas lines, petroleum pipelines, fiber optic cables, and telecommunication lines) were mapped by recording their aboveground signage with a handheld global positioning system unit.

The impact evaluation considers all utilities but focuses on major utilities. For the purpose of this analysis, major utilities include the following:

- High-voltage electrical lines (50 kilovolts [kV] or greater).
- High-pressure natural gas lines.
- Petroleum and fuel lines.

- Water, wastewater, irrigation and stormwater canals, conduits, and pipes (outside diameter of 16 inches or larger).
- Fiber optic and communication lines.

This analysis considers high-voltage, underground and aboveground electrical lines, underground high-pressure natural gas lines, and petroleum lines and facilities "high-risk" utilities (Caltrans 1997). In addition, this analysis considers electrical substations to be high risk. The remaining utilities, such as water and wastewater lines, have a lower safety risk.

Estimates for water demand, wastewater, stormwater, and waste removal services for HST stations use typical ratios, such as gallons per minute, water demand per square foot, and ridership and employment projections. The analysis compares these estimated quantities with anticipated supply and capacity, as reported by the service providers in the Merced to Fresno Section of the HST corridor.

Water demand estimates for construction are based on an estimated 5-year construction period concluding in 2020. Annual water use estimates for operations are based on full build-out of the project in 2035. Estimates of existing water use were generated by applying region-specific water use rates for the known land uses in project footprint (see Section 3.13, Station Planning, Land Use, and Development). Wastewater generation would be approximately 45% to 55% of total water demand during operation. Additional detail regarding water supply, stormwater, and hydrology can be found in Section 3.8, Hydrology and Water Resources.

Waste generated by C&D activities is based on estimates by project engineers using the existing character of the study area and the requirements of various project attributes. Operational waste generation is based on the anticipated ridership, the number of employees, and estimates of waste generation and recycling in California.

Energy

The proposed HST System would obtain electricity from the statewide grid. Although the Authority adopted a goal to power the system with clean, renewable electricity, any potential impacts on electrical production that may result from the proposed HST System would affect statewide electricity reserves and, to a lesser degree, transmission capacity. To identify the projected energy demand of the Merced to Fresno Section of the HST System, estimated energy impacts for the entire HST System were prorated based on the proportion of the length of HST guideway within the Merced to Fresno Section study area.

Transportation energy is generally discussed in terms of direct and indirect energy. Direct energy involves all energy consumed by vehicle propulsion. This energy is a function of traffic characteristics such as volume, speed, distance traveled, vehicle mix, and thermal value of the fuel being used. This energy also includes the electrical power requirements of the HST project as well as aircraft fuel. Indirect energy consumption involves the non-recoverable, one-time energy expenditure involved in constructing the physical infrastructure associated with the project.

Energy is commonly measured in terms of British thermal units (Btu). A Btu is defined as the amount of heat required to raise the temperature of 1 pound of water by 1 degree Fahrenheit. For transportation projects, energy usage is predominantly influenced by the amount of fuel used. The average Btu content of fuel is the heat value (or energy content) per volume of fuel as determined from tests of fuel samples. A gallon of gasoline produces approximately 114,000 Btu (EPA 2010); however, the Btu value of gasoline varies from season to season and from batch to batch. Btu is the unit of measure used to quantify the overall energy effects expected to result from construction and operation of the HST System.

Energy impacts caused by the project might include the additional consumption of electricity to power the HSTs (direct use) and consumption of resources to construct the proposed HST facilities (indirect use). Energy used for vehicle propulsion is a function of traffic characteristics and the thermal value of the fuel used. Petroleum consumption rates for vehicle travel were derived from the travel demand forecast for the HST and growth projections performed by the California Energy Commission (CEC). These consumption rates were used to determine the amount of petroleum used for transportation under the No Project Alternative and HST alternatives. Current electricity consumption rates from the CEC are compared with the projected energy consumption of the HST System.

The entire HST System would be approximately 800 miles long. The length of the Merced to Fresno Section alignment alternatives ranges from 62 to 84 miles, including the longest design options. This is approximately 10% of the length of the entire HST System. Therefore, the anticipated direct electricity use during operation would be approximately 10% of the total HST System power use or 8 gigawatt hours (GWh) per day.

Indirect energy consumption involves the nonrecoverable, one-time energy expenditure required to construct the physical infrastructure associated with the project. Indirect energy impacts are evaluated quantitatively. This analysis uses construction energy data from other sources or existing HST systems. Construction energy information for comparable HST systems is not readily available. Therefore, construction-related energy consumption factors are derived from construction data gathered for typical heavy-rail systems and the San Francisco Bay Area Rapid Transit District (BART) heavy-rail commuter system. These data were used to estimate the projected construction-related energy consumption for the HST alternatives in the Merced to Fresno Section presented in Table 3.6-2.

Actual energy consumption may differ from these estimates, depending on the final design. Table 3.6-2 indicates that the estimated energy consumed to construct guideway varies substantially by design type. The UPRR/SR 99 Alternative has two design options, and the BNSF Alternative has four design options, each with different lengths and ratios of at-grade and elevated guideway. To compare the HST alternatives, Table 3.6-2 shows the combination of alternative components that have the highest construction energy usage.

Table 3.6-2
Construction-Related Energy Consumption Assumptions for the Merced to Fresno Section

Feature	Energy Consumption Factor (billion Btu)[a]	UPRR/SR 99 Alternative[b]	BNSF Alternative[b]	Hybrid Alternative[b]
At-grade	19.11/one-way guideway miles	36 guideway miles	68 guideway miles	58 guideway miles
Elevated	55.63/one-way guideway miles	35 guideway miles	14 guideway miles	5 guideway miles
Retained Fill	163.14/one-way guideway miles	1 guideway mile	2 guideway miles	1 guideway mile
HST Station	78 per station	2 stations	2 stations	2 stations

[a] Factors for energy consumption for BART system construction (as surrogate for HST construction through urban areas) and a freight terminal (as a surrogate for a passenger train station), as identified in Table 3.5-2 of the Draft Bay Area to Central Valley HST Program EIR/EIS (Authority and FRA 2008).

[b] Values given for the most energy intensive design option. The values for "guideway miles" for each option accounts for a "one-way" guideway. The number of stations assumes construction of two HST stations (Merced and Fresno).

Specific profile data are not available for all of the HMF alternatives. The Castle Commerce Center HMF would require the greatest length of total guideway at approximately 8 miles, approximately 2 miles of which would need to be elevated to cross SR 99 and the BNSF railway. The remaining HMF stations would require between 3 and 4 miles of guideway. Because these HMF sites would only require a limited length of elevated track, energy consumption is calculated using the at-grade factor for preliminary estimates.

The construction energy payback period measures the number of years required to pay back the energy used in construction with operational energy consumption savings of the HST alternative prorated to statewide energy savings. The payback period is calculated for the Merced to Fresno Section by dividing the estimated HST System construction energy by the amount of energy that would later be saved by the full operation of the HST System (based on the prorated statewide value). The calculations assume that the amount of energy saved in the study year (2035) would remain constant throughout the payback period.

3.6.3.2 Methods for Evaluating Effects under NEPA

Pursuant to NEPA regulations (40 CFR 1500-1508), 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 consideration of context. Beneficial effects are identified and described. When there is no measurable effect, impact is found not to occur. Intensity of adverse effects is summarized as the degree or magnitude of a potential adverse effect where the adverse effect is thus determined to be negligible, moderate, or substantial. It is possible that a significant adverse effect may still exist when on balance the impact is negligible or even beneficial. For public utilities and energy, the terms are defined as follows:

Negligible public utilities impacts are those that result in a slight measurable increased use of utilities and service systems, but the increase is very close to the existing conditions. *Moderate* impacts are defined as a measureable change in these resources, but the change does not contribute to a violation of regulatory standards or conflict with or exceed the capacity of existing facilities (e.g., wastewater treatment plants or landfills). *Substantial* impacts are those that contribute to a violation of regulatory standards or conflict with or exceed the capacity of existing facilities.

Negligible energy impacts are those that would result in a slight measurable increased use of energy but are very close to the existing conditions. *Moderate* impacts are defined as a measurable change in energy consumption but that can be met through existing generating facilities or new power plant facilities already approved by state and federal regulatory agencies and scheduled to be built and operational by 2035. *Substantial* impacts are those that would require construction and operation of new electrical generating facilities.

3.6.3.3 CEQA Significance Criteria

Public Utilities

According to Appendix G of the CEQA Guidelines, a significant impact on utilities and service systems would occur if the project results in or requires any of the following:

- Construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.
- New or expanded entitlements to supply water to the project.
- A determination by the wastewater treatment provider that serves or may serve the project that it does not have adequate capacity to serve the projected project demand in addition to its existing commitments.
- Construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.

- Insufficient permitted capacity at the landfill serving the project to accommodate solid waste disposal needs.
- Noncompliance with federal, state, and local statutes and regulations related to solid waste.
- Conflict with a fixed facility such as an electrical substation or wastewater treatment plant (WWTP).

Energy

According to Appendix F of the CEQA Guidelines, the means to achieve the goal of conserving energy include decreasing overall per capita energy consumption, decreasing reliance on natural gas and oil, and increasing reliance on renewable energy sources. The following significance criterion determines whether the proposed HST alternatives would have a potentially significant effect on energy use, including energy conservation:

Significant long-term operational or direct energy impacts would occur if the proposed alternatives place a substantial demand on regional energy supply, require significant additional capacity, or significantly increase peak and base period demands for electricity and other forms of energy.

3.6.3.4 Study Area

This section considers two study areas in the analysis of public utility and energy resources. The study area for public utilities conflicts is the construction footprint (see Section 3.1, Introduction) and includes surface, subsurface, and overhead utilities.

The area studied to determine the potential impacts of the HST System on electricity generation and transmission includes the entire state of California (and western states that produce energy that is exported to California) because the HST System would obtain electricity from the statewide grid. Therefore, this analysis cannot apportion to a particular regional study area the use of any particular generation facilities.

3.6.4 Affected Environment

This section describes the current conditions for public utilities and infrastructure as well as energy demand.

3.6.4.1 Public Utilities

Major public utilities within the study area include facilities for electricity, natural gas and petroleum distribution, telecommunications, potable water, stormwater, wastewater, and solid waste. As shown in Table 3.6-3 and discussed in the following sections, various service providers maintain utilities and associated easements within the study area.

Table 3.6-3
Local Utility and Energy Providers

Utility Type		Provider	County/City
Electrical		Pacific Gas and Electric Company (PG&E)	Merced, Madera, and Fresno counties
		Merced Irrigation District	Merced County
Natural Gas		PG&E	Merced, Madera, and Fresno counties
Communications	Telephone	AT&T	Merced, Madera, and Fresno counties
	Cable/ Internet	Various	Merced County
			Madera County
			Fresno County
Water Supply		Merced Irrigation District	Merced County
		City of Merced	City of Merced
		City of Madera	Madera County
		City of Chowchilla	
		Madera Irrigation District	
		Chowchilla Water District	
		Madera County	
		City of Fresno	City of Fresno
Sewer		City of Atwater	City of Atwater
		City of Merced	City of Merced
		City of Madera	City of Madera
		City of Fresno	City of Fresno
Stormwater		City of Atwater	City of Atwater
		City of Merced	City of Merced
		City of Chowchilla	City of Chowchilla
		City of Madera	City of Madera
		Fresno Metropolitan Flood Control District	City of Fresno
Solid Waste		Merced County Solid Waste Regional Agency	Merced County
		Madera Disposal, Inc.	Madera County
		Allied Waste Services	Fresno County

Electrical Transmission Lines

PG&E provides electricity to much of northern California, from approximately Bakersfield to the Oregon border. The company's generation portfolio includes hydroelectric facilities, a nuclear power plant, and a natural gas-fired power plant. Merced Irrigation District provides electric service from the Downtown Merced Station area to approximately Mission Avenue, south of the City of Merced. Merced Irrigation District generates electricity at the McSwain and New Exchequer Dams in Mariposa County (City of Atwater 2009a).

Three transmission and power lines cross the study area in the City of Merced, concentrated near the downtown center. Transmission lines approximately parallel the existing UPRR/SR 99 corridor between the cities of Merced and Fresno. There are two substations in the study area, both in Madera County. One station, owned by PG&E, is located in the Ave 21 Wye study area southeast of Robertson Boulevard at the Avenue 21 and Railroad Avenue intersection. A second station (at 16223 Road 28¼) is in the study area of the BNSF and Hybrid alternatives. There is an additional substation located near the study area of the HST station alternatives in Fresno, but outside of the construction footprint. This station, located at 600 E Street, is not discussed further.

High Pressure Natural Gas Pipelines

PG&E is the only natural gas service provider for the region and is responsible for maintaining the infrastructure for natural gas distribution. High-pressure natural gas distribution lines generally follow existing transportation corridors (e.g., roads and railroad tracks). From the City of Merced through the City of Madera, natural gas transmission mains parallel the east side of the UPRR tracks. There are also several high-pressure natural gas lines that cross the study area in the City of Merced and between the community of Fairmead and the City of Madera. In the City of Madera, a high-pressure gas main and a gas transmission line cross the study area. In Fresno, two natural gas distribution lines cross the study area.

The community of Le Grand is located within the PG&E service area but historically has not had natural gas service (Le Grand 1983). There were no indications of underground natural gas lines in Le Grand during field reconnaissance; however, there was an indication of a gas line between the City of Merced and the community of Le Grand.

Petroleum and Fuel Pipelines

Kinder Morgan, a pipeline and energy storage company, owns and operates a high-pressure petroleum pipeline that parallels the SR 99 corridor. Signage paddles are located approximately every 300 feet along the existing UPRR right-of-way to indicate the location of the buried pipeline. The pipeline is part of Kinder Morgan's Pacific Operations Santa Fe Pacific Pipeline, which consists of approximately 684 miles of trunk pipeline in five sections throughout the western states (Kinder Morgan 2009).

Communication Facilities

The primary telecommunications service provider in the study area is AT&T (AT&T Knowledge Ventures, LLP 2007). Other utility providers own or lease cell towers and telecommunications lines (cable and telephone). Components of the infrastructure are located aboveground and belowground and are generally within the UPRR and SR 99 rights-of-way between the cities of Merced and Fresno. Sprint and Quest own fiber-optic lines between the cities of Merced and Fresno.

Water Supply Infrastructure

Groundwater is the basic source of drinking water in the region. Many residents in rural and unincorporated areas rely on private groundwater wells for drinking water. Agricultural water users augment their groundwater supplies with surface water that is conveyed through a network of natural and constructed channels. Irrigation of agricultural land is the primary water use in the San Joaquin River region (California Department of Water Resources 2005). Average daily use of public water in the

Merced, Madera, and Fresno county region is 275 gallons per resident (Sacramento Bee 2009). Table 3.6-4 summarizes water supplies for urban areas in the Merced to Fresno Section.

Table 3.6-4
Existing and Projected Urban Water Demand Summary
for the Merced to Fresno Section

Urban Area	Demand (acre-feet/year)	
	Current	Future (2025–2035) Projected
City of Atwater	10,650[a]	19,800[a]
City of Merced	30,120[a]	55,677[a]
Community of Le Grand	Not available	1,027[a]
Madera County[b]	29,540[c]	91,100[c]
City of Fresno	165,798[d]	209,400 to 239,200[d, e]

[a] Source: Merced County (2009).
[b] Includes urban and rural use in cities, unincorporated towns, and private residences.
[c] Source: Madera County (2008).
[d] Source: City of Fresno (2008).
[e] Includes savings expected through conservation and urban use reduction.
Note: 1 acre-foot of water is equivalent to 325,851 gallons.

Merced County

Merced Irrigation District supplies irrigation water from surface and groundwater sources to a large portion of eastern Merced County, south of the Merced River (Merced County LAFCO 2004). The principal water source for Merced County is the Merced River, which has headwaters in Yosemite National Park and flows southwest to the San Joaquin River. In addition to natural drainage features, water-supply-related infrastructure includes constructed irrigation canals. Distribution facilities include earthen channels, concrete-lined channels, and pipelines. The study area in the unincorporated area of the county south of the City of Merced includes a proposed water main.

City of Merced

The City of Merced pumps, treats, and delivers water to residents within the city. Merced Irrigation District serves agricultural users within the city.

The City of Merced uses deep wells that are located to minimize the potential for local drawdown of groundwater. The city's groundwater is in an overdraft condition, exhibiting an average drop of 1.7 feet annually between 1971 and 1997 (Merced County LAFCO 2004). Despite declining groundwater levels, the *Urban Water Management Plan* (City of Merced 2005) indicates that no preparation is needed to replace groundwater as the water source for the city. The water management plan presents guidelines for expansion of the water system to provide a reliable water supply through 2030.

Water infrastructure in the City of Merced includes constructed conduits and pipes, natural drainage features, and irrigation canals. Major water pipelines cross the study area in the City of Merced in four locations.

Community of Le Grand

According to the *Merced County Year 2000 General Plan* (Merced County 1990), the water supply for Le Grand is provided by Merced Irrigation District canals and groundwater pumping. Table III-24, Infrastructure Capacities, in the general plan states that the water supply is at approximately 75% capacity and has the potential to serve another 200 customers.

Madera County

In Madera County, several entities supply water, including the Chowchilla Water District, the City of Chowchilla Domestic Water System, Madera Irrigation District, the City of Madera Domestic Water System, Madera County, and others. Generally, groundwater is used for domestic purposes and surface water is used for agricultural irrigation (Madera County LAFCO 2007). The Madera Irrigation District supplies water to approximately 130,000 acres adjacent to the San Joaquin River through an estimated 315 miles of open canals and laterals, 150 miles of pipeline, and 102 miles of natural streams. Madera County operates and administers small public water systems that provide drinking water to more than 7,000 residents and several commercial and public users (Madera County LAFCO 2007).

City of Chowchilla

The Chowchilla Water District delivers water through earthen canals and concrete pipelines for agricultural irrigation (Madera County LAFCO 2007). Water releases into natural channels including the Chowchilla River, Ash Slough, and Berenda Slough for conveyance to the district's downstream canals. Chowchilla Water District also operates eight groundwater recharge ponds. The City of Chowchilla domestic water system, operated by the Water Division of the City of Chowchilla's Public Services Department, provides drinking water within the city limits (with the exception of the California Department of Corrections Central Valley Women's Facility and Valley State Prison). The Water Division is responsible for the operation and maintenance of nine city-owned wells, 37 miles of main distribution lines, backflow prevention devices, fire hydrants, water meters, and other equipment (City of Chowchilla 2005a; Madera County LAFCO 2007). The looped water system comprises mains that vary in size between 8 and 12 inches in diameter (City of Chowchilla 2009). There are no major water lines within the study area in the City of Chowchilla.

City of Madera

The City of Madera domestic water system relies entirely on groundwater. Existing water system facilities include 13 active wells, the Loy E. Cook 1-million-gallon water storage tower, and more than 200 miles of distribution pipelines ranging in size from 2 to 14 inches in diameter (City of Madera 1992; Madera County LAFCO 2007). City policy requires 12-inch-diameter water mains on a 0.5-mile grid, with 8- and 6-inch-diameter water lines to serve developed areas (City of Madera 1992). There are no major water mains in the City of Madera.

Fresno County

City of Fresno

The City of Fresno's existing water system consists of approximately 1,740 miles of transmission and distribution pipelines, 250 groundwater wells, a 30-million-gallon per day (mgd) surface water treatment facility, storage facilities, and booster pump facilities. The distribution system has four quasi-pressure zones to help regulate system pressures (City of Fresno 2008). Sixteen-inch water lines cross the study area on the south side of West Shaw Avenue and on the north side of West Clinton Avenue.

The groundwater, a bicarbonate-type water, generally meets primary and secondary drinking water requirements for municipal water users. Approximately 20 mgd of treated surface water supplements groundwater supplies. Fresno Irrigation District canals deliver water to the treatment facility; treated water from the facility exceeds drinking water standards (City of Fresno 2010a). The city's projected future water supplies will increase to 205,300 acre-feet per year by 2030. Overall water supply reliability for the city is high (City of Fresno 2008).

Because of groundwater contamination, groundwater overdraft, and increasing water demands, the Fresno City Council and the Fresno Department of Public Works have adopted the Metropolitan Water Resource Management Plan, which includes strategies to help provide a reliable source of water for the Fresno metropolitan area through the year 2050 (City of Fresno 2010a). The plan includes conservation measures, discusses the importance of supplementing groundwater with surface water, and explains the need for artificial recharge of the groundwater basin. To mitigate the effects of long-term overdraft of the local aquifer, the City of Fresno diverts surface water to flood control basins and a city-owned recharge facility to infiltrate into the groundwater table (City of Fresno 2010a).

Wastewater Infrastructure

Generally, onsite sewage systems (e.g., septic tanks) are used in rural and low-density areas of the study area. Table 3.6-5 summarizes local wastewater systems for the urban areas of each county, which are discussed in the following subsections.

Table 3.6-5
Wastewater Treatment Plant Capacity Summary for Proposed HST Station and Maintenance Facility Locations in the Merced to Fresno Section

Agency	WWTP Name	WWTP Address	Capacity (mgd)
City of Atwater	Wastewater Treatment Plant	550 Commerce Avenue, Atwater	6[a, b]
Le Grand Community Services District	Le Grand Wastewater Treatment Facility	5529 McKee Road, Le Grand	1.54[c]
City of Merced	City of Merced Wastewater Treatment Plant	10260 Grove Road, Merced	10[c, d]
City of Chowchilla	Chowchilla Wastewater Treatment Facility	15750 Avenue 24½, Chowchilla	1.8[e, f]
City of Madera	Madera Wastewater Treatment Facility	13048 Road 21½, Madera	10.1[g]
City of Fresno	Fresno-Clovis Regional Wastewater Treatment and Reclamation Facility	5607 W. Jensen, Fresno	80[h]

[a] Source: Veolia Water (2010).
[b] Proposed expansion project would increase capacity to 10 mgd.
[c] Source: Merced County LAFCO (2007).
[d] Proposed expansion project would increase capacity to 16 mgd.
e Source: City of Chowchilla (2009).
[f] Has a current permitted capacity of 1.8 mgd; an additional 49,500 gallons per day is expected to be needed by 2020.
[g] Source: City of Madera (2010b).
[h] Source: City of Fresno (2010b).

Merced County

City of Atwater

The City of Atwater provides sewage disposal and treatment for discharges collected within the city limits. The city is in the process of updating its WWTP, which Veolia Water operates. The WWTP serves Atwater, Winton, and the Castle Airport Aviation and Development Center. Additional wastewater infrastructure includes pipes (from 6 to 33 inches in diameter) and 15 lift stations (Veolia Water 2010).

City of Merced

The City of Merced collects wastewater from residents, businesses, and industrial users throughout the city (City of Merced 1997; Merced County LAFCO 2004). The sewer system consists of approximately 215 miles of gravity sewers with diameters up to 48 inches, pumping stations, and force mains that convey wastewater to the Merced WWTP. The WWTP can process up to 10 mgd of untreated wastewater. The WWTP is currently undergoing review for an expansion that would increase the treatment capacity to approximately 20 mgd.

The WWTP discharges most of the treated wastewater into Hartley Slough, which joins the San Joaquin River. In addition, approximately 815 acre-feet of effluent irrigates a 580-acre site that the city uses to grow fodder crops. Effluent is also used to irrigate a 385-acre wildlife management area owned by the city and operated by the California Department of Fish and Game. Dried sludge from the WWTP is disposed of as a soil amendment on 600 acres of farmland owned by the city.

Community of Le Grand

The Le Grand Community Services District provides sewer services for the community of Le Grand. According to the *Merced County Year 2000 General Plan* (Merced County 1990), the existing treatment facility serves approximately 465 customers and has enough capacity to serve approximately 250 more (approximately 35% increase).

Madera County

Madera County maintenance districts and service areas operate 14 major public wastewater systems (Madera County 1995). The wastewater processes used in these systems include community septic tanks, stabilization ponds, activated sludge, and aerated lagoon treatments. All major wastewater facilities in the study area are in the incorporated cities.

City of Chowchilla

Within the City of Chowchilla, the Wastewater Division of the city's Public Services Department collects wastewater. The city's WWTP is permitted to treat 1.8 mgd of municipal wastewater (City of Chowchilla 2009). The city also maintains four sewage lift pump stations and 37 miles of sewage pipelines (City of Chowchilla 2005a). Current predictions estimate that the WWTP will be at capacity by the year 2014 (City of Chowchilla 2005b). To meet continuing demand, the city plans to construct a residential WWTP on the east side of Chowchilla, near SR 152 and Road 11; the city will divert domestic wastewater to the new facility (City of Chowchilla 2005c). The current facility would then become available for industrial wastewater service. The *City of Chowchilla 2040 General Plan Update Public Review Draft* (City of Chowchilla 2009) confirms these plans.

A domestic sewer main owned by the City of Chowchilla parallels the eastern side of the study area from the Colusa Avenue area to Avenue 24½, where it splits east and west.

City of Madera

According to the *City of Madera Comprehensive General Plan & Environmental Impact Report* (City of Madera 1992), the city collects and conveys untreated wastewater from public and private generators via approximately 140 miles of sanitary sewer lines to the city's WWTP. Located at Avenue 13 and Road 21½ (approximately 3.5 miles southwest of the city), the WWTP treats wastewater and discharges the effluent to a series of percolation ponds (approximately 320 acres) for evaporation and percolation into the soil. The approximate capacity of the WWTP is 10 mgd.

Fresno County

City of Fresno

The City of Fresno is the designated regional sewer agency for the Fresno-Clovis Metropolitan Area of Fresno County. A joint powers agreement between the City of Fresno and Fresno County provides sewer services to most areas within the county. Since 1968, the City of Fresno has enforced a mandatory sewer ordinance that requires an end to use of onsite sewage systems. Developments must connect to the regional sewer system as connections become available within the city limits.

The Fresno-Clovis Regional Wastewater Treatment and Reclamation Facility provides trunk sewer lines and treatment services for the cities of Clovis and Fresno. Operation, maintenance, and long-term planning for the treatment facility are the responsibility of the City of Fresno. The treatment capacity is approximately 80 mgd for an average flow, including equipment redundancy for maintenance and equipment failures (City of Fresno 2002). The facility provides primary and secondary treatment processes, and a treatment process for solids removed at the facility (City of Fresno 2009).

The City of Fresno owns major sewer lines that cross the study area in Fresno north of West Bullard Avenue and north of West Shaw Avenue. The study area does not include any WWTPs or sewer lift stations within the City of Fresno.

Storm Drains

Storm drain systems are more prominent in developed urban areas. In the rural areas, roadside ditches, irrigation canals, and natural drainages convey stormwater runoff.

Merced County

Merced County, Merced Irrigation District, and the City of Merced have formed a stormwater management group to implement a plan to provide for the continuity of programs that fulfill requirements of the State Water Resources Control Board General Permit and Section 402(p) of the federal Clean Water Act (City of Atwater 2009b). Within the City of Merced, there are four major storm drains that cross the study area, and approximately five additional storm drain mains are planned that would also cross the study area. Merced County manages stormwater drainage within the community of Le Grand and rural areas of the county.

Madera County

City of Chowchilla

The Storm Water Division of the city's Public Services Department maintains and operates the storm drain system in the City of Chowchilla. The system includes approximately 4 miles of drainage ditches, eight stormwater basins, three pump stations, and other storm drainage facilities (City of Chowchilla 2005d). A storm drain owned by the City of Chowchilla parallels the eastern side of the study area from the Colusa Avenue area to Avenue 24½, where it follows the roadway to the west.

City of Madera

Within the City of Madera, street curbs and concrete gutters channel to a pipeline system. Most stormwater drains to retention basins constructed below ground level; however, some stormwater drains directly into the Fresno River and Madera Irrigation District conveyance facilities. The City of Madera owns and operates the storm drain and retention basin system for the city (City of Madera 2004).

The City of Madera plans to upgrade its stormwater system with additional drains and basins. There are stormwater basins near Clark Street and Madera Irrigation District's Lateral 24.2; the irrigation district proposes to expand Lateral 24.2, which is associated with existing and proposed storm drains. A pump station is located near Riverside Drive.

Fresno County

The Fresno Metropolitan Flood Control District (FMFCD) is responsible for planning and managing flood control areas. The FMFCD prepared a stormwater drainage and flood control master plan (FMFCD 2004) to coordinate the activities of FMFCD, Fresno County, and individual cities. The plan identifies drainage area boundaries, runoff flow calculations, facility locations, street grades, and the collection networks.

City of Fresno

FMFCD owns and operates several major storm drains and stormwater retention basins in the City of Fresno.

Solid Waste Facilities

The following sections discuss solid waste facilities that may serve the project. The project would not directly affect active solid waste disposal facilities (i.e., landfills) or recycling facilities. Table 3.6-6 summarizes landfill capacity.

Table 3.6-6
Landfill Facility Summary for the Merced to Fresno Section

Landfill	Landfill Permitted Daily Tonnage (tons per day)	Estimated Permitted Landfill Capacity (cubic yards)	Remaining Landfill Capacity (cubic yards)	Estimated Permitted Closure Date
Billy Wright Landfill	800	3,650,000	529,178	2010
Highway 59 Landfill	1,500	30,012,352	28,025,334	2030
Fairmead Landfill	1,100	9,400,000	5,552,894	2033
American Avenue Landfill	2,200	32,700,000	29,358,535	2031

Source: CalRecycle (2011a).
Note: Based on 2000 Capacity Information.

Merced County and its incorporated cities jointly own and operate Billy Wright Landfill, which serves the western part of the county. The types of wastes accepted at the Billy Wright Landfill include agricultural, C&D, and mixed municipal (CIWMB 2009a). Merced County and its incorporated cities also jointly own and operate the Highway 59 Landfill, which serves eastern areas of the county (including the City of Merced). The Highway 59 Landfill is located at 6040 North Highway 59, approximately 6 miles north of the City of Merced. In 2008, Merced County estimated that the landfill was approximately 28.2% full. Permitted waste types at the Highway 59 Landfill are Class III, nonhazardous solid waste, inert waste, and nonfriable asbestos. The Highway 59 Landfill also accepts wood and green wastes for composting, concrete, and asphalt (CIWMB 2009b).

Madera County owns Fairmead Landfill, and contracts operations to Madera Disposal, Inc. Fairmead Landfill is the only landfill in Madera County. Approximately 50% of the waste produced in Madera County is disposed of at Fairmead Landfill; the remaining waste is recycled or diverted to other nearby landfills. According to CIWMB, Fairmead Landfill has an available capacity of 59.1%. The Fairmead Landfill is projected to close in 2033. The landfill accepts agricultural wastes, C&D materials, industrial wastes, tires, asbestos, green materials, mixed municipal wastes, and wood wastes (CIWMB 2009c). Fairmead Landfill is located approximately 0.25 mile west of the study area, south of the City of Chowchilla.

Fresno County owns and operates American Avenue Landfill, which serves incorporated and unincorporated areas of Fresno County (CIWMB 2009d). The landfill is located at 18950 West America Avenue, in the City of Kerman (approximately 18 miles west of the City of Fresno). According to CIWMB, the landfill has used approximately 10.2% of the permitted capacity. American Avenue Landfill is a sanitary landfill and does not accept hazardous waste or C&D material (City of Fresno 2010c). The projected closure date for this landfill is August 2031. C&D projects in the City of Fresno are required to haul C&D material to one of six approved C&D facilities (City of Fresno 2010d).

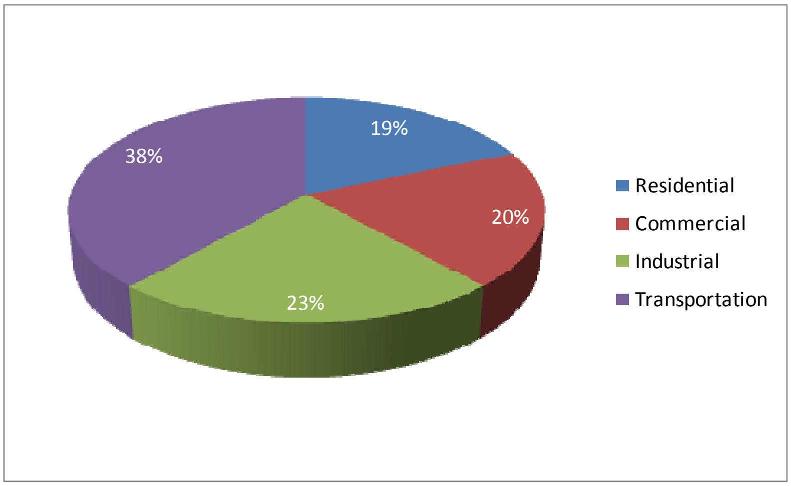
Waste disposal characteristics of communities between the cities of Merced and Fresno are summarized in Table 3.6-7.

Table 3.6-7
Solid Waste Volumes and Diversion Summary for the Merced to Fresno Section

Jurisdiction	Amount of Solid Waste Landfilled in 2009 (tons)	CalRecycle-Approved Diversion Rate (2006)
Merced County	224,098	71%
Unincorporated Madera County	67,434	75%
City of Chowchilla	12,329	59%
City of Madera	40,913	46%
City of Fresno	307,424	71%
Source: CalRecycle (2011b).		

3.6.4.2 Energy

California is the tenth largest energy consumer in the world (CEC 2010a). The transportation sector consumes 38% of California's energy, the industrial sector consumes 23%, the residential sector consumes 19%, and the commercial sector consumes 20% (U.S. Energy Information Administration 2008). Figure 3.6-1 illustrates California's energy consumption in 2008.



Source: U.S. Energy Information Administration (2008).

Figure 3.6-1
California Energy Consumption by Sector, 2008

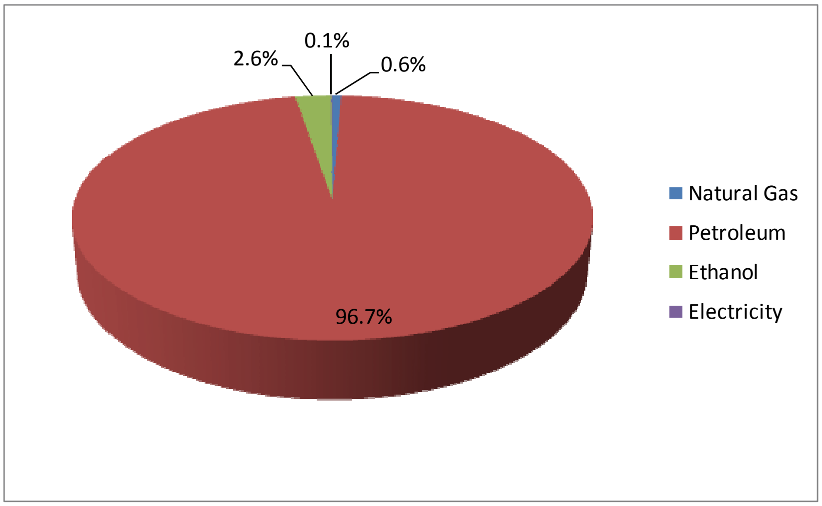
In California, electricity and natural gas are nearly synonymous with stationary energy usage, and petroleum is similarly synonymous with transportation energy (CEC 2000). Figure 3.6-2, depicts the sources of energy used for transportation in California in 2008.

Energy Resources

Electricity

Demand

There are two ways to measure electricity demand: consumption and peak demand. Electricity consumption is the amount of electricity used by consumers in the state. According to the CEC, total statewide electricity consumption grew from 166,979 GWh in 1980 to 272,000 GWh in 2005 (CEC 2010b). This overall trend fluctuates in the short term as a result of several factors, including the economy. Electricity consumption growth rates fell from an estimated rate of 3.2% in the 1980s to a rate of 0.9% between 1990 and 1998. This reduction in consumption is attributed to the economic recession in the early part of the decade (Authority and FRA 2005).



Source: U.S. Energy Information Administration (2008).

Figure 3.6-2
California Transportation Energy Consumption by Source, 2008

The highest electric power requirement during a specified period, known as peak demand, is measured as the amount of electricity consumed at any given moment, usually integrated over a 1-hour period. Because electricity must be generated at the instant it is consumed, this measurement specifies the greatest generating capacity that must be available during periods of peak demand. Peak demand is important in evaluating system reliability, identifying congestion points on the electrical grid, and designing required system upgrades. California's peak demand typically occurs in August, between 3 p.m. and 5 p.m. In the Merced to Fresno areas, high air conditioning loads and irrigation pumping contribute to this summer peak demand. Table 3.6-8 summarizes electricity consumption in Merced, Madera, and Fresno counties in 2009.

Table 3.6-8
2009 Electricity Consumption in Merced, Madera, and Fresno Counties

County	2009 Usage (million kilowatt hours)
Merced	2745.50
Madera	1427.39
Fresno	7222.12
Source: CEC (2010b).	

Generation

The electric power sector is the fastest growing share of the energy economy in California (U.S. Department of Energy 2008). The projected net power supply within the grid controlled by the California Independent System Operator for summer 2010 was roughly 62,000 megawatts (MW) (CEC 2010b). Table 3.6-9 summarizes fuel sources for electric power in California for 2005.

Table 3.6-9
Fuel Sources for Electric Power in California in 2005

Fuel Source	Quantity Used (trillion Btu)	Percent of Fuel Mix
Coal	20.7	1
Petroleum	49.4	3
Nuclear	376.8	19
Hydroelectric	396.2	20
Renewable	398.3	20
Natural Gas	709.3	36
Source: U.S. Department of Energy (2008).		

In-state electricity generation accounted for 73% of the total electricity supply for California in 2008. Existing power plants near the Merced to Fresno Section study area use biomass, municipal solid waste, solar, hydro, oil, and gas energy resources to generate electricity. Power plants in the study area include steam turbine and internal combustion plants fueled by natural gas and hydroelectric plants. An estimated 23% of the generating capacity near the study area comes from clean, renewable sources; natural gas fuels the remaining 77% (CEC 2008).

Electricity Demand and Generation Capacity Outlook

Statewide, the projected average summer power supply in 2010 was forecast at 76,968 MW. Assuming 1-in-2 summer temperatures,[1] demand was approximately 57,253 MW. The result is an average planning reserve margin[2] of 36% (CEC 2010b). California's population will exceed 49 million by 2025 and more than 53 million by 2030, requiring an additional 92,000 MW of peak summer capacity in 2030[3] to meet demand and have an adequate reserve margin (Electric Power Group, LLC 2004).

Projections of in-state generation capacity for 2035 are not possible because generation infrastructure decisions typically are not made more than 2 to 3 years in advance of construction. The Western Electric Coordinating Council (WECC) 2008 power supply assessment projects system deficits within the forecast period (2017). These values factor in the loss of generating capacity from decommissioned sources and the addition of programmed capacity. Most of the programmed generating resources are renewable (e.g., wind, gas, hydroelectric, and solar) (WECC 2008). Projected deficits indicate the need for additional generation capacity. However, historically new generation has kept up with demand. Where supply insufficiencies have occurred, they have been the result of a number of interrelated factors, including faulty market design and regulatory issues (Weare 2003).

Transmission

California's electricity transmission system comprises more than 31,000 miles of bulk electric transmission lines rated at 69 kV or more, towers, and substations (Authority and FRA 2008). The system links

[1] 1-in-2 forecast temperatures are temperatures with a 50% chance of not being exceeded.
[2] Planning reserve calculation = ((Total Net Supply + Demand Response + Interruptible Power)/1-in-2 Demand) – 1.
[3] This value assumes a 1.5% annual growth rate in peak demand and includes a 15% reserve margin.

generation to distribution in a complex electrical network that balances supply and demand on a nearly instantaneous basis. The California Independent System Operator, a non-profit entity responsible for the system's reliability and non-discriminatory transmission of energy, operates California's transmission system.

In addition to the in-state transmission connections, there is a system of transmission interconnections that connect California's electricity grid with out-of-state electricity utilities. The Western Interconnection connects California to electricity generation facilities in 10 other western states, western Canada, and northwestern Mexico. With a total importing capacity of 18,170 MW, these interconnections serve a critical role in satisfying California's electricity consumption (Authority and FRA 2008). As electricity consumption grows, the addition of transmission capacity may facilitate energy transfers from subregions where there is surplus generating capacity to subregions that require additional energy. However, when the overall energy market is in a deficit; additional transmission capacity alone cannot relieve the subregional deficits.

Natural Gas

California is the second largest consumer of natural gas in the nation, with consumption at 71,567 million cubic feet (MMcf) per day in 2007. Natural gas is the most used fuel for electricity generation in California, and approximately 44% of the 2006 daily consumption of natural gas was for electricity generation (CEC 2007a). In 2007, California produced 12.9% of the natural gas consumed in the state. Most of the natural gas consumed comes from the southwestern United States (40.8%), the Rocky Mountain area (24.2%), and Canada (22.1%) (CEC 2009).

The CEC predicts that overall natural gas demand will grow slightly more than 1% annually through 2017, with demand volumes of 89,720 MMcf daily by 2017 (CEC 2007b). Within the contiguous United States, the projected natural gas reserves recoverable with today's technology are expected to permit current levels of production for the next 50 years (Authority and FRA 2005). Natural gas supplies are not considered to limit California's projected demand.

Petroleum

Automobile travel is the predominant mode of passenger transportation within the study area. Historically, demand for transportation services (and petroleum consumption) in California has mirrored the growth of the state's population and economic output. The *Base Case Forecast of California Transportation Energy Demand* (CEC 2001) indicates that vehicle miles traveled (VMT) is currently growing at an average rate of 1.8% annually, which is greater than the population growth rate. The report projects that between 2000 and 2020, on-road gasoline demand will increase an average of 1.6% annually, and diesel demand will increase by an average of 2.4% annually.

3.6.5 Environmental Consequences

This section provides the impact analysis relating to public utilities and energy for the project. The Statewide Program EIR/EIS addressed consultation with each utility provider and owner to avoid or reduce potential impacts on existing and planned utilities.

3.6.5.1 Overview

Utilities

Constructing the Merced to Fresno Section of the California HST System could result in scheduled and accidental interruptions of utility services, and it would generate C&D material. Letters and newspaper notices would inform utility customers of scheduled outages. Probing for existing utilities prior to the start of construction would reduce the risk of accidental service interruptions. C&D material would be recycled or repurposed to divert it from landfills.

The permanent project footprint would be located where current utility lines exist (i.e., creating a potential "utility conflict"). Utilities within the permanent project footprint would be either relocated outside the restricted access areas of the HST right-of-way, or they would be modified (i.e., encased in a pipe sturdy enough to withstand the weight of HST system elements) so that there is no damage to or impairment of the operation of these utilities because of the HST project. It would be standard practice that agreements related to utility relocation or encasement require utility owners and operators to notify the Authority in advance of monitoring or maintenance of their facilities that remain in the HST right-of-way after construction of the guideway.

The following sections analyze utility conflicts by alternative for high-risk utilities and low-risk utilities, respectively. High-risk utilities are shown on Figures 3.6-3 through 3.6-6. The UPRR/SR 99 Alternative and Castle Commerce Center HMF would conflict with the greatest number of utilities; the BNSF Alternative and the Kojima Development HMF site would conflict with the lowest number of utilities. The BNSF Alternative, Hybrid Alternative, and Ave 21 Wye would affect existing substations. The alternatives would barely affect the inside of the fenceline of one substation, but the Ave 21 Wye would affect the electrical equipment at another substation facility, resulting in a substantial effect under NEPA and a significant impact under CEQA. In accordance with standard practices and applicable regulations, existing electrical systems such as power lines and substations would be upgraded, as necessary, to connect to the HST power distribution system.

The project would require water supply, wastewater treatment, and waste disposal for HST station and HMF operations. Existing utility capacity is adequate to meet project demands.

Energy

The CEQA Guidelines require an EIR to describe the existing physical environmental conditions in the vicinity of the project that "will normally constitute the baseline physical conditions by which a lead agency determines whether an impact is significant" (CEQA Guidelines §15125[a]). For a project such as the HST, which would not commence operation for almost 10 years and would not reach full operation for almost 25 years, use of only existing conditions as a baseline for energy impacts would be misleading. It is more likely that existing background traffic volumes (and the intensity of energy use) would change because of planned traffic improvement projects between today and 2020/2035 than it is that existing traffic conditions would remain unchanged over the next 10 to 25 years. For example, Regional Transportation Plans (RTP) include funded transportation projects that are programmed to be constructed by 2035. To ignore that these projects would be in place before the HST project reaches maturity (i.e., the point/year at which HST-related transportation generation reaches its maximum), and to evaluate the HST project's energy impacts ignoring that these improvements would change the underlying background conditions to which HST project effects would be added, would present a misleading hypothetical comparison.

Therefore, the energy analysis uses a dual baseline approach. That is, the HST project's energy impacts are evaluated both against existing conditions and against background (i.e., No Project) conditions as they are expected to be in 2035. The results of comparing the project with the future expected baseline are presented in detail in this document, while the results of comparing the project with existing conditions are summarized in this document. This approach complies with CEQA (see *Woodwark Park Homeowners Ass'n v. City of Fresno* [2007], 150 Cal.App.4th 683, 707 and *Sunnyvale West Neighborhood Assn. v. City of Sunnyvale* [2010], 190 Cal.App.4th 1351) by informing the public of potential project impacts under both baselines, but it focuses the analysis on the baseline analysis more likely to occur.

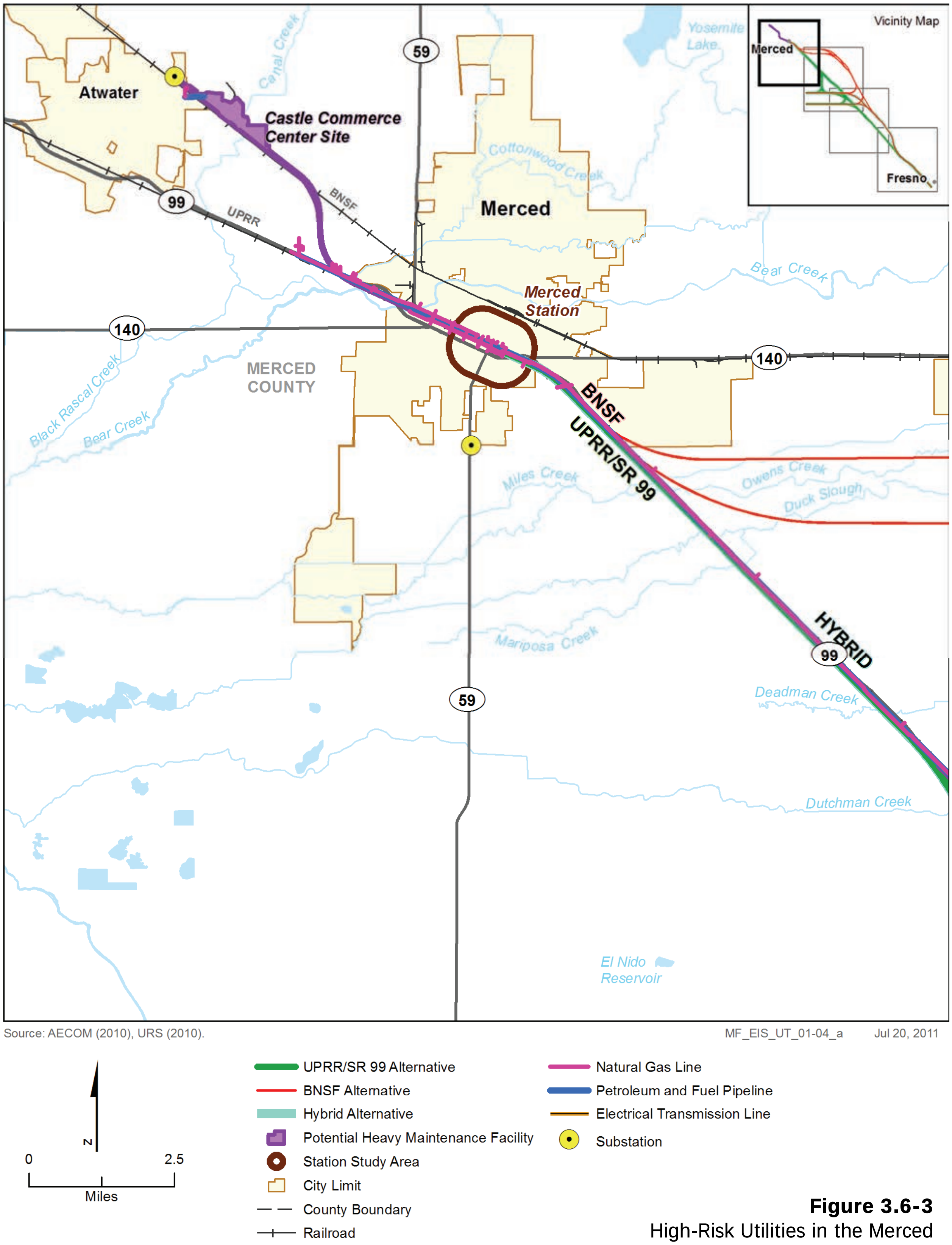
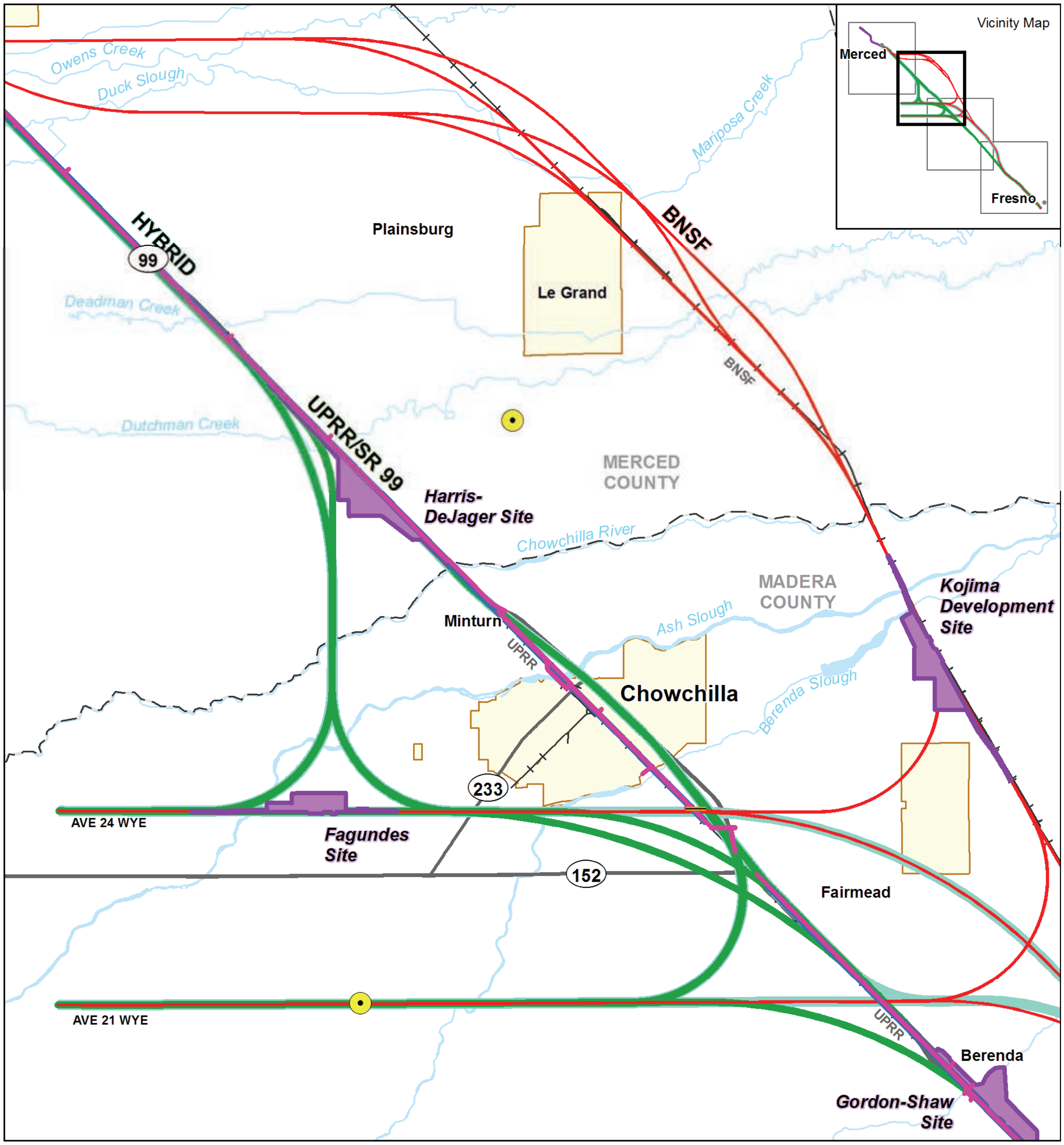


Figure 3.6-3
High-Risk Utilities in the Merced Project Vicinity



Source: AECOM (2010), URS (2010). MF_EIS_UT_01-04_b Jul 20, 2011

N

0 2.5

Miles

- UPRR/SR 99 Alternative
- BNSF Alternative
- Hybrid Alternative
- Potential Heavy Maintenance Facility
- Station Study Area
- City Limit
- County Boundary
- Railroad
- Natural Gas Line
- Petroleum and Fuel Pipeline
- Electrical Transmission Line
- Substation

Figure 3.6-4
High-Risk Utilities in the Chowchilla Project Vicinity

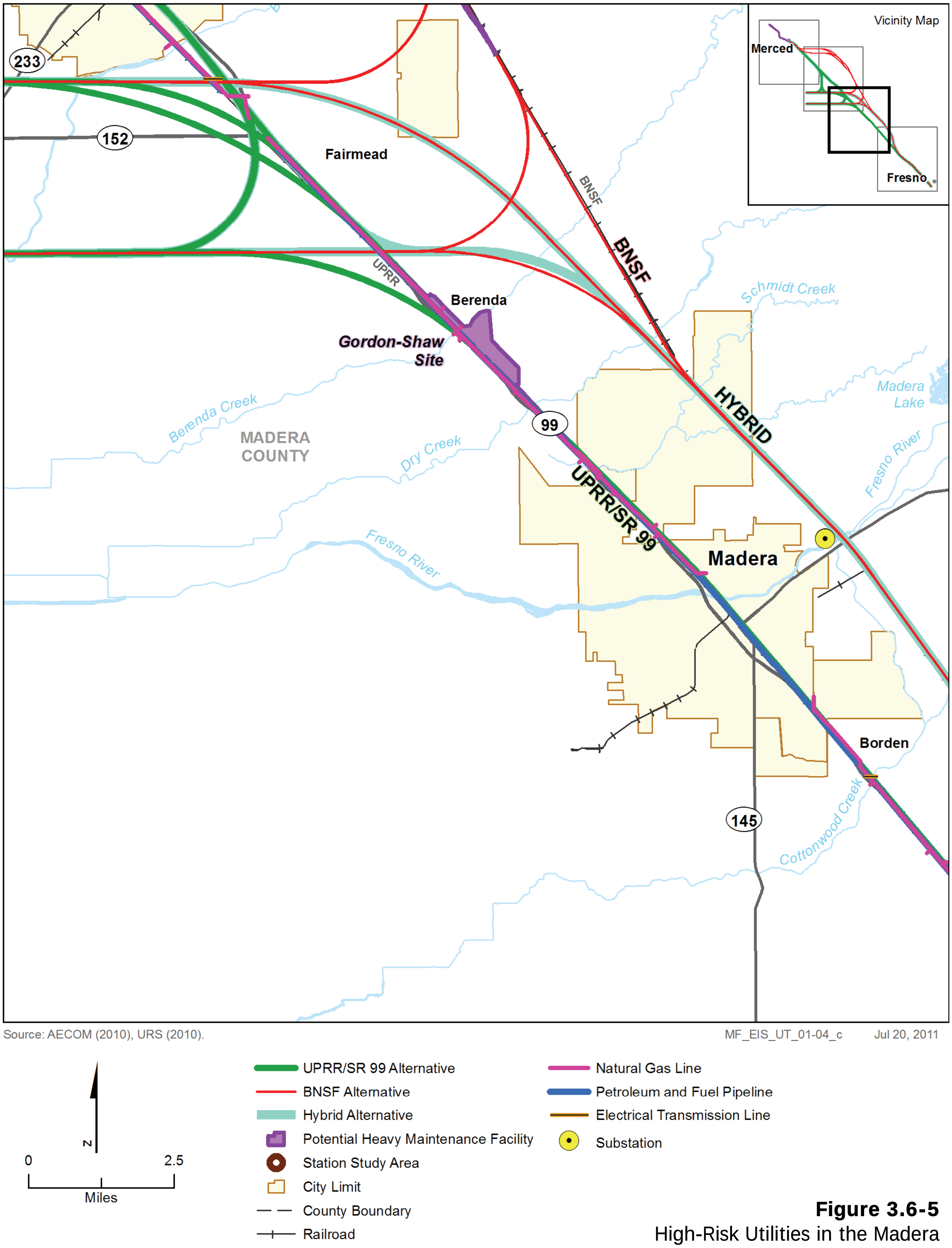
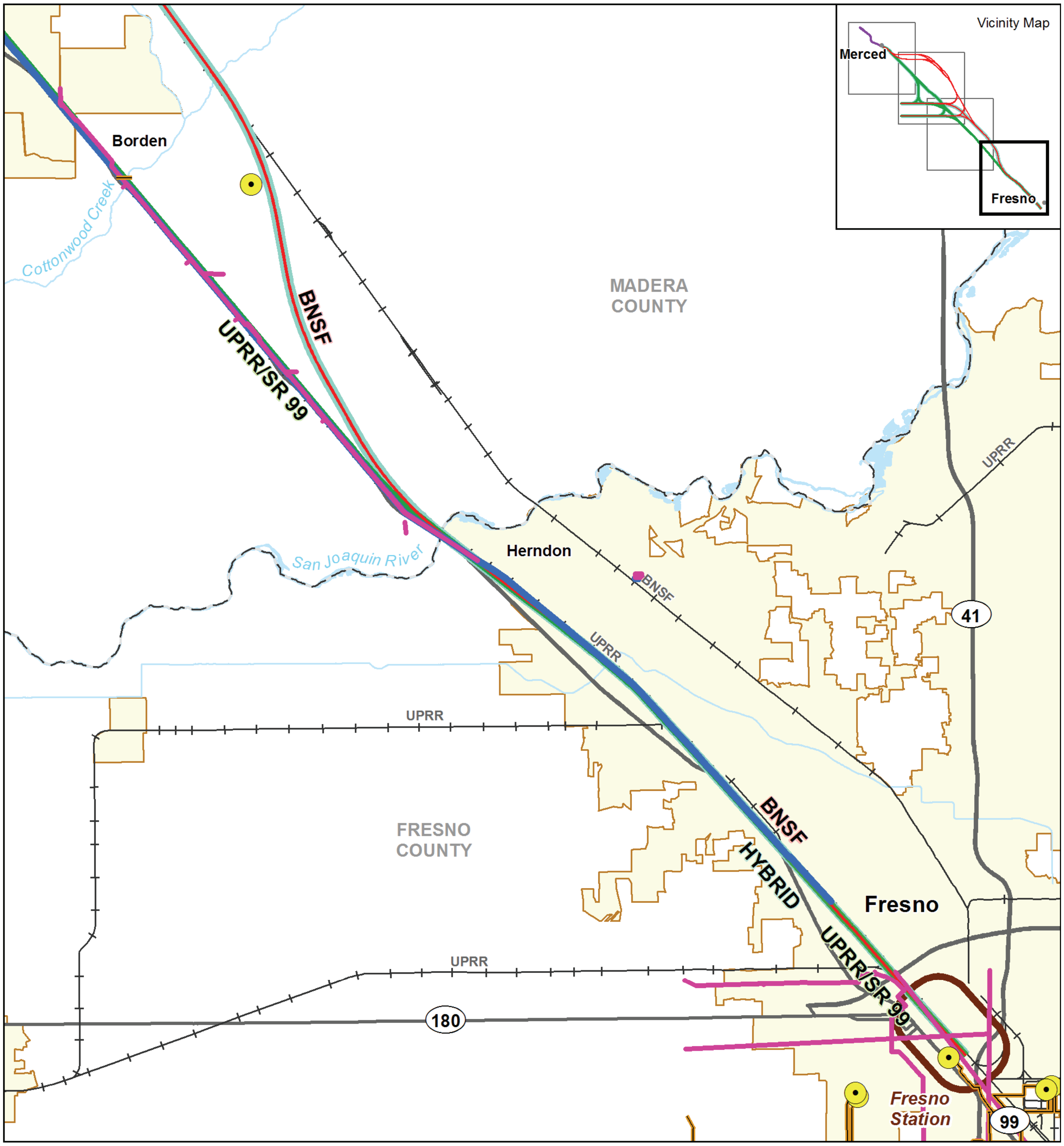


Figure 3.6-5
High-Risk Utilities in the Madera Project Vicinity



Source: AECOM (2010), URS (2010). MF_EIS_UT_01-04_d Jul 20, 2011

Figure 3.6-6
High-Risk Utilities in the Fresno Project Vicinity

Electrical Requirements of HST

The electrical demand for the propulsion of the trains, the operation of the trains at terminal stations, and in storage depots and maintenance facilities, etc., has been conservatively estimated by the project's engineers to be 8 GWh per day. Transmission losses, the percentage of energy lost due to transmission from the power plant to the project, have been estimated to be approximately 4%. Applying this factor to the 8 GWh per day electrical requirement of the HST System results in the total electrical requirement at the power plant to be approximately 8.32 GWh, or 28,404 million Btu (MMBtu), per day. This change is predicted to occur in the existing conditions plus project scenario and the 2035 build scenario.

Table 3.6-10 summarizes the statewide energy changes that would result from the project. The analysis conducted for this project estimated the changes in energy use anticipated throughout the state with and without the HST. The analysis estimated the energy changes from reduced on-road VMT, reduced intrastate airplane travel, and increased electrical demand. Although the HST System would result in an increase in electricity demand, it would reduce the energy demands from automobile and airplane travel, resulting in an overall beneficial effect on statewide energy use.[4]

Table 3.6-10
2035 Estimated Change in Energy Consumption due to the HST System

Projected Outcomes of the HST System	Change in Energy Usage due to HST versus Future Conditions (MMBtu/day)	Change in Energy Usage due to HST versus Current Conditions (MMBtu/day)
Reduced VMT	-150,240	-87,496
Reduced Airplane Travel	-16,985	-9,851
Increased Electricity Consumption	28,404	28,404
Net Change in Energy Use	-138,821	-68,943

The Merced to Fresno Section of the HST System would contribute approximately 10% to the statewide estimates of HST energy demand and savings, as compared with the energy use of conventional means of transportation. The payback period for energy used during construction would be approximately a year.

3.6.5.2 No Project Alternative

The population in Merced, Madera, and Fresno counties is projected to grow, as discussed in Chapter 1, Purpose, Need, and Objectives of the Project, and Section 3.18, Regional Growth. An increase in population would increase the demand for utility services. Section 3.19, Cumulative Impacts, discusses foreseeable future projects, which include shopping centers and large residential developments between the cities of Merced and Fresno. These projects are planned or approved to accommodate the growth projections in the area. As discussed in Section 3.6.4, Affected Environment, local utilities have capital improvement plans to accommodate the anticipated population growth. These improvements include the expansion of the wastewater treatment plants in the cities of Merced and Chowchilla. Planned infrastructure additions and upgrades would provide the necessary services to growing populations.

Demand for energy would also increase at a level commensurate with population growth. The region would increase peak and base period electricity demand and would require additional generation and transmission capacity.

[4] Substantially more energy is required to move a person by car or by airplane than by rail.

Under the No Project Alternative, the daily VMT in Merced, Madera, and Fresno counties would increase by 2035, as described in Section 3.2, Transportation. This increase would require an additional estimated 2 million gallons of petroleum in the Merced to Fresno region alone (Bureau of Transportation Statistics 2010).[5] Potential increases in petroleum demand could be a concern under the No Project Alternative.

3.6.5.3 High-Speed Train Alternatives

<u>Utilities</u>

Construction and operation of the HST would meet the requirements of applicable federal and state regulations. These regulations include the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended. The act and its amendments guide federal agencies on compensation for impacts on property owners and tenants who must relocate if they are displaced by a federally sponsored project. This act applies to all real property, including land acquired for the relocation of utilities. The Authority would positively locate public utilities within the potential impact area (by probing, potholing, electronic detection, as-built designs, or to other means) prior to construction, in compliance with state law (i.e., California Government Code 4216). Where it is not possible to avoid utilities, they would be improved (e.g., steel pipe encasement) so that there is no damage to or impairment of the operation of these utilities because of the HST project.

Construction Period Impacts – Common Utilities Impacts

The construction of any of the three project alternatives and the HMF could result in planned temporary interruption of utility service, accidental disruption of services, increased water use, and an increase in waste generation.

Temporary Interruption of Utility Service

Construction could require the temporary shutdown of utility lines, such as water, electricity, or gas, to safely move or extend these lines. Shutdowns could interrupt utility services to industrial, commercial, agricultural, and residential customers. This would result in a negligible effect under NEPA and a less than significant impact under CEQA.

Where necessary, project design and phasing of construction activities would minimize interruptions, including for upgrades of existing power lines to connect the HST system to existing PG&E substations. Prior to construction in areas where utility service interruptions are unavoidable, the contractor would notify the public within the jurisdiction and affected service providers of the planned outage through a combination of communication media (e.g., by phone, email, mail, newspaper notices, or other means). The notification would specify the estimated duration of the planned outage and would be published no less than 7 days prior to the outage. Construction would be coordinated to avoid interruptions of utility service to hospitals and other critical users. Because of the short duration of the planned interruptions and the interruption notification procedures, this effect would be negligible under NEPA. Under CEQA, this impact would be less than significant.

Accidents and Disruption of Services

During construction, the potential for accidental disruption of utility systems including overhead utility lines (e.g., telephone and cable television) and buried utility lines (e.g., water, wastewater, and natural gas lines) is low due to the established practices of utility identification. The potential effect would be negligible under NEPA. Under CEQA, the impact would be less than significant.

Water Demand

Construction activities would use water to prepare concrete, increase the water content of soil to optimize compaction, for controlling dust, and to re-seed disturbed areas. Table 3.6-11 shows the estimated maximum and minimum water usage among various alternative and wye combinations.

[5] Based on the 2007 national average fuel economy for passenger and other two-axle, four-tire vehicles.

Table 3.6-11
Construction Phase Water Consumption

Work/Operation Requiring Water Use	Minimum Water Use (Hybrid Alternative – Ave 24 Wye) (million gallons)	Maximum Water Use BNSF Alternative – Ave 24 Wye) (million gallons)
Concrete Work	52	83
Earthwork Compaction for Rail Embankments	21	26
Dust Control		
Railroad Tracks	470	615
HMF	179	179
Irrigation for Reseeded Areas		
Railroad Tracks	106	139
HMF	7	7
Note: Assumes 5 years of water consumption during the construction period		

The difference in water demand between the alternatives is a function of the total guideway length and type. The BNSF Alternative with the Ave 24 Wye would consume the most water during construction (approximately 644 acre-feet annually); the Hybrid Alternative with the Ave 24 Wye would consume the least (approximately 513 acre-feet annually). A variety of sources would provide water, depending on the alternative constructed. Existing annual water use that would be displaced/terminated by the project (e.g., irrigated farmland that would convert to track alignment) is estimated between 4,892 acre-feet for the UPRR/SR 99 Alternative and 6,703 acre-feet for the BNSF Alternative. Therefore, average annual water use over the construction period would be less than existing demand and could be supplied from existing sources (Authority 2011). For this reason, HST construction would require neither construction nor expansion of a water treatment facility and would also not require new or expanded entitlements. Impacts resulting from water demand would be negligible under NEPA and less than significant under CEQA.

Waste Generation

Clearing of vegetation, removal of existing asphalt and gravel, and demolition of existing structures during construction would generate waste. Construction of any of the HST alternatives would generate an estimated 1.9 million cubic yards of waste. The HMF would generate between 400,000 and 500,000 cubic yards of waste (an HMF at the Castle Commerce Center would generate the most waste because the site is partially developed and would require the longest access guideway).

As standard construction practice, the contractor would divert C&D waste from landfills by reusing or recycling to aid with implementing the Local Government C&D Guide (Senate Bill 1374) and meet solid waste diversion goals (see Table 3.6-7), 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 unsegregated waste and dispose of it at a certified recycling facility.

Reuse and recycling of C&D material could divert much of the waste from landfills. The landfills to which C&D material from the project would be sent have not been identified. Each landfill has specific requirements regarding the acceptance of hazardous wastes and C&D material that may influence the selection of disposal sites. Although there are three landfills in the immediate area that accept C&D material, other regional facilities (such as those that serve the City of Fresno) may be used for waste disposal. Based on estimates that the total volume of C&D material is a maximum of 2.4 million cubic yards before recycling (approximately 7% of the total permitted capacity of the three previously discussed landfills that accept C&D material), the Merced to Fresno HST would have a negligible effect under NEPA on area landfills. Under CEQA, the impact on permitted landfills that would serve the project is less than significant.

As discussed in Section 3.10, Hazardous Materials and Wastes, construction would generate hazardous waste consisting of welding materials, fuel and lubricant containers, paint and solvent containers, and cement products containing strong basic or acidic chemicals. Demolition of older buildings could also generate hazardous waste, such as asbestos-containing materials and lead based paint. The Authority would handle, store, and dispose of all hazardous waste in accordance with applicable requirements, including the Resource Conservation and Recovery Act (see Section 3.10, Hazardous Materials and Wastes). A certified hazardous waste collection company would deliver the waste to an authorized hazardous waste management facility for recycling or disposal. Some in-state landfills, such as Clean Harbors Westmorland Landfill in Imperial County, the Chemical Waste Management Kettleman Hills Landfill in Kings County, and other permitted landfills accept hazardous wastes (DTSC 2007). Because hazardous waste could be disposed of at permitted landfills that have sufficient capacity, potential effects are negligible under NEPA and less than significant under CEQA.

Project Impacts – Common Utilities Impacts

The operation and maintenance of the three project alternatives and an HMF could result in permanent relocation and extensions of utilities; reduced access to existing utilities in the project footprint; and increased demand for water, wastewater, and waste disposal services. None of the project alternatives would physically encroach on the footprint of water or wastewater treatment facilities, water pump stations, or power plants.

Conflicts with Existing Utilities

There are many utilities within or crossing the study area for the proposed HST and associated facilities. The project would not be compatible with most of these existing utilities. The Authority would work with utility owners during final engineering design and construction of the project to relocate utilities or protect them in place. Where overhead transmission lines cross the HST alignment, the Authority and the utility owner may determine that it is best to place the line underground. In this case, the transmission line would be placed in a conduit so that future maintenance of the line could be accomplished outside the HST right-of-way. Where existing underground utilities such as gas, petroleum, and water pipelines cross the HST alignment, the utilities would also be placed in a protective casing so that future maintenance could be accomplished from outside of the HST right-of-way. The project construction contractor would coordinate schedules for utility relocations and protection-in-place with the utility owner to ensure the project would not result in prolonged disruption of services. In compliance with state law (California Government Code 4216), the construction contractor would use a utility locating service and manually probe for buried utilities within the construction footprint prior to initiating ground disturbing activities. This would avoid accidental disruption of utility services. Transmission lines between the transmission power supply stations and the existing substations would be constructed aboveground to industry standards and would not conflict with existing infrastructure. Therefore, the effect of the project on utility providers and their customers would be negligible under NEPA and the impact would be less than significant under CEQA.

The HST may conflict with existing stormwater basins; this is potentially a substantial impact under NEPA and a potentially significant impact under CEQA. As feasible, any loss in capacity at the retention ponds would be restored within the existing utility footprint or the HST alignment would be modified to avoid impacts, which would reduce the impact to negligible under NEPA and less than significant under CEQA. Some stormwater basins will require relocation within the study area. Impacts would be negligible under NEPA and less than significant under CEQA.

Where the alignments would conflict with existing electrical substations, there is a potential for a substantial impact under NEPA and a significant impact under CEQA. Where possible, portions of the HST alignment would be redesigned to avoid impacts; this would reduce the impact to negligible under NEPA and less than significant under CEQA. If redesign is not feasible, the impact would remain substantial under NEPA and significant under CEQA.

UPRR/SR 99 Alternative

The UPRR/SR 99 Alternative could affect developed areas in the communities of Merced, Chowchilla, Fairmead, Madera, and Fresno. The UPRR/SR 99 Alternative with the East Chowchilla design option and Ave 21 Wye would affect a substation near the westernmost point of the wye. Table 3.6-12 shows the number of high-risk utilities that could be affected by the UPRR/SR 99 Alternative; Table 3.6-13 shows the number of low-risk utilities that could be affected.

Table 3.6-12
UPRR/SR 99 Alternative Impacts – High-Risk Utilities

Design Option	Electrical Transmission and Power Lines	Natural Gas Distribution Lines	Petroleum and Fuel Pipelines	Substation
Impacts by Project Combination[a]				
UPRR/SR 99 with West Chowchilla Design Option and Ave 24 Wye	7	23	7	0
UPRR/SR 99 with East Chowchilla Design Option and Ave 24 Wye	7	33	7	0
UPRR/SR 99 with East Chowchilla Design Option and Ave 21 Wye	6	31	7	1
HST Stations[a]				
Downtown Merced Station	0	2	1	0
Downtown Fresno – Mariposa Street Station Alternative	4	1	1	0
Downtown Fresno – Kern Street Station Alternative	3	1	1	0
Range of Total Impacts under the UPRR/SR 99 Alternative[b]	**9 to 11**	**26 to 36**	**9**	**0 to 1**

[a] The number of impacts for each utility type was calculated by adding the number of conflicts for individual project features.

[b] The total range of impacts for each utility type was calculated by adding the number of impacts when combining options with the lowest and highest number of impacts.

Table 3.6-13
UPRR/SR 99 Alternative Impacts – Low-Risk Utilities

Design Option	Cable and Telephone Lines	Fiber Optic Lines	Irriga-tion Canals	Water Lines	Sewer	Stormwater Retention Pond	Storm-water Pipeline
Impacts by Project Combination[a]							
UPRR/SR 99 with West Chowchilla Design Option and Ave 24 Wye	45	9	21	7	13	7	33
UPRR/SR 99 with East Chowchilla Design Option and Ave 24 Wye	56	11	28	6	11	7	25
UPRR/SR 99 with East Chowchilla Design Option and Ave 21 Wye	53	9	14	5	10	7	26
HST Stations[a]							
Downtown Merced Station	4	2	0	0	0	0	1
Downtown Fresno – Mariposa Street Station Alternative	0	0	0	0	0	0	2
Downtown Fresno – Kern Street Station Alternative	1	0	0	0	1	0	1
Range of Total Impacts under the UPRR/SR 99 Alternative[b]	**49 to 61**	**11 to 13**	**14 to 28**	**5 to 7**	**10 to 14**	**7**	**27 to 36**

[a] The number of impacts for each utility type was calculated by adding the number of conflicts for individual project features.

[b] The total range of impacts for each utility type was calculated by adding the number of impacts when combining options with the lowest and highest number of impacts.

The UPRR/SR 99 Alternative would cross approximately 164 to 220 utilities; approximately 44 to 57 of these utilities are high risk. The West Chowchilla design option would result in fewer high-risk utility conflicts than the UPRR/SR 99 Alternative traveling through the City of Chowchilla.

BNSF Alternative

The BNSF Alternative could affect developed areas in the cities of Merced, and Fresno, and the communities of Le Grand and Madera Acres. Table 3.6-14 shows the number of high-risk utilities that could be affected by the BNSF Alternative; Table 3.6-15 shows the number of low-risk utilities that could be affected.

The BNSF Alternative design options cross approximately 21 to 29 high-risk utilities and approximately 81 to 101 low-risk utilities. The Ave 21 Wye design option would cross more irrigation canals than the design options using the Ave 24 Wye. There is an electrical substation in the study area at Road 28½ and

Raymond Road. The BNSF Alternative proposes modifications to Raymond Road to accommodate the HST. The Ave 21 Wye would also affect a substation near its westernmost point.

Table 3.6-14
Utilities Potentially Affected by the BNSF Alternative – High-Risk Utilities

Design Option	Electrical Transmission and Power Lines	Natural Gas Distribution Lines	Petroleum and Fuel Pipelines	Sub-station
Impacts by Project Combination[a]				
BNSF Alternative with Ave 24 Wye[b]	2	6	4	1
BNSF Alternative with Ave 21 Wye[b]	2	4	2	2
Le Grand Design Options[a]				
Mission Ave	3	2	1	0
Mission Ave East of Le Grand	3	2	1	0
Mariposa Way	2	2	0	0
Mariposa Way East of Le Grand	3	2	0	0
HST Stations[a]				
Downtown Merced Station	0	2	1	0
Downtown Fresno – Mariposa Street Station Alternative	4	1	1	0
Downtown Fresno – Kern Street Station Alternative	3	1	1	0
Impact of Components Combined[a]				
BNSF Alternative, Ave 24 Wye	7 to 9	11	6 to 7	1
BNSF Alternative, Ave 21 Wye	7 to 9	9	4 to 5	2
Range of Total Impacts under the BNSF Alternative[c]	**7 to 9**	**9 to 11**	**4 to 7**	**1 to 2**

[a] The number of impacts for each utility type was calculated by adding the number of conflicts for individual project features.

[b] Does not include Le Grand design options.

[c] The total range of impacts for each utility type was calculated by adding the number of impacts when combining options having the lowest and the highest number of impacts.

Table 3.6-15
Utilities Potentially Affected by the BNSF Alternative – Low-Risk Utilities

Design Option	Cable and Tele-phone Lines	Fiber Optic Lines	Irriga-tion Canals	Water Lines	Sewer	Storm-water Retention Pond	Storm-water Pipeline
Impacts by Project Combination[a]							
BNSF Alternative with Ave 24 Wye[b]	17	3	18	3	9	5	11
BNSF Alternative with Ave 21 Wye[b]	17	1	23	3	9	4	12
Le Grand Design Options[a]							
Mission Ave	4	4	10	0	0	0	0
Mission Ave East of Le Grand	4	2	8	0	0	0	0
Mariposa Way	1	3	7	0	0	0	0
Mariposa Way East of Le Grand	1	3	8	0	0	0	0
HST Stations [a]							
Downtown Merced Station	4	2	0	0	0	0	1
Downtown Fresno – Mariposa Street Station Alternative	0	0	0	0	0	0	2
Downtown Fresno – Kern Street Station Alternative	1	0	0	0	1	0	1
Impact of Components Combined[a]							
BNSF Alternative with Ave 24 Wye	22 to 26	7 to 9	25 to 28	3	9 to 10	5	13 to 14
BNSF Alternative with Ave 21 Wye	22 to 26	5 to 7	30 to 33	3	9 to 10	4	14 to 15
Range of Total Impacts under the BNSF Alternative	**22 to 26**	**5 to 9**	**25 to 33**	**3**	**9 to 10**	**4 to 5**	**13 to 15**

[a] The number of impacts for each utility type was calculated by adding the number of conflicts for individual project features.

[b] Does not include the Le Grand design options.

[c] The total range of impacts for each utility type was calculated by adding the number of impacts when combining options having the lowest and the highest number of impacts.

Hybrid Alternative

The Hybrid Alternative could affect developed areas in the cities of Merced and Fresno and the community of Madera Acres. With the Ave 21 Wye, the Hybrid Alternative could also affect the City of Chowchilla. The Hybrid Alternative design options would cross approximately 25 to 41 high-risk utilities and approximately 90 to 125 low-risk utilities.

As with the BNSF Alternative, an electrical substation northeast of the Madera city limits would be located in the study area for road improvements associated with the Hybrid Alternative. Impacts on stormwater basins in the City of Fresno would be as discussed above for the UPRR/SR 99 Alternative. The Hybrid Alternative with the Ave 21 Wye would also affect a substation along the Ave 21 Wye. Table 3.6-16 shows the number of high-risk utilities that could be affected by the Hybrid Alternative; Table 3.6-17 shows the number of low-risk utilities that could be affected.

Table 3.6-16
Utilities Potentially Affected by Hybrid Alternative – High-Risk Utilities

Design Option	Electrical Transmission and Power Lines	Natural Gas Distribution Lines	Petroleum and Fuel Pipelines	Sub-station
Hybrid Alternative with Ave 24 Wye[a]	9	5	4	1
Hybrid Alternative with Ave 21 Wye	7	15	6	2
HST Stations[a]				
Downtown Merced Station	0	2	1	0
Downtown Fresno – Mariposa Street Station Alternative	4	1	1	0
Downtown Fresno – Kern Street Station Alternative	3	1	1	0
Range of Total Impacts under the Hybrid Alternative[b]	**10 to 13**	**8 to 18**	**6 to 8**	**1 to 2**

[a] The number of impacts for each utility type was calculated by adding the number of conflicts for the individual project components.

[b] The total range of impacts for each utility type was calculated by adding the number of impacts when combining options having the lowest and the highest number of impacts.

Table 3.6-17
Utilities Potentially Affected by Hybrid Alternative[a] – Low-Risk Utilities

Design Option	Cable & Telephone Lines	Fiber Optic Lines	Irriga-tion Canals	Water Lines	Sewer	Stormwater Retention Pond	Storm-water Pipeline
Hybrid Alternative with Ave 24 Wye[a]	33	3	24	2	5	3	19
Hybrid Alternative with Ave 21 Wye	48	5	17	5	10	3	19
HST Stations[a]							
Downtown Merced Station	4	2	0	0	0	0	1

Design Option	Cable & Telephone Lines	Fiber Optic Lines	Irriga-tion Canals	Water Lines	Sewer	Stormwater Retention Pond	Storm-water Pipeline
Downtown Fresno – Mariposa Street Station Alternative	0	0	0	0	0	0	2
Downtown Fresno – Kern Street Station Alternative	1	0	0	0	1	0	1
Range of Total Impacts under the Hybrid Alternative[b]	**37 to 53**	**5 to 7**	**17 to 24**	**2 to 5**	**5 to 11**	**3**	**21 to 22**

[a] The number of impacts for each utility type was calculated by adding the number of conflicts for individual project features.

[b] The total range of impacts for each utility type was calculated by adding the number of impacts when combining options having the lowest and the highest number of impacts.

Heavy Maintenance Facility Alternatives

Table 3.6-18 lists the number of high-risk utilities that could be affected by the HMF alternatives; Table 3.6-19 lists the number of low-risk utilities that could be affected. The Castle Commerce Center HMF site is already developed and would require the longest lead track to connect to the HST alignments; it would also have the highest number of conflicts with utility infrastructure (47 conflicts). The Fagundes and Kojima Development HMF sites would have the lowest number of utility conflicts (nine and eight conflicts, respectively). The Harris-DeJager and Gordon-Shaw HMF sites would affect 10 and 14 utilities, respectively; these undeveloped sites are located along the UPRR and SR 99 corridors.

Table 3.6-18
Utilities Potentially Affected by the HMF Alternatives – High-Risk Utilities

HMF Site	Electrical Transmission and Power Lines	Natural Gas Distribution Lines	Petroleum and Fuel Pipelines	Substation
Castle Commerce Center	8	4	1	0
Harris-DeJager	5	1	0	0
Fagundes	3	0	0	0
Gordon-Shaw	5	2	0	0
Kojima Development	2	0	0	0

Table 3.6-19
Utilities Potentially Affected by the HMF Alternatives – Low-Risk Utilities

HMF Site	Cell / Radio Towers	Cable & Telephone Lines	Fiber Optic Lines	Irrigation Canals	Water Lines	Sewer	Stormwater Retention Pond	Storm-water Pipeline
Castle Commerce Center	0	12	6	8	4	3	0	1

HMF Site	Cell / Radio Towers	Cable & Telephone Lines	Fiber Optic Lines	Irrigation Canals	Water Lines	Sewer	Stormwater Retention Pond	Storm-water Pipeline
Harris-DeJager	0	1	0	3	0	0	0	0
Fagundes	0	3	0	2	0	1	0	0
Gordon-Shaw	1	4	1	1	0	0	0	0
Kojima Development	0	1	2	2	0	0	1	0

Reduced Access to Existing Utilities in the HST Right-of-Way

The HST right-of-way would be fenced and secured after construction, and maintenance access for utilities that remain within the right-of-way would be limited. The UPRR/SR 99 Alternative and the Castle Commerce Center HMF site have the largest number of utility conflicts and are likely to have the largest number of utilities remaining within the right-of-way. Underground wet utilities such as water, sewer, storm drains, gas, and petroleum lines are conveyed inside a pipeline material with a typical service life of 50 years or more. Dry utilities such as electrical, fiber optics, and telephone lines are encased in durable pipelines, for example made of steel, that protect the dry utilities from deterioration and also have long service lives. Utilities that remain in the HST right-of-way would be placed in a casing pipe that is strong enough to carry the HST system facilities and is large enough to accommodate equipment for remote monitoring of the condition of the carrier pipe. If the utility conveyance pipeline is in need of repair or replacement, the casing pipe would stay in place so that HST operations could continue. It is common practice that utility owners coordinate and schedule in advance any field visits to their facilities with the owner of the property within which their facilities lie. With implementation of these standard engineering and utility access practices, reduced access to existing utility lines would be a negligible effect under NEPA. Under CEQA, the impact would be less than significant.

Upgrade or Construction of Power Lines

The HST System would use an electrified line with traction power for electric vehicles. Electricity would be supplied and distributed by a 2 x 25-kV autotransformer power supply system and an overhead contact system (Authority 2009a). The HST System would connect to existing PG&E substations (see Chapter 2, Alternatives). Establishing connections to existing PG& E substations may require upgrade of the substations (including enlarging the footprint by approximately 0.5 acre to accommodate new equipment), upgrade of existing transmission lines, or construction of new overhead lines. Because these upgrades would be conducted in accordance with applicable regulations, these modifications would have a negligible effect on existing electrical infrastructure under NEPA. Under CEQA, the impact would be less than significant.

Downtown Merced Station and Downtown Fresno Station

Power would be required at the Merced and Fresno HST stations. The proposed station locations are in developed areas with access to electricity.

Heavy Maintenance Facility Alternatives

Power would be needed at the HMF location. This may require the installation of switching stations or an additional transmission line.

At the Castle Commerce Center HMF site, there is a 230-kV power line along the west side of Santa Fe Drive. A switching station would be needed to provide power to the Castle Commerce Center HMF site.

At the Harris-DeJager HMF site, there are overhead electric power lines along Vista Avenue adjacent to the south side of the site. This power line may require an upgrade to provide power for the HMF.

Alternatively, a 115-kV power line along Sandy Mush Road, approximately 2 miles from the HMF site, may be used. A switching station would be constructed adjacent to the HST right-of-way at Sandy Mush Road, and power lines would be constructed within the HST right-of-way.

The Fagundes HMF would be powered by a 115-kV power line on the east end of the site along Road 13.

There are existing 230-kV power lines approximately 1.5 miles from the Gordon-Shaw HMF site. A switching station and new power line to the HMF site would be required.

Near the Kojima Development HMF site, there are existing 115-kV power lines along Avenue 26. A switching station and new power line would be needed to service the HMF from the existing power lines.

Increased Demand for Water Supply

The HST alignment alternatives would not use substantial quantities of water in their operations. Operational water supply at HST stations and the HMF would be required for a variety of uses, including drinking fountains and restrooms in HST stations, irrigation for landscaping, and wash water for HSTs and facility maintenance. Annual operational water requirements are anticipated to be approximately 1.5% of the existing water usage that would be replaced by HST facilities. The project is not expected to require or result in the construction of new water treatment facilities or expansion of existing facilities, nor require new or expanded entitlements to supply water to the project; therefore, the project impact on water supplies would be negligible under NEPA. Under CEQA, the impact would be less than significant. Potential impacts on groundwater resources are described in Section 3.8, Hydrology and Water Resources.

Downtown Merced Station and Downtown Fresno Station

Table 3.6-20 provides estimates for the estimated current water usage based on land use and project-related consumption of water for each HST station. These estimates are based on a daily consumption factor of 5 gallons per passenger and 30 gallons per employee. Landscaping developed in conjunction with local communities would use native and drought tolerant plants (i.e., xeriscape) and would consist of a narrow (approximately 3 feet wide) strip along sidewalks and roadways. Although reclaimed or recycled water would likely be used for landscape irrigation at the HST stations, estimates provided in Table 3.6-20 assume irrigation water (i.e., not reclaimed/recycled) in the total demand to be conservative.

Table 3.6-20
Existing and Project-Related Water Consumption

HST Station	Existing Water Use (acre-feet/year)	Project-Related Water Demand (acre-feet/year)
Downtown Merced	47	15
Downtown Fresno	32	47
Source: Authority (2011).		

The Downtown Merced and Fresno HST stations would continue to be supplied with treated water from their respective municipal water supplier: the City of Merced, Division of Water Supply, and the City of Fresno, Water Division. The projected water demand at the Downtown Merced HST station would be less than the current demand. Water demand at the Fresno HST station would increase, because of the largely undeveloped nature of the land and the high rate of passenger boarding expected at the station. The City of Fresno is developing an ongoing plan to meet the water demand for this and other users within the Fresno Urban Water Management Plan study area (Authority 2011). No additional entitlements would be necessary.

The projected demand for the HST stations would be less than 0.01% of the total projected water demand of the municipalities that would serve the sites. The estimates of per capita water usage in the region indicate that the combined water demand at the HST stations would be equivalent to the daily water use of approximately 200 people (Sacramento Bee 2009). This measurable increase would be very close to existing conditions; therefore, the impact would be negligible under NEPA. Under CEQA, the effect would be less than significant because the project would not require the construction or expansion of water treatment facilities, or new or expanded water rights.

Heavy Maintenance Facility Alternatives

Water demand estimates for the HMF are based on water use data from a comparable facility operated by BART in Hayward, California, and include water used for industrial operations, landscaping, and train washing. Daily water use is estimated at 30 gallons per employee. The HMF would employ approximately 1,500 individuals, so the annual water demand of the facility would be approximately 17 million gallons, or 50 acre-feet (Authority 2011).

The HMF alternative sites are in the service areas of local water districts. Merced Irrigation District provides water service to the Castle Commerce Center HMF site. The Harris-DeJager, Fagundes, and Kojima Development HMF sites are partially within the Chowchilla Water District. The Gordon-Shaw HMF site is partially within the Madera Irrigation District service area. The Harris-DeJager, Fagundes, Kojima Development, and Gordon Shaw HMF sites are on agricultural land, and are irrigated with surface water supplied from local districts or groundwater from private wells. A typical acre of agricultural land in the region consumes approximately 3.5 acre-feet of water annually (Western Farm Press 2010).

For all of the HMF sites, groundwater is likely to be the water source, with wellhead treatment. It is unlikely that surface water would be used because the local irrigation districts do not have water rights that allow them to serve industrial uses. The alternative HMF locations are currently supplied, at least in part, by groundwater and groundwater supply systems (i.e., wells, pumps, reservoirs, and pipes) that are already in place. In addition, groundwater is more reliable because it is not subject to rationing, and it would require less treatment. Based on current land use, annual water use at the HMF sites is estimated to range from 69 acre-feet at the Castle Commerce Center site to 568 acre-feet at the Kojima Development site (Authority 2011). The projected water demand of 50 acre-feet per year for an HMF would be a reduction in water demand, compared to existing conditions, and a reduced draw on groundwater at any site except the Fagundes HMF site, at which surface water is currently primarily used for irrigation (Authority 2011). To the extent that 50 acre-feet per year is an increase in groundwater pumping compared to current levels, additional aquifer drawdown could occur. However, as discussed in Section 3.8, Hydrology and Water Resources, drawdown effects would be negligible. No entitlements are necessary to pump groundwater. Because the projected water demand at each HMF would amount to a reduced water demand at the HMFs and a reduced drawdown on groundwater, operation of the HMF would result in a negligible impact on water supply in the study area under NEPA and a less than significant impact under CEQA.

Demand for Wastewater Services

HST System operations would generate wastewater at the HST stations and the HMF. Impacts on existing water treatment facilities are expected to be negligible under NEPA and less than significant under CEQA. The following sections describe wastewater demand for these facilities.

Downtown Merced Station and Downtown Fresno Station

Wastewater from the HST stations would feed into the local sewer network. Table 3.6-21 shows the wastewater estimates for each HST station. The estimated amount of sewage generated is assumed to be between 45% and 55% of the total water demand generated from uses in occupied areas, such as the concourse, offices, parking structure, outdoor car parking, and HST platform.

Table 3.6-21
Project-Related Wastewater Generated for the HST Stations

HST Station	Sewage Generation (gpd)
Downtown Merced	13,600
Downtown Fresno	11,370

The City of Merced Wastewater Treatment Plant currently has a capacity of 10 mgd and there are plans to upgrade to 16 mgd. The Downtown Merced Station would require less than 0.1% of the current treatment capacity. The volume of wastewater produced by the proposed Downtown Fresno Station represents less than 0.1% of the excess capacity of the Fresno treatment facilities. The volume of wastewater generated at the proposed HST stations would have a negligible impact on the treatment systems in the cities of Merced and Fresno under NEPA. Under CEQA, the effect would be less than significant.

Heavy Maintenance Facility Alternatives

The City of Atwater provides sewer service to the area proposed for the Caste Commerce Center HMF. The Fagundes HMF site has one sewer line. None of the other sites have established infrastructure. Wastewater could be hauled by truck to a municipal treatment facility, or an auxiliary distribution line from the nearest accessible main could be constructed. This may require the installation of wastewater lines adjacent to the HST alignment or along established roadways. Finally, the HMF sites may install onsite wastewater treatment. If HMFs contain an onsite wastewater treatment package plant, treated wastewater would be used for onsite irrigation. Sludge generated by the process would be tested and disposed of at an appropriate landfill disposal facility. The effect on utilities and service systems would be negligible under NEPA, and the impact would be less than significant under CEQA.

Accordingly, an HMF would produce approximately 5.7 million gallons of wastewater annually (or approximately 15,600 gallons per day). This volume represents less than 1% of the capacity of any of the wastewater treatment facilities in Atwater, Chowchilla, and Madera. Therefore, wastewater generated at the HMF is within the capacity of the regional wastewater treatment facilities, so impacts would be negligible under NEPA and less than significant under CEQA.

Stormwater Generation

As discussed in Section 3.8, Hydrology and Water Resources, the project would result in increases in stormwater runoff. The project design would specifically address stormwater volumes and flow requirements. During final design, an evaluation of each receiving stormwater system's capacity to accommodate project runoff would be conducted. As necessary, onsite stormwater management measures, such as detention or selected upgrades to the receiving system, would be included in the design to provide adequate capacity. Project stormwater pipelines and ditches would be sized to convey runoff from the 25-year storm in rural areas and the 50-year storm in urban areas (Authority 2010). Measures such as onsite retention, infiltration basins, and detention ponds would be used to maintain offsite stormwater discharge in compliance with the General Construction Stormwater Permit issued by the State Water Resources Control Board. Where a local agency requires a higher level of stormwater runoff control, the more stringent requirement would be applied to the project. In addition, stormwater best management practices (BMPs) would be applied to treat stormwater from pollutant-generating surfaces such as project parking lots, access roads, and public roads relocated due to the project (note that runoff from the at-grade tracks and elevated guideways would have minimal pollutants and would not need treatment). BMPs could include bioretention swales, grass filter strips, infiltration and water quality ponds. More information on stormwater measures can be found in Section 3.8, Hydrology and Water Resources. As a result of these project design measures and BMPs, project stormwater impacts would be negligible under NEPA and less than significant under CEQA.

Waste Generation

Project operation activities that would generate solid waste include passenger refuse disposal and materials used for HST maintenance. Maintenance of the HST guideway would generate small amounts of wastes that are included in the discussion of waste generation at the HMF. Impacts on solid waste facilities are expected to be negligible under NEPA and less than significant under CEQA.

Downtown Merced Station and Downtown Fresno Station

Table 3.6-22 presents the anticipated amount of nonhazardous solid waste for each HST station. These amounts are based on the anticipated station ridership per day (Authority 2009b, Table D), the average daily per capita residential disposal rate in California in 2009 (factored by 0.2) (CalRecycle 2010a), and a recycling diversion factor of 42% for Californians in 2009 (CalRecycle 2010a). The recycling diversion factor assumes that 42% of waste would be disposed of at a landfill after recyclables are diverted.

Waste generated at the Downtown Merced Station would be disposed of at the Highway 59 Landfill. The volume of solid waste generated by the station represents approximately 0.1% of the daily capacity of the landfill. Solid waste from the Downtown Fresno Station would be disposed of at the American Avenue Landfill. The volume of solid waste generated by the HST station represents less than 0.05% of the daily capacity of the landfill. Therefore, a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs would serve HST station operations, and the project would have a negligible effect on solid waste disposal under NEPA. Under CEQA, this impact would be less than significant.

Table 3.6-22
Project-Related Solid Waste Generated for the HST Stations

HST Station	Solid Waste Generation (pounds per day)
Downtown Merced	4,770
Downtown Fresno	4,050

Heavy Maintenance Facility Alternatives

Activities at the HMF, including administrative (office) work, packaging of materials and equipment used for maintenance of the HST, and incidental waste from HMF employees would generate solid waste such as paper, cardboard, plastics, and other materials similar to household waste. Non-air travel related transportation businesses dispose approximately 1.3 tons of waste per year (CalRecycle 2010b). Estimates indicate that the HMF, with up to 1,500 employees, would dispose approximately 41,000 cubic yards of waste annually, representing between 3% and 17% of estimated remaining landfill capacity at landfills in the area. Because solid waste such as paper and cardboard could be diverted from landfills and because the waste could be distributed between several landfills, potential effects on solid waste capacity would negligible under NEPA and less than significant under CEQA.

Hazardous Waste Generation

As discussed in Chapter 3.10, Hazardous Materials and Wastes, routine maintenance of the HST station and HMF facilities would produce small quantities of hazardous waste. Operation of the HMF would involve the use, storage, and disposal of hazardous materials and petroleum products associated with maintenance of HST equipment. Hazardous waste may consist of welding materials, fuel and lubricant containers, batteries, and paint and solvent residues and containers. All hazardous wastes would be handled, stored, and disposed of in accordance with applicable requirements, such as the Resource Conservation and Recovery Act (see Section 3.10, Hazardous Materials and Wastes). A certified hazardous waste collection company would deliver the waste to an authorized hazardous waste management facility for recycling or disposal. Landfills, such as Clean Harbors Westmorland landfill in Imperial County, the Chemical Waste Management Kettleman Hills Landfill in Kings County, and permitted out-of-state landfills accept hazardous wastes. Because hazardous wastes could be disposed of at permitted landfills that have sufficient capacity, potential effects are negligible under NEPA and less than significant under CEQA.

Energy

Construction Period Impacts – Common Energy Impacts

During project construction, energy would be consumed to produce and transport construction materials. Operating and maintaining construction equipment would also consume energy resources. Energy would be used for the construction of track work, guideways, maintenance yards, stations, support facilities, and other structures.

Energy consumption during construction of the Merced to Fresno Section of the HST System depends on the characteristics of the alternative, including the length of elevated, retained-fill, and at-grade guideway. Energy consumption estimates for constructing the guideway for the Merced to Fresno Section range between 1,606,611 MMBtu for the Hybrid Alternative and 2,851,883 MMBtu for the UPRR/SR 99 Alternative. Construction of the Castle Commerce Center HMF, including approximately 7 miles of access guideway, would require 418,349 MMBtu. Construction of an HMF at any of the other sites would require approximately 66,885 MMBtu. Therefore, construction of the Merced to Fresno Section, including guideway, HMF, and stations, would range from 1,661,919 MMBtu for the Hybrid Alternative with the Fagundes HMF to 3,270,388 MMBtu for the UPRR/SR 99 Alternative with the Castle Commerce Center HMF. At a prorated annual energy savings of 5,051,089 or 2,516,967 MMBtu, the payback period for energy consumed during construction of the Merced to Fresno Section would be approximately a year when compared to both the future and existing condition baselines.

Although measurable, the energy used for project construction would not require significant additional capacity or significantly increase peak or base period demands for electricity and other forms of energy. Energy efficiency is expected for the offsite production of construction materials, based on the economic incentive for efficiency. Standard BMPs would be implemented onsite so that non-renewable energy would not be consumed in a wasteful, inefficient, or unnecessary manner. The indirect use of energy for construction of the Merced to Fresno Section of the HST system would be moderate effect under NEPA and would be a less-than-significant impact under CEQA.

Project Impacts – Common Energy Impacts

The electric vehicles of the HST System would use an electrified line with traction power connected to existing PG&E substations (see Chapter 2, Alternatives). For determining HST energy consumption, the analysis assumed use of a Siemens ICE-3 Velaro vehicle operating as two 8-car trainsets and traveling 43.1 million annual train miles by 2035. As shown in Table 3.6-23, the analysis does not include the use of regenerative braking, to account for the possibility that the braking energy cannot be reused by other trains in the system. The analysis does include transmission losses. The electrical demand for the propulsion of the HST, and operation of the HST at terminal stations, storage depots, and maintenance facilities is conservatively estimated to be 10,367,643 MMBtus annually, or 28,404.48 MMBtus per day. This energy estimate, reflecting a refinement of the analysis conducted in the 2005 Bay Area to Central Valley Program EIR/EIS (Authority and FRA 2010) energy assessment, utilizes current conversion factors, ridership forecasts, train sets and vehicle miles traveled. This is an increase in energy consumption of approximately 28,404 MMBtu per day, or less than 1% of statewide consumption, which is equivalent to the consumption for a city of 200,000 people. A comparison of the energy requirements calculated for the 2008 Program EIR/EIS and the current analysis is found in Appendix 3.6-A of this Project EIR/EIS.

Table 3.6-23
Daily HST Energy Usage Calculations

	Methodology	HST System Energy Usage	Values/ Unit	Assumptions
	Trainset Definition			Assumed use of Siemens ICE-3 Velaro for calculation
1	Traction energy consumed per trainset-mile (8-car train)	60.00	kWH	Without generation, based on Traction Power Simulation Studies
2	Assume regeneration under braking	51.00	kWH	15% energy savings assumed
3	Traction energy consumed per train (16-car)-mile	102.00	kWh	Multiply by two times the 8-car train value.[a]
4	On-board services consumption	6.00	kWh	Per 16-car train-mile
5	Energy consumed	108.00	kWh	Per 16-car train mile
6	Annual train-miles expected in the horizon year (2035)	43.10	Million	Business Plan 2009 (Table H, Page 79) 8-car trains
7	Traction energy consumed per year	2327.00	GWh	In 2035 (54 kWh per trainset x 43.1 million trainset miles)
8	Traction energy consumed per day	6.38	GWh/day	Divide by 365 days – with regeneration
9	Total traction energy	7.10	GWh/day	Without regeneration
10	Energy usage including stations, facilities, dwells, maintenance, empty moves, etc. in horizon year (2035)	8.00	GWh/day	Conservative figure which does not take into account regeneration
11	Transmission losses	0.04	%	Total of 4% - includes 3% transmission line loss and 1% (2 x 0.5) transformer losses
12	Total energy usage (2035)	8.32	GWh	Per day (8 GWh/day x 1.04) = 8.32 including losses
13	Total energy usage per day, including losses[b]	28,404.48	MMBtu/day	1 kWh = 3,414 Btu
14	Total energy usage energy per year, including losses	10,367,643	MMBtu/year	Multiply by 365

[a] A conservative figure of 2 times the 8-car train value has been used because the Davis Formula for resistance to motion for a 16-car train was not available from the trainset manufacturer.

[b] The current analysis reflects operational, design, and analysis requirements that have occurred since the Bay Area to Central Valley Program EIR/EIS was published in 2008. For the Program EIR/EIS, an incorrect application of generation and conversion loss factors resulted in an overstated daily energy usage of 108,879 MMBtus compared to 28,404.5 MMBtus calculated for the current analysis. As a result, the 2011 estimates show that the HST System will use less energy than previously predicted.

The HST would decrease automobile VMT and reduce energy consumption per passenger mile. This would result in an overall reduction in energy use for intercity and commuter travel. Current estimates indicate that HSTs would require approximately one-third of the energy required by an airplane and approximately one-fifth of the energy required by a commuter automobile trip, when comparing the energy required by each mode to transport a passenger 1 mile. Table 3.6-24 shows the estimated VMT with and without the HST System. When compared to future conditions, analysis of the projected effects of the HST on VMT in the Merced to Fresno region indicates that the HST would reduce daily VMT in Madera, Merced, and Fresno counties by nearly 5 million miles a day, or 10%, due to travelers choosing to use the HST rather than drive. When compared to existing conditions, the reduction in VMT is estimated to be approximately 700,000 miles. These values, together with associated average daily speed estimates, were used to develop predictions of the change in energy use with the Merced to Fresno HST.

Table 3.6-24
On-Road Vehicle Energy Changes in the Merced to Fresno Region

County	No Project Future Conditions				Existing Conditions			
	VMT With HST	VMT Without HST	Change in VMT with HST	Change in Energy Con-sumption with HST (MMBtu/Day)	VMT With HST	VMT Without HST	Change in VMT with HST	Change in Energy Con-sumption with HST (MMBtu/Day)
Fresno	24,364,285	27,367,949	-3,003,664	-13,493	22,050,000	22,500,000	-450,000	-2,194
Madera	8,256,392	8,532,552	-276,160	-1,259	4,094,136	4,094,136	-83,553	-419
Merced	12,018,453	13,534,370	-1,515,917	-6,813	6,860,000	6,860,000	-140,000	-731
Total	**44,639,130**	**49,434,871**	**-4,795,741**	**-21,565**	**33,004,136**	**33,454,136**	**-673,553**	**-3,344**

As shown in Table 3.6-25, the number of plane flights statewide (intrastate) would decrease with the California HST System when analyzed against both the future condition and existing condition baselines because travelers would choose to use the HST rather than fly to their destination. The average fuel consumption rate for aircraft is based on the profile of aircraft currently servicing the San Francisco to Los Angeles airline corridor. The number of air trips removed due to the HST System was estimated by using the travel demand modeling analysis conducted for the project.

Table 3.6-25
Aircraft Energy Changes Due to HST System

Origin	No Project Future Conditions		Existing Conditions	
	No. of Flights Removed	Change in Energy due to HST (MMBtu/Day)	No. of Flights Removed	Change in Energy due to HST (MMBtu/Day)
Central Coast	-1	-44	-1	-25
Far North	-16	-702	-9	-407
Fresno/Madera	0	0	0	0
Kern	-16	-702	-9	-407
Los Angeles Basin – North	-43	-1,887	-25	-1,095
Los Angeles Basin – South	-88	-3,862	-51	-2,240

Origin	No Project Future Conditions		Existing Conditions	
	No. of Flights Removed	Change in Energy due to HST (MMBtu/Day)	No. of Flights Removed	Change in Energy due to HST (MMBtu/Day)
Merced	-1	-44	-1	-25
Monterey Bay	-16	-702	-9	-407
Sacramento Region	-16	-702	-9	-407
San Diego Region	-47	-2,063	-27	-1,196
San Joaquin	-7	-307	-4	-178
SF Bay Area	-130	-5,706	-75	-3,309
South SJ Valley	0	0	0	0
Stanislaus	-5	-219	-3	-127
Western Sierra Nevada	-1	-44	-1	-25
Statewide Total	**-387**	**-16,984**	**-224**	**-9,848**

The Authority is part of the EPA Collaborative for Sustainable Transportation and Infrastructure Construction. The HST System would be an energy-efficient mode of transportation and would serve to decrease overall per capita energy consumption by providing a travel alternative that is less energy intensive than the personal vehicles and commercial air flights that would be used under the No Project Alternative; energy consumption would increase at a slower rate than under No Project Alternative conditions. The Statewide Program EIR/EIS indicates that the California HST Project could result in a total energy savings of 25% over conditions without the Project.

To enhance the benefits of the HST, the Authority will strive to purchase up to 100% clean, renewable electricity to provide power for HST operations. HST project buildings would conform to U.S. Green Building Council Leadership in Energy and Environmental Design (i.e., LEED) rating standards for environmentally sustainable new construction; HST facilities, including HST stations and any HMFs, would be certified at the Silver Level. Achieving the Authority's policy goal of using up to 100% renewable energy sources for the HST System would result in a total estimated reduction in fossil fuel energy resources for the HST System of up to 12.7 million barrels of oil annually by 2030 (Authority 2008). Due to the net benefit of the HST on the overall energy demand (even if the 100% renewable policy is not fully successful), operational energy consumption impacts would be less than significant under CEQA.

The project would increase electricity demand. Because of the anticipated times of peak rail travel, impacts on electricity generation and transmission facilities would be particularly focused on peak electricity demand periods (4 p.m. to 6 p.m.). According to the Statewide Program EIR/EIS (Authority and FRA 2005), the HST would increase peak electricity demand on the state's generation and transmission infrastructure by an estimated 480 MW in 2020. This peak demand would be evenly spread throughout the system, so the Merced to Fresno Section would require approximately 50 MW of additional peak capacity.

Summer 2010 electricity reserves were estimated to be between 27,708 MW for 1-in-2 summer temperatures and 18,472 MW for 1-in-10 summer temperatures (CEC 2010b). The projected peak demand of the HST is not anticipated to exceed these existing reserve amounts. Although it is not possible to predict supplies in 2035, 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 project's impact on peak electricity demand would be less than significant.

3.6.6 Project Design Features

Statewide Program EIR/EIS mitigation strategies have been refined and adapted for this project-level EIR/EIS. The project design incorporates precautions to avoid existing utilities and design elements that minimize electricity consumption (e.g., using regenerative breaking, and energy-saving equipment and facilities), and the project would not overburden utility services.

3.6.7 Mitigation Measures

To mitigate for potential impacts, the following mitigation measures could be implemented:

PUE-MM#1: **Redesign to avoid substation.** Roadway modifications associated with the BNSF Alternative and the Hybrid Alternative would affect a substation. The final project design would avoid these conflicts through refinements of project features.

PUE-MM#2: Move existing substation. If the Ave 21 Wye requires relocation of a substation, the existing substation would be moved to one of two potential locations, as shown in Figure 3.6-7. Each location would affect important farmland and farmland under Williamson Act contracts. Location 2 would affect the historic Robertson Boulevard Palm Trees. Mitigation for these effects is described in Section 3.14. Agricultural Lands, and Section 3.17, Cultural and Paleontological Resources.

3.6.8 NEPA Impacts Summary

The No Project Alternative represents changes in local conditions that would occur over time without implementation of the project, including an increasing demand for utility services and energy supply as a result of population growth.

Project construction could result in scheduled service interruptions. With advance notices, utility customers would experience negligible effects.

Project construction would require water. Because various existing sources would provide adequate water supply during construction and because of the overall decrease in demand, the effect is negligible.

Construction of the project would require removal of existing facilities, including roads and buildings. These activities would generate demolition waste, including hazardous waste (e.g., asbestos-containing materials). Because regional solid waste and hazardous waste landfills have adequate capacity, the effect would be negligible.

Construction-related energy use has been estimated at a maximum of 3,270,388 MMBtu. Although this energy use would be mitigated for in less than 1 year by the projected energy savings for regional use of the HST rather than other forms of travel, this impact would be a moderate impact under NEPA.

The project would conflict with existing underground and aboveground utilities. The project would protect linear utilities while maintaining access by moving or encasing them, resulting in a negligible effect. Upgrades of existing power lines and substations would result in a negligible effect. Impacts on existing substations would be substantial. The effects on one of the substations would be avoided by redesigning portions of the HST alignment alternatives; the other would require moving the existing substation to a new, nearby location (see Figure 3.6-7). With implementation of these mitigation measures, the impacts on the existing substations would be negligible.

Operation of the HST stations and HMF would increase the demand for water supply, wastewater treatment, and waste disposal. Impacts would be negligible because all utility service providers have sufficient capacity and groundwater drawdown effects would be negligible.

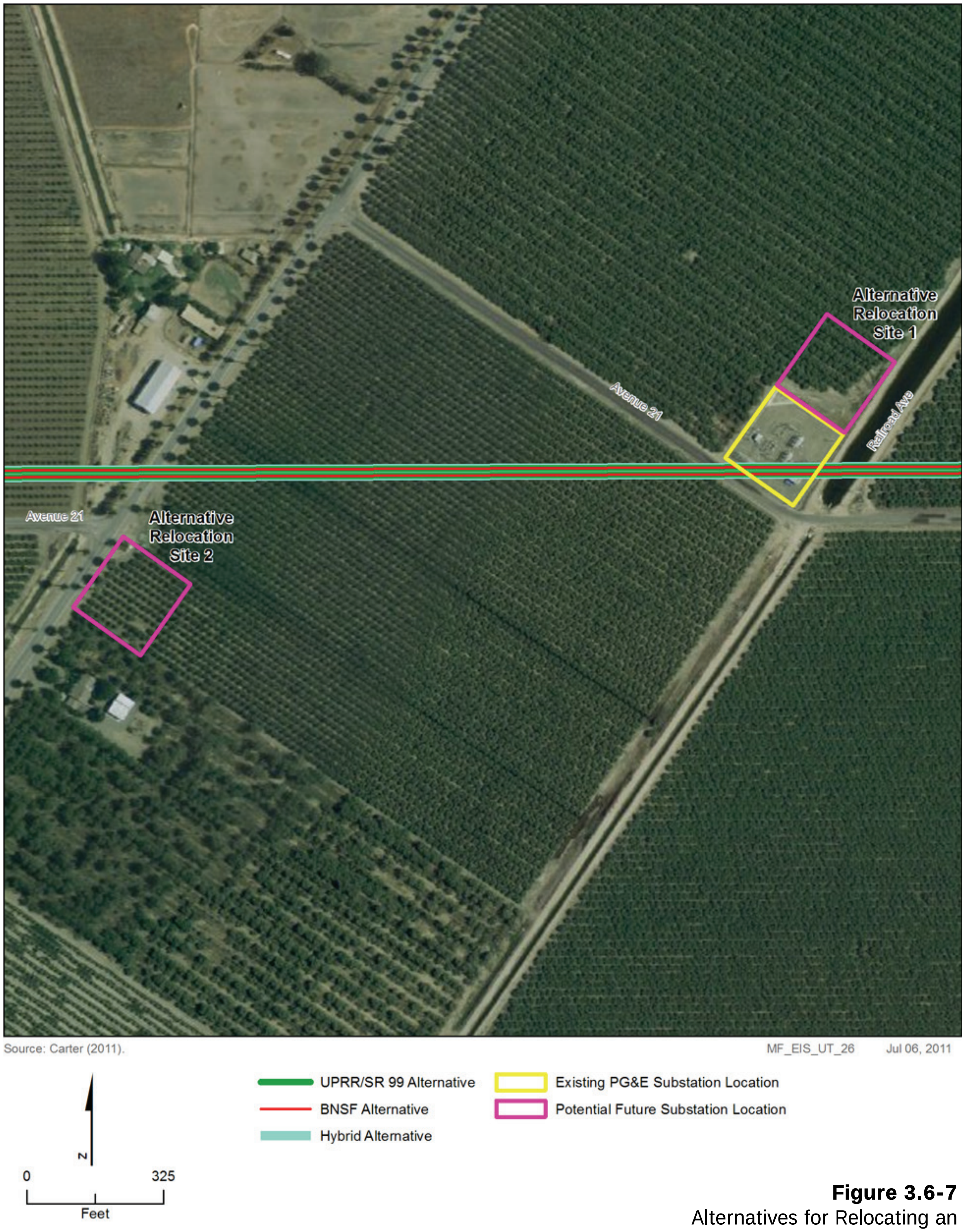


Figure 3.6-7
Alternatives for Relocating an Existing Substation Affected by the Ave 21 Wye

Operation of the HST System would increase the demand for electricity and reduce the overall demand for energy as a result of the decreased number of road vehicle and airplane trips. Operation of the Merced to Fresno Section of the HST System would contribute approximately 10% to the increase in demand for electricity, while resulting in an overall reduction of energy consumption in California.

3.6.9 CEQA Significance Conclusions

Table 3.6-26 provides a summary of impacts, associated mitigation measures, and the level of significance after mitigation.

Table 3.6-26
Summary of Potentially Significant Utility Impacts and Mitigation Measures

Impact	Level of Significance before Mitigation	Mitigation Measure	Level of Significance after Mitigation
Construction Period Impacts			
None			
Project Impacts			
PUE#1. Conflicts with Existing Substations The BNSF and Hybrid alternatives and the Ave 21 Wye could conflict with existing substations.	Significant	**PUE-MM#1:** Redesign project features to avoid substation; **PUE-MM#2:** Move existing substation.	Less than significant